Author's response to reviews

Title: Institutional and Professional Homophily in the Formation of Interphysician networks: A Comparative Analysis

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Author's response to reviews: see over
Dear Editor,

We would like to thank the reviewers for their very helpful comments. We have studied the comments carefully taking into consideration all changes recommended. According to your suggestion, we responded to comments point by point indicating where changes have been made. All our replies are indicated in *red italics*. We also inform you that a native English speaker has inspected and corrected our article where appropriate. We believe that the result of the revision is a much improved manuscript, and hope that you and the reviewers share our enthusiasm for the revised paper. We look forward to hearing from you in due course.

Yours sincerely,

Daniele Mascia
On the behalf of all the Authors

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Reviewer 1: Laurent Boyer

This is an interesting work on the relationships between professionals. This approach is particularly relevant for health care organization, providing useful information. The article is well written and the analyses sound good.

***We are delighted that the reviewer liked our paper. We respond to specific comments below.

I have some comments (Minor Essential or discretionary).

1.1 - First, the aim (in the abstract) is better than the one in the introduction. It is the same idea, but the first one is better. "The aim of the present paper is to explore and compare the impact of institutional and professional homophily on the formation of inter-physician professional networks" (abstract). "Given this theoretical background, in this paper we assume that the social environment in which physicians interact is a relevant issue affecting homophilous ties. More formally, the aim of this study is to investigate the antecedents of inter-physician professional networks within healthcare organizations. Specifically, we conduct a comparative investigation of the relevance of professional and institutional homophily in the creation of relationships among physicians in the Italian National Health Service (I-NHS)" (introduction).

*** Thanks for this suggestion. We modified the paper accordingly.

1.2 - Second, give the questionnaire used in appendix.

*** The questionnaire in its current form is in Italian. We believe that including an Italian questionnaire in the paper would not be useful for readers. We did not use an English questionnaires in our research in light of the problems that clinicians -as the rest of the population in Italy- might find in understanding and responding properly to all questions. However, we decided to include the following note for interested readers: “The questionnaire is available from the Authors upon request” (pg 6).

1.3 - Third, please discuss the R2 in the MR-QAP: is it low or high, and if low, what explanation, what other factors can be studied....? This is important to discuss because one interest of these results is to act on the relationships of professionals in the futures.

*** As suggested, in the revised paper we included a couple of sentences aimed at discussing the level of the R2 found in our results, especially in light of other factors that future studies are called to explore. The following sentence was included in the new version of our manuscript (pg. 11, lines 11-15): “Finally, the coefficients of determination for both models were moderate in degree. This finding clearly indicated that other factors not included in the present study can also explain interphysician collaborative network ties. Prior relationships, friendship ties, and the joint involvement of clinicians in ad hoc organizational task forces or teams are relevant examples of other predictors that future studies should explore”.

1.4 - Fourth, do the author have more information on non-respondants (is there differences between their characteristics and those of the respondants?).

*** Thank you for this comment. A similar concern was pointed out by another reviewer (Referee 3). Network information for non-respondents are not at our disposal, unfortunately. However
our response rate is well above the threshold (higher than the 60% of the population) routinely used to assess the accuracy and validity of network analysis studies. Some other information, such as clinicians’ age, tenure in the NHS and formal belonging to clinical directorates, were available. No systematic differences were seen for these characteristics between physicians responding and those not-responding to the survey.
Reviewer 2: Frances Cunningham

Thank you for your comments. Below we provide details about how we corrected the manuscript according to your suggestions. Please consider that a native English speaker has proof-edited the entire manuscript so that some of your editorial revisions – in light of edited changes – were no longer applicable. We reported the following sentence to highlight such cases: “A native English speaker has corrected this part”.

Major Compulsory Revisions

2.1 - On page 6, third line could the authors clarify if the ‘one summary network’ was for both types of ties?

***We have made clear in the paper that the summary network includes both types of ties.

2.2 - On p. 6, line 14, delete ‘any’ and insert ‘no’ (I assume this is what the authors intended to convey?)

***Done.

2.3 - On p. 7, in line 18, after ‘similarity in age’, insert ‘between associates’.

***Done.

2.4 - P.12, line 1, after ‘compliance’, it would be good for the authors to refer here to their high response rate by way of example.

***Done. We recalled in the text the high response rate we obtained with our survey.

2.5 - P.12, line 31, could the authors provide an example after ‘resources’ and explain this a little more for the reader?

***As requested, we provided an example in order to facilitate the reader in understanding how managerial strategies aimed at increasing the networking activities among physicians should be performed.

Minor Essential Revisions

It is recommended that the authors amend the text as changes are essential to the English expression to facilitate the readability of the manuscript. Acknowledging that the BMC HSR journal editor may make final editorial changes, I have suggested a number of changes to clarify expression, particularly technical expression, in the text – as these suggested amendments will also help the reader in following the methodological description of the social network analyses techniques and other discussion in the document. Suggested amendments are as follows:

***We thank the reviewer for his valuable suggestions, all of which were received in the paper. In addition, the paper has been inspected by a native English speaker before resubmission.
2.6 - In the Abstract under 'Results', second line: delete ‘attending’ and insert ‘having a’. In the third line, insert ‘are’ after ‘structure’; after 'likely', insert 'to'.

***Done. A native English speaker has corrected this part.***

2.7 - P.3, under ‘Background’, para 2, 4th line, insert ‘and’ before ‘prescribing’. Next line, delete ‘s’ from ‘Networks’.

***Done.***

2.8 - P.3, third paragraph: delete: 'Several studies started documenting' and insert 'Earlier research has shown.'

***Done. A native English speaker has corrected this part.***

2.9 - P.3, fourth para, 8th line, delete the apostrophe after ‘world’.

***Done.***

2.10 - P.3, second last line, at the beginning of the second sentence, delete ‘The’ and capitalise ‘B’ in ‘Belonging’.

***Done.***

2.11 - P.4, 6th line, delete ‘origin’ and replace with ‘instigate’. Next sentence, insert ‘the’ after ‘In’.

***Done.***

2.12 - P.4, 3rd last line in first para, insert ‘an’ before ‘institutional’.

***Done.***

2.13 - P.4, 2nd para, 6th line, delete ‘to be’ and insert ‘being'; delete ‘achieve' insert ‘achieving’.

***Done.***

2.14 - P.4, 3rd para, 4th line, delete ‘conduct’, insert ‘conducted’. 8th line down, insert ‘a’ before ‘similar’. In the next line, insert ‘a’ before ‘role’.

***Done.***

2.15 - P.5, second line, delete ‘to create’, and insert ‘creating’.

***Done. A native English speaker has corrected this part.***

2.16 - P.5, para 2, line 7, delete ‘to establish’, insert ‘of establishing’. At the end of line 7, insert ‘the’ before ‘field’. In line 8, insert ‘a’ before ‘similar’, delete ‘in creating’, and insert ‘to create’.
2.17 - P.5, under Methods, line 14, delete ‘the’ before ‘Bologna’. In line 21, delete ‘the’ before ‘Bologna’.

***Done.

2.18 - P.5, Line 26, insert ‘a’ before ‘previous’.

***Done. A native English speaker has corrected this part.

2.19 - P.5, line 30, delete ‘collected’, insert ‘collect’.

***Done.

2.20 - P.6, line 5, after ‘strong’, delete ‘of’.

***Done. A native English speaker has corrected this part.

2.21 - P.7, line 1, insert ‘a’ before ‘positive’ and delete ‘that’ before ‘larger’.

***Done. A native English speaker has corrected this part.

2.22 - P.7, line 28, delete ‘the belonging LHA of each professional’ and insert ‘the LHA that each professional belonged to’. In line 30, delete ‘explaining if’, and insert ‘in terms of whether’.

***Done. A native English speaker has corrected this part.

2.23 - P.8, line 9, insert ‘a’ before ‘role’.

***Done. A native English speaker has corrected this part.

2.24 - P.8, line 19, delete ‘Procedures’, and insert ‘Procedure’.

***Done. A native English speaker has corrected this part.

2.25 - P.8, line 28, delete ‘was made’ and insert ‘consisted’. After all, insert ‘the’. P.9, line 14, delete ‘Instead’, and insert ‘On the other hand’.

***Done. A native English speaker has corrected this part.

2.26 - P.9, line 21, delete ‘then’, and insert ‘on’.

***Done. A native English speaker has corrected this part.

2.27 - P.9, line 23, insert ‘correlation’ before ‘between’.

***Done.
2.28 - P.9, line 25, insert ‘a’ before ‘level’.

***Done. A native English speaker has corrected this part.

2.29 - P.10, line 8, delete ‘afford’ and insert ‘allow’.

***Done. A native English speaker has corrected this part.

2.30 - P.10, line 22, delete ‘although important, this result surely deserves’, and insert ‘this is an important finding deserving of’. Delete ‘analyses’ and insert ‘analysis’.

***Done.

2.31 - P.10, line 33, delete ‘guarantying’ and insert ‘guaranteeing’. • P.11, line 1, delete ‘to remain’, insert ‘remaining’.

***Done.

2.32 - P.11, line 16, insert ‘to which’ before ‘they’.

***Done. A native English speaker has corrected this part.


***Done.

2.34 - P.11, delete ‘they are’, and insert ‘is it that they are more likely’.

***Done.

2.35 - P.12, line 4, delete ‘time when’, insert ‘timing of adoption of’ and delete ‘are adopted’.

***Done.

2.36 - P.12, line 34, delete ‘processes restructuring’ and insert ‘restructuring of processes’.

***Done. A native English speaker has corrected this part.


***Done.
Reviewer 3: Paola Zappa

Thank you for the opportunity to review the manuscript ‘Institutional and Professional Homophily in the Formation of Inter-physician Networks: a Comparative Analysis’. The topic is surely relevant and I agree with the Authors that accounting for tendency toward homophily in studying physician networks could provide a better understanding of how ties are built and knowledge is shared. Notwithstanding, I think the manuscript needs some more work before it can be considered for publication. I have some suggestions which I hope will help the Authors to further improve the manuscript.

***We thank the reviewer for her valuable comments. We did our best to address all suggestions in the revision. Below we describe how we modified the manuscript in response to her comments.

Major Compulsory Revisions

3.1 - The literature review is interesting and the study is well situated within the body of available research. However, in the current illustration, the description of the various sources of homophily seems to me a little confusing and difficult to follow. This illustration could surely benefit from a more organic structuring of the text. For instance, the distinction between “choice homophily” and “induced homophily” is made at the very beginning and, then, lost.

***The distinction between “induced homophily” and “choice homophily” has been further developed in the discussion section, taking into account how these two perspectives could be correlated to the different homophilous mechanisms discussed in our paper. The following sentences were included in the new version of our manuscript (pg. 11, lines 29-34): “As documented, homophily can arise from the social context ("induced homophily") or from individual preference ("choice homophily") [21]. In our perspective, institutional homophily clearly correlates with the reference social context, which the management contributed to (re)shape by introducing a new organizational model. Conversely, professional homophily represents a mixed composition of the two perspectives, as the choice of the medical field is originally due to an individual choice”.

3.2 - Somehow related to this point, a more detailed explanation of the reasons why it is important to investigate professional and institutional homophily-based interaction in medical settings is needed. This is very well done in the Discussion and Conclusions sections, but elaborating more on this point also in the Background could help the readers understand why the study is relevant from the very beginning of the paper. For example, it could be useful to emphasize whether professional and institutional homophily is good or not as well as why the hospital managers need to know whether these types of homophily are operating.

***Some relevant issues argued in the Discussion and Conclusions sections have been presented also in the Background section, in order to improve this latter with the helpful comments from the reviewer. The following sentences were included in the new version of our manuscript (pg. 4, lines 23-28): “An understanding of homophilous relationships is particularly interesting in the healthcare setting, where the final aim is the integration and standardization of healthcare processes. Indeed, the organizational establishments created to achieve these goals are considered ineffective if they do not encourage interactions among professionals. Regardless of the positives and negatives of similarity, it is crucial to investigate the antecedents of these
interactions, to provide the management with an informative basis for evaluating the quality of organizational action”.

3.3 - The link to the case study in the background seems to me weak. I am unsure whether the description of the Italian NHS is placed in the right part of the paper. It could be useful to move this paragraph to the ‘research setting’ section. Alternatively, the description could be kept in the background section, but enlarged and linked more tightly to the general theory. In both the cases, the choice of analyzing the Italian NHS should be better motivated. A non-Italian reader may also wonder how ‘clinical directorates’ are defined. The definition provided does not fully clarify how they are structured and whether they consist of various specialties or not. This is a crucial point, because it could strongly impact on the interpretation of results.

*** We believe that the referee’s suggestion to keep the setting in the background section, enlarging its discussion and link to the general theory is the most appropriate. In the revised paper, as suggested, we emphasize the link between the new organizational model and the general theory, discussing much more in details the clinical directorate model. The following paragraph has been included in the new manuscript (pg. 4, lines 7-22): “Many Western healthcare systems (e.g., U.K., Italy, Australia, France) have implemented healthcare reforms aimed at the adoption of new organizational models that focus on fostering patient-centered care and a team-based approach in the development of clinical activities [31,32]. These newly adopted models, called “clinical directorates” or “departments,” are defined by groups of clinical specialties that are integrated with the specific purpose of changing the routine behaviors of professionals within hospitals. For example, clinical directorates were introduced to the Italian National Health System (I-NHS) as an institutional reference model for healthcare organizations, with the aim of reorienting activities towards healthcare processes by divisional units [33] in charge of making strategic and organizational decisions [34,35]. These intermediate organizational establishments manage certain services of large hospitals and resemble the divisions that are typically adopted in large private multinational corporations [31,32]. The directorate size, degree of departmental autonomy, and criteria used for integrating hospital clinical wards may vary considerably across health systems [32]. Hospital executives are often free to decide how to implement the new model in hospitals by selecting which specific clinical wards and medical specialties will be integrated into single departments. The variety of merged clinical specialties heavily influences the ability of clinical directorates to influence the behaviors of physicians, including their propensity to build collaborative relationships”.

3.4 - Also, Table 1 reveals that "age", "years since graduation" and "tenure" correlate very strongly with one another. I would recommend the Authors to think about an analytic strategy that allows ruling out the potential effects of multicollinearity among predictors.

*** We fully understand this referee’s concern. We reran both models by including only the variables of our theoretical interests. We do not intend to overwhelm referees with too many tables. Our findings are qualitatively similar to those reported in the manuscript. This leaves us confident that our analyses are not affected by multicollinearity.

3.5 - The Authors regress the set of independent variables on both the valued and the binary adjacency matrices, but do not justify their choice (why is it important to assess the effect of homophily on the strength of ties?), nor do they draw any conclusions - apart from few descriptive comments - on the similarity/difference of results between the two models.
**Justification** for having regressed both the two matrices have been provided in the Variables paragraph and a description of similarity/difference between the two models have been provided in the Variables section. The following sentences were included in the new version of our manuscript (pg. 7, lines 19-22): “Two different aspects of the interpersonal collaborative network were included in our model. First, we considered the simple presence of a collaboration. Second, because the presence of a collaboration is not sufficient to provide an extensive description of collaborative ties, we used a measure of relational “strength,” considering the frequency of collaboration among physicians”.

**Minor Essential Revisions:**

3.6 - The Authors use ‘common interest’ as a characteristic of both institutional and professional homophily. This seems to me a little confusing, because it could create potential – and misleading - overlaps between the two types of homophily.

***We reformulated the text, in order to avoid confusion and misunderstanding according to the reviewer’s suggestion. The text was modified in the new version of our manuscript as follows (pg. 5, lines 15-16): “On the other side, an individual’s professional background could influence interconnections among individuals. In particular, similar perspective and social capital could act as predictors of networks”.

3.7 - In describing the research setting, the Authors mention that the data were collected on the Bologna’s LHA. Why was this LHA chosen? And why does it make sense to set the boundaries at the LHA level?

***Thank you for this valuable comment and request of clarification. The adoption of the clinical directorate model in the Italian NHS is heterogeneous. A recent paper has clearly documented such heterogeneity, which concerns both “when” directorates are adopted and “how” they are adopted across the Italian NHS (Mascia, Morandi and Cicchetti, 2014). One of the author of the present paper was also directly involved in the data collection at the national level. He observed the distinct characteristics of clinical directorates adopted in the LHA of Bologna with respect to those adopted in other health care organizations across the country. The LHA of Bologna, other than for its dimension, is relevant because it was one of the pioneers in the introduction of the model and in light of the specific characteristics of clinical wards that were merged together into directorates. The management of this LHA decided to foster interdisciplinary by aggregating different specialties and clinical wards while building the new directorates. The LHA of Bologna was ideal to explore our research question because of the interdisciplinary nature of directorates, as well as the long time that elapsed since when the departments were adopted. Indeed organizational change needs time to be implemented properly and to obtain behavioral change, especially in health care. We believe that for this LHA the time elapsed since the adoption of the new model was enough to conduct our comparative analysis. In addition, we highlight that in light of their autonomy, accountability and responsibility on health care budgets, single organizations (such as LHAs or Hospital trusts) are appropriate units of analysis to explore institutional homophily. Either a larger (e.g. the region) or narrow (clinical wards) focus would probably frustrate the intention of researchers to explore actual changes implemented in the organization and behavior of healthcare professionals.

In the revised manuscript we summarizes such motivations in a couple of sentences (pg. 5, line 32). “In this LHA, moderately heterogeneous clinical wards and medical specialties are merged
into clinical directorates. Moreover, the time elapsed since the new model was formally adopted is satisfactory to ascertain whether behavioral changes, such as new patterns of collaboration between clinicians, are at play”.

3.8 - In the Estimation Technique session, it could be useful to explain a little more about QAP. A reader who is not expert in social network analysis and in related data structure concerns might wonder why the Authors did not simply specify a standard binary or ordinal logistic regression model – using maximum likelihood estimation - for tie variables. This is done in the second paragraph, but the paper does not mention explicitly the interdependence between observations - which is the main point -, nor does it explain how QAP works.

*** Thank you for this suggestion. The following sentence, which explicitly refers to the lack of independence between observations, has been included in the revised manuscript (pg. 9, lines 6-9): “The MR-QAP procedure was used to ensure that the reported nonparametric estimates would be as robust as possible with respect to our methodological choices, and to ensure the lack of independence of dyadic observations”.

3.9 - In introducing the results, the Authors mention that the response rate was 90%. Was there any bias ignoring the 10% non-respondents?

*** Another reviewer pointed out a similar concern (Referee 1). As stated above, network information for non-respondents are not at our disposal, unfortunately. However our response rate is well above the threshold (higher than the 60% of the population) routinely used to assess the accuracy and reliability of network analysis studies. Some other information, such as clinicians’ age, tenure in the NHS and formal belonging to clinical directorates, were available. No systematic differences were seen for these characteristics between physicians responding and those not-responding to the survey.

3.10 - The labels of some variables are different in the text (i.e., Exploratory Variables) and in the tables (Table 1 and Table 2).

***We double checked the name of the variables, which have been relabeled uniformly throughout the text and the tables.

3.11 - It could be useful to check the English carefully. In a few cases there seem to be some typos (e.g., Results, second paragraph) or missing words (e.g., Abstract).

***The paper has been inspected corrected by a native English speaker.

Discretionary Revisions

3.12 - In the background, some terms are introduced, but not precisely defined – e.g., social proximity. Although they are fairly intuitive, I think it could be useful to provide a (even informal) detailed definition.

***We provided ‘social proximity’ term with a proper definition. The following sentences were included in the new version of our manuscript (pg. 4, lines 28-30): “Organizational and social proximity, defined as the closeness among individuals within a certain context or network, make physicians more likely to link closely”.


Literature cited in this review