Knowledge exchange in the UK CLAHRCs:

The enabling role of academics and clinicians' social position

Structured abstract

Purpose

The goal of this study is to examine how knowledge exchange between academics and clinicians in CLAHRCs is influenced by their social position based on their symbolic and social capitals,—that is, their personal professional status and connections to high-status professional peers, knowledge brokers, and unfamiliar professional peers.

Design/methodology/approach

Using an online survey, we triangulate the cross-sectional measurement of the effects of academic and clinicians' social position in the initial and later phases of CLAHRCs with the longitudinal measurement of these effects over a two-year period.

Findings

First, academics and clinicians with a higher personal professional status are more likely to develop joint networks and decision-making both in the early and later phases of a CLAHRC. Second, academics and clinicians who are more connected to higher-status occupational peers are more likely to develop joint networks in the early phase of a knowledge exchange partnership but are less likely to become engaged in joint networks over time. Third, involvement of knowledge brokers in the networks of academics and clinicians is likely to facilitate their inter-professional networking only in the later partnership phase.

Practical implications

Academics and clinicians' capitals have a distinctive influence on knowledge exchange in the early and later phases of CLAHRCs and on a change in knowledge exchange over a two-year period.

Originality/value

Prior research on CLAHRCs has examined how knowledge exchange between academics and clinicians can be encouraged by the creation of shared governance mechanisms. We advance this research by highlighting the role of their social position in facilitating knowledge exchange.

Key words: knowledge exchange; CLAHRCs; knowledge transfer partnerships; social position; symbolic and social capitals.

Classification of article: Research paper

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Background

Over the past decade, policy makers around the world have increasingly sought to facilitate the uptake of healthcare research into clinical delivery by incentivizing knowledge exchange between academic and clinical professionals (Lomas, 2000; Greenhalgh et al., 2004; Mitton et al., 2007; Pentland et al., 2011). In the United Kingdom, a number of government reports have highlighted the problematic persistence of a significant time lag between the appropriation of knowledge generated by healthcare research into clinical practice (Cooksey, 2006; Tooke, 2007). In response, the Department of Health funded the establishment of innovative knowledge exchange partnerships between academic and clinical organizations called Collaborations for Leadership in Applied Health Research and Care (CLAHRCs). These partnerships encouraged the engagement of academics and clinicians in knowledge exchange during the development of joint research on issues relevant to clinical delivery (Oborn, Barrett & Racko, 2013; Evans & Scarbrough, 2014) and established governance and information exchange mechanisms to facilitate this engagement (Harvey et al., 2011; Kislov, Harvey & Walshe, 2011; Rowley et al., 2012; Smith & Ward, 2015).

Prior research on CLAHRCS has identified factors that facilitate knowledge exchange between academic and clinical professionals, focusing mostly on the enabling role of shared governance mechanisms. Studies demonstrate how inter-professional knowledge exchange can be encouraged by creating governance mechanisms that balance the exploration of knowledge associated with the generation of new healthcare research with the exploitation of knowledge associated with the implementation of research findings in clinical delivery (Oborn, Barrett, Prince & Racko, 2013). Knowledge exchange between academics and clinicians can be enabled by leadership mechanisms that address the strategic priorities of

stakeholder organizations (Fitzgerald & Harvey, 2015; D'Andreta, Scarbrough & Evans, 2013) and promote a symmetrical power relationship between these organizations (Evans & Scarbrough, 2014). Inter-professional knowledge exchange can be also facilitated by including joint research evaluations in the implementation strategy (Harvey et al., 2011) and promoting collaborative decision-making in project management meetings (Smith & Ward, 2015).

While prior studies have underscored the enabling role of governance mechanisms in knowledge exchange, relatively little is known about how knowledge exchange between academic and clinical professionals in CLAHRCs can be influenced by their social position. In this study, we draw on theoretical conceptualizations of the enabling role of individuals' social position in innovation (Batillana, 2006; Sauder, Lynn & Podolny, 2012) and the literature reviews of the antecedents of knowledge exchange in the healthcare field (Greenhalgh et al., 2004; Mitton et al., 2007; Pentland et al., 2011) to suggest that academics and clinicians who occupy a privileged social position, in terms of the ownership of the relevant forms of capital, are more likely to engage in knowledge exchange.

Drawing on theoretical conceptualizations of the enabling role of individuals' social position (Batillana, 2006; Bourdieu, 2002; Sauder et al., 2012), we predict that the engagement of academics and clinicians in knowledge exchange, as a non-conventional form of knowledge mobilization in academic and clinical professions, is likely to be shaped by their social position based on their ownership of symbolic and social capitals. Symbolic capital is defined in terms of the prestige and reputation derived from a privileged social status (Bourdieu, 2002). Academics and clinicians with high status are perceived as having better reputations and being more trustworthy partners in knowledge exchange (Link, Siegel, & Bozeman, 2007; Haeussler & Colyvas, 2011; Currie, Lockett & Enany, 2013). Social

capital is defined in terms of the social connections that the individual can mobilize (Bourdieu, 2002), which consists of academic and clinical experts' professional connections (Maguire, Hardy & Lawrence, 2004; Stuart & Ding, 2005; Tasselli, 2015). The social position of professionals, based on their ownership of symbolic and social capitals, is likely to influence their worldviews of the importance of non-conventional knowledge mobilization and strategies that can be used to pursue it (Batillana, 2006; Sauder et al., 2012). High-status professionals can leverage their superior reputation and legitimacy to pursue non-conventional forms of knowledge mobilization with little risk to their occupational legitimacy. They tend to have privileged access to strategic information about the internal and external environment of organizations in which they are employed that can be used to identify and develop new forms of knowledge mobilization. Academics and clinicians with high social capital are likely to be connected to professionals who can facilitate their engagement in non-conventional forms of knowledge mobilization (Batillana, 2006; Bourdieu, 2002).

In this paper, we focus on four specific forms of symbolic and social capital that as revealed in literature reviews regarding healthcare knowledge exchange (Greenhalgh et al., 2004; Mitton et al., 2007; Pentland et al., 2011) are likely to influence the exchange of knowledge between academics and clinicians. In terms of symbolic capital, we predict that (1) academics and clinicians of higher professional status are more likely to engage in knowledge exchange. In terms of social capital, we predict that academics and clinicians are more likely to engage in knowledge exchange when they are connected to (2) higher-status professional peers, (3) knowledge brokers, and (4) professional peers with whom they have not worked previously. Below, we outline the theoretical rationale for our hypotheses.

Personal professional status

We predict that academics and clinicians of higher status are more likely to engage in knowledge exchange (Lomas, 2000; Mitton et al., 2007). Higher-status professionals can take advantage of their superior reputation and legitimacy to develop non-conventional forms of knowledge mobilization (Batillana, 2006; Sauder et al., 2012) and to act as initiators and early adopters of innovations (Rogers, 2003). For these professionals, non-conformity with established occupational norms may serve to heighten their esteem and reputation (Berkowitz & Macaulay, 1961). Since these professionals are more secure in their roles, they can afford to engage in non-conventional knowledge mobilization with little risk of loss of their occupational legitimacy (Haeussler & Colyvas, 2011; Currie, Lockett & Enany, 2013). High-status academics may be more likely to engage in non-conventional knowledge mobilization because they have privileged access to occupational knowledge and connections (Casper and Murray, 2005) and are likely to experience diminishing reputational and financial returns from their further progression in the academic status hierarchy (Zuckerman & Merton, 1972).

Because high status professionals are perceived by representatives of other professions to be more trustworthy and resourceful, they are likely to have more opportunities to use this perception to their advantage in developing non-conventional forms of knowledge mobilization (Sauder et al., 2012; Tasselli, 2015). Practitioner professionals may perceive high-status academics' privileged access to resources as a pre-requisite for their engagement in knowledge exchange (D'Este & Patel, 2007). Therefore, we propose the following hypothesis:

Hypothesis 1. Academics and clinicians of higher professional status are more likely to engage in knowledge exchange.

Connections to higher status professionals

We predict that academics and clinicians who are connected to higher-status occupational peers are more likely to engage in knowledge exchange. A fundamental assumption of the social position literature is that an individual's position in a social hierarchy cannot be defined by the individual, but is relationally derived based on recognition by other individuals (Sauder et al., 2012; Batillana, 2006). Individuals' connections to high-status actors serve as observable characteristics of their reputation and outside recognition (Gould, 2002; Podolny, 1994). We thus expect that academics and clinicians who are members of intra-professional networks consisting of higher-status occupational peers are likely to exhibit higher legitimacy and trustworthiness in their interactions with members of other professions because these connections are likely to signal their superior occupational reputation and credibility (Sauder et al., 2012; Tasselli, 2015).

Connections to higher-status occupational peers are likely to provide academics and clinicians with information necessary for inter-professional knowledge generation and exchange (Maguire, Hardy & Lawrence, 2004). Academics that are connected to occupational peers with high network centrality in the commercial sector are more likely to pursue non-conventional research (Stuart & Ding, 2005). Networking with high-status occupational peers is likely to provide academics and clinicians with access to professionals who have the authority and competence to mediate cognitive barriers between professions (Casper & Murray, 2005; Burgess & Currie, 2013) and who serve as linkage agents for the identification and mobilization of participants in a knowledge exchange (Filieri & Alguezaui 2014). Even low-status professionals can participate in non-conventional knowledge

generation if they can form connections with high-status professional peers (Battilana, 2006). Therefore, we hypothesize:

Hypothesis 2. Academics and clinicians who are connected to higher-status professionals are more likely to engage in knowledge exchange.

Connections to knowledge brokers

We predict that academic and clinical professionals whose professional networks include more knowledge brokers are more likely to engage in knowledge exchange (Ward et al., 2009; Harvey et al., 2002). Knowledge brokers facilitate knowledge sharing between distinct professional groups that would otherwise be weakly connected (Hargadon & Sutton, 1997; Burt, 1992). As individuals embedded between distinct domains of professional practice, knowledge brokers are well placed to perceive, absorb and exploit knowledge that is useful for inter-professional knowledge exchange (Oborn et al., 2013). Knowledge brokers can help professionals to develop the skills, abilities and confidence necessary to interact with members of other professions (Pentland et al., 2011).

Knowledge brokers tend to be aware of innovative ideas and resources that can be reconfigured into new solutions by distinct professional groups (Hargadon & Sutton, 1997; Barnsley et al., 1998; Greenhalgh et al., 2004) and can encourage knowledge exchange by facilitating the translation and interpretation of professional knowledge between these groups (Swan et al., 2007). Knowledge brokers learn and transfer non-codified professional knowledge that cannot be transferred using standardized mechanisms of information technology (Mitton et al., 2007). Inter-organizational knowledge transfer is often associated with the concentration of knowledge brokers in an organization or industry (Almeida & Phene, 2004).

Knowledge brokers can encourage knowledge exchange between academics and clinicians by facilitating their participation in inter-professional networks and by providing them with capacity-building skills that are helpful in generating collaborative knowledge (Ward, Smith, House & Hamer, 2012; Morgan et al., 2011). These individuals facilitate networking between academics and clinicians by encouraging their involvement in joint research mapping and consultation exercises as well as inter-professional learning and knowledge-sharing events (Ward et al., 2009). They inform academics about areas of clinical expertise that can be mobilized in joint research and enable academics to address the capacity-building requirements of clinicians by helping them to identify and design relevant clinical interventions (Ward et al., 2009). We thus predict that:

Hypothesis 3. Academics and clinicians who are connected to more knowledge brokers are more likely to engage in knowledge exchange.

Connections to unfamiliar professional peers

Academics and clinicians are also more likely to engage in knowledge exchange when they are connected to professional peers with whom they have not worked before. Networking of academics and clinicians with unfamiliar occupational peers can encourage their engagement in knowledge exchange by raising awareness regarding the jurisdictional contradictions between distinct professions and by encouraging the development of strategies to bridge these contradictions (Hargrave & Van de Ven, 2006). Academics who are involved in non-conventional professional and occupational networks that fall outside their main research peer group are more likely to engage in inter-professional knowledge exchange (Haeussler & Colyvas, 2011; Boardman & Corley, 2008).

A heterogeneous social network facilitates innovation by exposing individuals to diverse information (Burt, 1992) and increasing the likelihood of knowledge seeking outside a social network (Hansen et al., 2005). Academics and clinicians who have unfamiliar occupational peers in their professional networks are more likely to encounter worldviews that are responsive to inter-professional knowledge exchange (Boyko et al., 2012). They are also more likely to be open to innovative knowledge generation (Rogers, 2003; Greenhalgh et al., 2004) and to identify and develop opportunities for it to occur (Aldrich, 1999).

Academics who are connected to unfamiliar occupational peers are less likely to face the institutional pressures of established intra-professional networks (West et al., 1999) and are less likely to depend on these networks for access to knowledge, connections and funding (Hirschman, 1970). Conversely, academics who have invested their time and effort in the reproduction of established intra-professional networks can be committed to these networks and therefore can be disinclined to develop new inter-professional networks (Landry, Amara, & Rherrad, 2006). Therefore, we expect the following:

Hypothesis 4. Academics and clinicians who are more connected to unfamiliar professional peers are more likely to engage in knowledge exchange.

Methods

Procedure and sample

To test our hypotheses, we surveyed academics and clinicians in three CLAHRCs. These CLAHRCs were formed through collaboration between, on the one hand, university academics involved in pure medical research and healthcare services research and, on the other, clinical practitioners working in healthcare organizations. The three CLAHRCs that we examined in this study were based in university medical departments that were ranked

among the top 15 in the United Kingdom in the last national assessment of research quality (i.e., Research Excellence Framework 2014), two of which were ranked among the top 10. We selected these CLAHRCs to ensure that the research ranking of university medical departments does not confound the assessment of the effects of academics' professional characteristics on their engagement in knowledge exchange with clinicians.

Medical academics in these CLAHRCs collaborated with the clinicians affiliated with one or more acute hospitals, community-based health providers, and health administrative organizations. The other partnering organizations in these CLAHRCs were voluntary sector organizations, municipal authorities, and in one case, a private sector company.

The strategic priorities of these CLAHRCs were to develop innovative applied health research that addresses the capacity-building requirements of stakeholders, to streamline the transfer of academic research into health services delivery, to institutionalize the culture of collaborative knowledge generation between academics and clinicians, and to enhance research capacity in clinical partner organizations by facilitating the use of evidence-based approaches in health services delivery.

To develop a more nuanced understanding of the hypothesized effects of academics and clinicians' social position on their engagement in knowledge exchange, we triangulated the cross-sectional measurement of hypothesized effects in the initial and later phases of CLAHRCs, with the longitudinal measurement of these hypothesized effects over a two-year period. To do so, we conducted two web-based surveys using the Network Genie online platform. We administered the first survey approximately six months after the establishment of the selected CLAHRCs (Wave I) and the second two years after the first (Wave II). Surveys were emailed to the members of each CLAHRC based on a list supplied by its management. The first and second survey waves generated 66 and 70 responses for 54

and 57 percent of CLAHRC members, respectively. Longitudinal data were obtained for 42 individuals or 34 percent of partnership staff. The first and second survey wave samples included 73 and 71 percent academics, respectively. In the longitudinal sample, 69 percent were academics. Tables 1A and 1B present descriptive statistics of the study variables in the first and second survey waves.

Insert Tables 1A and 1B about here

Measures

Knowledge exchange. We used two measures to assess the engagement of academics and clinicians in knowledge exchange. We measured their engagement in (1) joint research-related networks and (2) joint decision-making regarding the objectives of their collaborative research. First, engagement of academics and clinicians in joint research-related networks in each of the three CLAHRCs was measured as the number of professionals of the opposite category in a professional network of academics and clinicians; that is, for academics, it was the number of clinicians in their professional network, while for clinicians, it was the number of academics in their professional network. Second, engagement of academics and clinicians in joint decision-making about the objectives of their collaborative research was measured as the mean score of the influence that all the network members of the opposite professional category exerted on a participant concerning the decisions about the objectives of joint research; that is, for academics it was the influence exerted by clinicians, and for clinicians it was the influence exerted by academics. We measured the engagement of academics and clinicians in joint decision-making using a

five-point Likert-type scale ranging from “no influence at all” (1) to “the highest level of influence” (5). We measured the change in the degree of their engagement in joint networks and decision-making over time as the product of the difference between criterion measure scores in Waves II and I ($X_{Change} = X_{Wave\ II} - X_{Wave\ I}$) (Hair, Black, Babin, & Anderson, 2010). The results of our preliminary data analyses indicated that participants who responded in both waves did not differ from those who had responded only in Wave I with respect to the two measures of knowledge exchange: joint networks ($F(1,63) = .02$, $p = .89$) and joint decision-making ($F(1,63) = .93$, $p = .34$).

Social position: Symbolic and social capitals. The symbolic capital of academics and clinicians was measured in the form of their personal professional status. To increase the validity of this measure, two senior academics and one junior academic of a CLAHRCs included in the study were asked to independently rank-order the professional status of academics and clinicians on a four-point ordinal scale with ascending seniority. Subsequently, these academics discussed the proposed status categories and established an agreement concerning their rank-ordering. The final measure was also validated by two clinicians from the same CLAHRC. This measure comprised the following rankings. The highest rank of four was given to academics and clinicians in the most senior positions of their professional status hierarchies (e.g., senior professors, directors of the knowledge exchange partnerships, principal research theme leaders, directors of clinical service provider organizations, etc.). The rank of three was given to professionals with relatively senior roles, including research theme co-leaders, readers and senior lecturers, as well as senior practitioners below the level of director. The rank of two was given to lecturers, research

associates, and healthcare practitioners. Finally, the rank of one was given to the lowest-status actors, such as research assistants, PhD students, and junior nurses.

We assessed the three forms of social capital of academics and clinicians using the following measures. First, we measured *connections to higher status professionals* as a mean score of the status of all occupational peers involved in the professional network. We assessed the status of the network members using the same four-point ordinal scale we used to measure personal professional status. Second, we measured *connections to knowledge brokers* in terms of the number of knowledge brokers in a professional network of academics and clinicians. Variously identified as "knowledge transfer associates," "improvement managers," and "diffusion fellows," these knowledge brokers were representatives of clinical service provider organizations, including, for example, non-clinical management professionals, general practitioners, and hospital clinicians (e.g., physiotherapist or doctor). Third, we measured *connections to unfamiliar professional peers* as the number of occupational peers in a professional network of academics and clinicians with whom they had not worked prior to their involvement in the CLAHRC.

Controls. We used the following control variables. The size of an intra-professional network was measured in terms of the number of professional connections in the same occupational category in a network (i.e. for academics it was the number of academics in their network, and for clinicians it was the number of clinicians in their network). We also controlled for participants' professional background ("academic" = 1 and "clinical practitioner" = 0); gender ("female" = 1 and "male" = 0); education ("PhD" = 1 and "below PhD" = 0); and organizational status measured as the status of a university medical department involved in a CLAHRC based on its position in the national research rankings (i.e., Research Excellence

Framework 2014). Based on the national research rankings, CLAHRCs 1 and 2 were coded as "higher status" and given a value of 1, and CLAHRC 3 was coded as "lower status" and given a value of 0. We also included a dummy variable for CLAHRC 1 to control for the variation between CLAHRCs 1 and 2.

Results

Tables 2A, 2B, and 2C present the correlations of study variables for the cross-sectional and longitudinal data.

Insert Tables 2A, 2B and 2C about here

We examined the hypothesized effects of the predictors of academics and clinicians' social position on their engagement in knowledge exchange, in the form of their engagement in joint research-related networks and decision-making, using the cross-sectional analyses of the first and second survey wave data and the longitudinal analyses of change in their engagement over a two-year period of time. The results of OLS regressions for the cross-sectional and longitudinal data analyses are presented in Tables 3 and 4, respectively. While, overall, the regression models explained a considerable proportion of the variance in the criterion measures, they explained noticeably more variance in the engagement of academics and clinicians in joint networks (60 to 80 percent) than in joint decision-making (43 to 54 percent).

Insert Tables 3 and 4 about here

Hypothesis 1 predicted that academics and clinicians of a higher status will be more likely to engage in knowledge exchange. The results of data analyses indicated that the personal professional status of academics and clinicians had significant and positive effects on their engagement in joint networks in the survey wave I ($\beta = .16$, $p < .1$) and wave II ($\beta = .21$, $p < .05$), as well as change in their engagement in joint networks over time ($\beta = .35$, $p < .05$). Personal professional status also had significant and positive effects on joint decision-making in the wave I ($\beta = .34$, $p < .05$) and wave II ($\beta = .32$, $p < .01$) but not on change in decision-making over time ($p > .1$).

Hypothesis 2 predicted that academics and clinicians who are connected to higher-status professional peers will be more likely to engage in knowledge exchange. There was a significant and positive effect of the predictor on the engagement of academics and clinicians in joint networks in the wave I ($\beta = .20$, $p < .05$) but not in wave II ($p > .1$). However, the predictor had a significant and negative effect on change in the engagement of academics and clinicians in joint networks over time ($\beta = -.46$, $p < .05$). There was also a significant and negative effect of the predictor on joint decision-making in the wave II ($\beta = -.22$, $p < .1$) but not in wave I ($p > .1$). The results of longitudinal data analyses indicated that the predictor had no effect on change in joint decision-making over time ($p > .1$).

Hypothesis 3 predicted that academics and clinicians who are connected to more knowledge brokers will be more likely to engage in knowledge exchange. The predictor had a significant and positive effect on the engagement of academics and clinicians in joint networks in wave II ($\beta = .63$, $p < .01$) but not in wave I or over time ($p > .1$). The predictor also had a significant and positive effect on change in the engagement of academics and clinicians in joint decision-making over time ($\beta = .54$, $p < .05$) but not in waves I and II ($p > .1$).

Hypothesis 4 predicted that academics and clinicians who are connected to unfamiliar occupational peers will be more likely to engage in knowledge exchange. The predictor had significant positive effects on the engagement of academics and clinicians in joint networks ($\beta = .63$, $p < .01$) and decision-making ($\beta = .26$, $p < .1$) in wave I but not in wave II ($p > .1$). The results of longitudinal data analyses indicated that the predictor had a significant negative effect on change in the engagement of academics and clinicians in joint networks over time ($\beta = -.39$, $p < .05$).

Discussion

Policy makers in the United Kingdom funded the establishment of CLAHRCs to facilitate knowledge exchange between academics and clinicians. While previous studies of CLAHRCs have highlighted the role of governance mechanisms in inter-professional knowledge exchange (Harvey et al., 2011; Oborn et al., 2013; D'Andreta et al., 2013; Evans & Scarbrough, 2014; Fitzgerald & Harvey, 2015; Smith & Ward, 2015), this study demonstrates how knowledge exchange between academics and clinicians can be influenced by their social position based on the ownership of symbolic and social capitals. Our study contributes to a more nuanced understanding of the determinants of knowledge exchange by highlighting how academics and clinicians' symbolic and social capitals influence their engagement in joint research-related networks and decision-making during the early and later phases of collaboration and over time.

Consistent with research on the enabling role of professionals' social position in inter-professional knowledge exchange (Lomas, 2000; Mitton et al., 2007; Tasselli, 2015) we found that academics and clinicians with higher symbolic capital, in the form of superior professional status, were more likely to engage in both joint research-related networks and

decision-making. We suggest that high-status academics and clinicians may be more likely to engage in knowledge exchange because they have a superior reputation, expertise and professional connections and because they can afford to develop nonconventional forms of knowledge mobilization with little risk to their occupational legitimacy (Batillana, 2006).

Our findings also suggest that the personal professional status of academics and clinicians can be a stronger predictor of their engagement in joint decision-making than in their joint networking. Since higher-status academics and clinicians have superior occupational authority, they can more effectively influence the decisions of their professional counterparts concerning the objectives of joint research. Their privileged access to occupational resources, such as occupational knowledge, professional connections and funding, can provide them with greater bargaining power in decision-making processes by enabling them to exchange these occupational resources in return for the acceptance of research objectives (Bourdieu, 2002).

A superior professional status is theoretically assumed to be important for non-conventional knowledge mobilization particularly in the early phase of a knowledge exchange partnership (Greenhalgh et al., 2004). However, our findings indicated that academics and clinicians of higher professional status are more likely to engage in joint networks and decision-making in both the early and later phases of their CLAHRC involvement. They are also likely to become more engaged in joint networks over time. These findings suggest that the recruitment of high-status professionals in CLAHRCs is imperative for the creation, maintenance and extension of inter-professional ties between academics and clinicians.

Our findings also suggest that academics and clinicians who are more connected to higher-status occupational peers are more likely to develop joint networks in the early

phase of a knowledge exchange partnership but are less likely to become engaged in joint networks over time. We suggest that in the early partnership phase, connections of academics and clinicians with higher-status occupational peers can facilitate their engagement in inter-professional networks by enhancing their reputation and bargaining power (Bourdieu, 2002) and by reducing their initial uncertainty about the strategic priorities of collaborative work (Podolny, 1994). In the context of high uncertainty, academics and clinicians are likely to make judgments about the quality and credibility of their inter-professional collaborators based on the observable characteristics of their intra-professional status (Sauder et al., 2012).

However, our findings also suggest that academics and clinicians who are initially more connected to higher-status occupational peers may become less engaged in inter-professional networks over time, as connections to lower-status occupational peers become more relevant for inter-professional networking. This is because over time, lower status members of a CLAHRC tend to become more involved in its day-to-day operations and more exposed to the knowledge, skills, and connections that are operationally relevant, so their involvement in the professional networks of academics and clinicians can play a more significant role in inter-professional networking.

Few prior studies have highlighted how knowledge exchange between academics and clinicians in CLAHRCs can be facilitated by their engagement with knowledge brokers (Kislov et al., 2011; Rowley et al., 2012). Our findings suggest that the involvement of knowledge brokers in the networks of academics and clinicians is likely to facilitate their inter-professional networking only in the later partnership phase. Because in the later phase of CLAHRCs, knowledge brokers are likely to have legitimized their role as credible intermediaries with the authority to encourage inter-professional collaboration, they are

also likely to be more effective in facilitating inter-professional networking between academics and clinicians. Brokers can encourage inter-professional networking between academics and clinicians by informing academics about the capacity-building requirements of clinicians and by informing clinicians about the academic expertise that can be mobilized in the development of applied research (Harvey et al., 2002; Ward et al., 2009).

Previous research suggests that professionals with connections to unfamiliar professional peers are more likely to engage in inter-professional knowledge exchange because they are more open to new insights and more tolerant of jurisdictional contradictions between distinct professional domains (West et al., 1999; Haussler & Colyvas, 2011; Hargrave & Van de Ven, 2006; Landry, Amara & Rherrad, 2006). Our findings indicate that academics and clinicians who are more connected to professional peers with whom they have not worked together before are likely to engage in joint networks and decision-making only in the early phase of their collaboration. We suggest that openness to new insights and tolerance of professional differences can be particularly important in the early collaboration phase, when parties experience high uncertainty about the strategic priorities of collaborative work (Greenhalgh et al., 2004). Conversely, academics and clinicians who are less connected to unfamiliar peers are likely to be more embedded in the reproduction of the established intra-professional networks; therefore, they are more likely to close themselves off from inter-professional networking to maintain and enhance their intra-professional status (Landry et al., 2006).

While our study offers important insights regarding the role of academics and clinicians' social position in knowledge exchange, it has a number of limitations that can be addressed in future research. A more precise assessment of inter-professional networking could be obtained by measuring the frequency of the engagement of the members of the

opposite professional category (i.e., for academics, the frequency of engagement of clinicians; for clinicians, the frequency of engagement of academics). Similarly, to provide a more exhaustive assessment of inter-professional decision-making, future research could measure a number of decision-making processes involved in the design and implementation of joint research.

The validity of the results of multivariate analyses could have been increased using a more differentiated set of predictors and controls. Future research could develop a more nuanced understanding of the role of knowledge brokers in the engagement of academics and clinicians in knowledge exchange. For example, research could examine the effects of the networking of academics and clinicians with knowledge brokers of higher professional status as well as the effects of the quantity and quality of their interaction with knowledge brokers on their engagement in knowledge exchange. Nevertheless, in our study, OLS regressions with predictors and controls explained a considerable proportion of variance in the engagement of academics and clinicians in joint networks and decision-making (72 and 47 percent of variance on average, respectively).

The use of a relatively small sample size in longitudinal multivariate analyses (N=42) may have increased the likelihood of Type II statistical error. However, in longitudinal regression analyses, standardized regression coefficients for the insignificant effects of the predictors of academics and clinicians' social positions on their engagement in joint networking and decision-making were very low, ranging from 0.01 to 0.09. Longitudinal data analyses were thus unlikely to miss a valid effect of the predictors on the measures of knowledge exchange.

We assessed academics and clinicians' symbolic capital using a measure of their professional status. This measure was validated by academics and clinicians from one of the

CLAHRC examined in this study, and it assessed academics and clinicians' reputation and prestige based on their formal position in the intra-professional status hierarchy. Future research could fruitfully investigate the effect of professionals' informal status in organizational and networks on their engagement in inter-professional knowledge exchange.

Our study examined academics and clinicians' engagement in knowledge exchange in the three CLAHRCs that were affiliated with the university medical departments ranking high in the Research Excellence Framework. This was done to ensure that the measurement of the effects of academics' professional status is not confounded by the organizational status of their academic departments based on their national research ranking. Future research could advance our understanding of the effect of academics and clinicians' professional status on their engagement in knowledge exchange by examining how the organizational status of academics' departments moderates this effect.

Conclusions

Our study contributes to the understanding of the role of academics and clinicians' social position in their engagement in knowledge exchange in the UK CLAHRCs. Our findings suggest that knowledge exchange between academic and clinical professionals is likely to be influenced by their symbolic capital, in the form of professional status, as well as their social capital, in the form of their connections to high-status professional peers, knowledge brokers, and unfamiliar occupational peers. The findings also suggest that these forms of capital can have a distinctive influence on inter-professional knowledge exchange in the early and later phases of CLAHRCs.

Future research could provide a more nuanced examination of the effects of status and the network characteristics of academics and clinicians on their engagement in knowledge exchange. A fruitful examination could be made of the interaction effects between the personal and organizational statuses of academics and clinicians in the earlier and later phases of their involvement in CLAHRCs on their engagement in joint networks and decision-making. In the United Kingdom, knowledge exchange between academics and practitioners is incentivized by the new governmental assessment of academic performance, which measures the impact of research on economy and society, i.e. Research Excellence Framework, 2014. It remains to be seen how the partnerships with clinical practitioners will be pursued as academics seek to create impact, what strategies will be used by the higher- and lower-status professionals, and how these will change over time.

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Tables

Table 1A Descriptive statistics of wave I data

Variables	*Minimum*	*Maximum*	*Mean*	*SD*
Joint networks	0	11	1.94	2.26
Joint decision-making	0	5	2.54	1.91
Personal professional status	1	4	2.52	1.00
Connections to higher status professionals	1.8	4	2.95	0.67
Connections to knowledge brokers	0	5	0.57	1.12
Connections to unfamiliar professional peers	0	20	3.35	3.14
Size of intra-professional network	0	12	4.23	2.57
Professional background [a]	0	1	0.73	0.45
Gender [b]	0	1	0.59	0.50
Educational level [c]	0	1	0.64	0.48
Organizational status [d]	0	1	0.59	0.50
CLAHRC 1 dummie	0	1	0.33	0.48

N=66; [a] 1 = academic, 0 = clinical practitioner; [b] 1 = female, 0 = male; [c] 1 = PhD, 0 = below PhD; [d] 1 = higher status, 0 = lower status.

Table 1B Descriptive statistics of wave II data

Variables	*Minimum*	*Maximum*	*Mean*	*SD*
Joint networks	0	9	2.25	2.38
Joint decision-making	0	5	2.25	1.82
Personal professional status	1	4	2.29	0.85
Connections to higher status professionals	1	4	2.76	0.69
Connections to knowledge brokers	0	11	1.74	2.39
Connections to unfamiliar professional peers	0	13	3.66	2.96
Size of intra-professional network	0	11	3.99	2.35
Professional background [a]	0	1	0.71	0.46
Gender [b]	0	1	0.54	0.50
Educational level [c]	0	1	0.60	0.49
Organizational status [d]	0	1	0.67	0.47
CLAHRC 1 dummie	0	1	0.29	0.46

N=70; [a] 1 = academic, 0 = clinical practitioner; [b] 1 = female, 0 = male; [c] 1 = PhD, 0 = below PhD; [d] 1 = higher status, 0 = lower status.

Table 2A Correlations of study variables in the cross-sectional data set of Wave I

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Knowledge exchange: Joint networks											
2. Knowledge exchange: Joint decision-making	.53***										
3. Personal professional status	.32**	.29**									
4. Connections to higher status professionals	-.09	-.30**	.31**								
5. Connections to knowledge brokers	.45***	.36**	.01	-.40***							
6. Connections to unfamiliar professional peers	.70***	.36**	-.01	-.23*	.42***						
7. Size of intra-professional network	.11	.15	-.01	-.08	.35**	.36**					
8. Professional background [a]	-.41***	-.43***	-.11	.43***	.36**	-.16	-.42***				
9. Gender [b]	.18	.13	-.18	-.17	.19	.22*	.02	-.03			
10. Educational level [c]	.05	-.04	.45***	.43***	.33**	-.09	-.06	.39***	-.12		
11. Organizational status [d]	.02	-.14	.24*	.23*	.16	.18	-.10	.32**	.00	.27**	
12. CLAHRC 1 dummie	.25**	-.06	.15	.09	.00	.27**	.19	.00	-.13	.13	.59***

N=66; $^{*}p < 0.1$ $^{**}p < 0.05$, $^{***}p < 0.01$.

[a] 1 = academic, 0 = clinical practitioner; [b] 1 = female, 0 = male; [c] 1 = PhD, 0 = below PhD; [d] 1 = higher status, 0 = lower status.

Table 2B Correlations of study variables in the cross-sectional data set of Wave II

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Knowledge exchange: Joint networks											
2. Knowledge exchange: Joint decision-making	.56***										
3. Personal professional status	.35**	.29**									
4. Connections to higher status professionals	-.31**	-.24**	.15								
5. Connections to knowledge brokers	.80***	.39***	.18	-.50***							
6. Connections to unfamiliar professional peers	.45***	.22*	.01	-.50***	.59***						
7. Size of intra-professional network	.30**	-.20*	.15	-.22*	.37**	.30**					
8. Professional background [a]	-.53***	-.53***	-.08	.18	.13	-.19	-.42***				
9. Gender [b]	-.02	.02	.00	-.34**	.01	.22*	.11	-.15			
10. Educational level [c]	-.18	-.21*	.33**	.21*	.14	-.21*	-.12	.58***	-.16		
11. Organizational status [d]	-.25*	-.32**	.07	.01	.05	.06	-.13	.29**	.03	.24**	
12. CLAHRC 1 dummie	.07	.08	.03	.05	-.15	.03	.12	-.04	-.12	.26**	.44**

N=70; $^{*}p < 0.1$ $^{**}p < 0.05$, $^{***}p < 0.01$.

[a] 1 = academic, 0 = clinical practitioner; [b] 1 = female, 0 = male; [c] 1 = PhD, 0 = below PhD; [d] 1 = higher status, 0 = lower status.

Table 2C Correlations of study variables in a longitudinal data set

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Knowledge exchange: Joint networks											
2. Knowledge exchange: Joint decision-making	.38**										
3. Personal professional status	-.04	-.09									
4. Connections to higher status professionals	.02	.30*	.29*								
5. Connections to knowledge brokers	-.32**	-.06	.01	-.52***							
6. Connections to unfamiliar professional peers	-.62***	-.24	.07	-.25	.51***						
7. Size of intra-professional network	-.27**	-.40***	.04	-.19	.36**	.47***					
8. Professional background [a]	.19	.08	-.08	.47***	.39***	-.16	-.41***				
9. Gender [b]	-.22	-.21	-.17	-.19	.17	.19	.12	-.09			
10. Educational level [c]	-.02	.01	.47***	.44***	.22	-.01	-.18	.39***	-.07		
11. Organizational status [d]	-.31**	-.12	.23	.14	.25	.26*	-.05	.36**	.12	.30*	
12. CLAHRC 1 dummie	-.34**	.10	.21	.07	-.04	.36**	.29*	-.07	-.07	.17	.53***

N=42; $^{*}p < 0.1$ $^{**}p < 0.05$, $^{***}p < 0.01$.

[a] 1 = academic, 0 = clinical practitioner; [b] 1 = female, 0 = male; [c] 1 = PhD, 0 = below PhD; [d] 1 = higher status, 0 = lower status.

Table 3 OLS regression standardized coefficients predicting the forms of knowledge exchange between healthcare academics and practitioners in the Waves I and II (cross-sectional data analyses)

	Knowledge exchange			
	Joint networks		Joint decision-making	
	Wave I	Wave II	Wave I	Wave II
Personal professional status	.16(.20)*	.21(.22)**	.34(.26)**	.32(.25)***
Connections to higher status professionals	.20(.30)**	.06(.31)	-.18(.40)	-.22(.35)*
Connections to knowledge brokers	.10(.19)	.63(.12)***	-.09(.25)	.02(.14)
Connections to unfamiliar professional peers	.63(.06)***	.06(.07)	.26(.08)*	.09(.08)
Size of intra-professional network	-.01(.08)	.11(.09)	.22(.11)	-.18(.10)
Professional background [a]	-.40(.56)***	-.22(.52)**	-.43(.74)*	-.33(.59)**
Gender [b]	.13(.32)*	-.16(.35)	.03(.43)	-.11(.40)
Educational level [c]	.19(.43)**	-.08(.47)	.02(.57)	-.01(.54)
Organizational status [d]	-.09(.43)	-.15(.41)*	-.08(.57)	-.30(.47)**
CLAHRC 1 dummie	.10(.41)	.05(.45)	-.11(.55)	.19(.51)
R^2	.79	.77	.49	.49

N_{waveI} = 66, N_{waveII} = 70; $^{*}p < 0.1$ $^{**}p < 0.05$, $^{***}p < 0.01$.
Standard errors in parentheses.
[a] 1 = academic, 0 = clinical practitioner; [b] 1 = female, 0 = male; [c] 1 = PhD, 0 = below PhD; [d] 1 = higher status, 0 = lower status.

Table 4 OLS regression standardized coefficients predicting the change in the forms of knowledge exchange between healthcare academics and practitioners over the two year period (longitudinal data analyses)

	Knowledge exchange	
	Joint networks	Joint decision-making
Personal professional status	.35(.53)**	.08(.41)
Connections to higher status professionals	-.46(.80)**	.09(.61)
Connections to knowledge brokers	-.35(.27)*	-.84(.21)***
Connections to unfamiliar professional peers	-.39(.15)**	.01(.12)
Size of intra-professional network	-.01(.49)	.54(.37)**
Professional background [a]	.74(1.59)***	.73(1.22)**
Gender [b]	.04(.81)	.09(.63)
Educational level [c]	-.15(1.05)	-.05(.81)
Organizational status [d]	-.44(1.20)**	-.26(.92)
CLAHRC 1 dummie	.04(1.14)	.08(.88)
R^2	.60	.43

N = 42; $^{*}p < 0.1$ $^{**}p < 0.05$, $^{***}p < 0.01$.
Standard errors in parentheses.
[a] 1 = academic, 0 = clinical practitioner; [b] 1 = female, 0 = male; [c] 1 = PhD, 0 = below PhD; [d] 1 = higher status, 0 = lower status.