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Physician entrepreneurship: A study of early career physicians' founding motivations and actions

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ABSTRACT

The literature on professional socialization suggests that their training and socialization lead physicians to prioritize professionally prescribed activities over entrepreneurial activity. This leaves unexplained how and why early career physicians would engage in entrepreneurship, a behavior that many healthcare organizations now seek to encourage. To address this shortcoming, we conducted an inductive study, augmented with survey data, of UK National Health Service physicians involved in entrepreneurial projects. We detail a process of physician entrepreneurship underpinned by organizational improvement motives and identification with the organization. Entrepreneurs breached constraining roles and formed ventures which originated as intrapreneurial initiatives but shifted to individual-level resourcing. Entrepreneurial behaviors coincided with physicians' commitment to remain with the NHS albeit with adjustments to their career plans. Overall, the study suggests that physicians manage the pressure exerted by professional socialization by adapting both the kind of entrepreneurial projects and career pathways they pursue.

Across health care sectors internationally, organizations are making efforts to promote entrepreneurship amongst physicians. Entrepreneurial efforts by medical professionals are perceived as a way in which significant healthcare challenges can be tackled by promising solutions that can scale beyond physicians' individual practice (Cutler, 2011; Hodgson et al., 2022; Ostrovsky and Barnett, 2014; Small et al., 2017; Suennen, 2014). At the same time, entrepreneurial engagement does not form part of the typical portfolio of activities that physicians are trained to undertake. Moreover, these kinds of activities do not necessarily reflect the mainstream of values and norms that medical doctors are inculcated in as they are socialized into the profession, nor are they central to the typical kind of professional identities these individuals develop and value as a result of this socialization (Carlos and Hiatt, 2022).

Against this background, we explore the circumstances and the process by which physicians engage in entrepreneurial activities within the setting of a large-scale health care organization. We characterize entrepreneurship in broad sense, as the "pursuit of opportunity without regard to resources currently controlled" (Stevenson, 1983), encompassing intrapreneurial initiatives but also activities that may lead to the creation of ventures by physicians. Our focus is on innovation-driven entrepreneurship, aimed at creating new products or services, and hence we exclude conventional "private practice" from our consideration (Greenblatt, 2021).

We frame our research interest against the literature on how professionals, including physicians, are socialized and form identities (Becker et al., 1961; Konner, 1987; Pratt et al., 2006; Skorikov and Vondracek, 2011). This body of work has documented how individuals come to be strongly committed to their profession, and how this leads them to prioritize professionally proscribed activities that build and leverage their expert knowledge in the service of patient care. In contrast, activities such as entrepreneurship are digressive because the entrepreneurial role is oriented towards market (consumer or business) demand where success is measured by economic metrics, rather than based on professional evaluation and is guided by pecuniary interests although not exclusively so (Carlos and Hiatt, 2022; Hurst and Pugsley, 2011).

Our focus is on early career physicians as, for them, deviating from the proscribed professional pathways will likely have more profound consequences for how they progress whilst also being more challenging as they are in a position of relatively lesser power in the medical hierarchy. We ask how early career physicians embrace entrepreneurial

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activities and how they integrate them into their unfolding careers.

To address this question, we conducted an inductive study of the activities of physicians participating in a program to encourage entrepreneurship in the UK National Health Service (NHS). We find that an important driving force behind physicians' entrepreneurial efforts is their support of the NHS as organizational members. Physician-entrepreneurs were oriented to improve the system; in the first instance, internal projects were initiated. As they moved their ideas toward realization, they addressed obstacles encountered by breaching the roles assigned to them and engaging in individual-level resourcing of their projects. This resulted in work role changes and revisions to the traditional career trajectory followed by their peers. In addition, we leverage related organizational research and present results of a survey conducted with the first two cohorts of the NHS Clinical Entrepreneur Programme which capture key constructs that emerged from the inductive study.

Our work contributes to the empirical base of physician entrepreneurship by capturing motivations and actions of early career physicians focused on developing novel innovations that can benefit the healthcare system. It reveals a pathway by which employed professionals initiate entrepreneurial activity and develop strategies aimed at reconciling these activities with their commitment to the profession. We also contribute to work on entrepreneurship in professionalized contexts where socialization into adopting a profession's norms, values and behaviors can constrain entrepreneurship.

1. Theoretical background

We consider how medical professionals respond to opportunities of entrepreneurial innovation within their professionalized organizational context. To frame the study, we examine the literature on the socialization of medical professionals and use social identity theory to link it to the formation of professional identity and identification with the profession. We then discuss how entrepreneurial activities diverge from early career physicians' socialization and professional identity, given that entrepreneurship is not typically aligned with the values and norms of the medical profession.

1.1. Professional socialization

To become a practicing member of the medical profession, individuals have to undergo long periods of training aimed at inculcating advanced and specialized knowledge and skills. In addition to the acquisition of formal knowledge, prolonged training periods also facilitate individuals' socialization into the profession, implying an absorption of and identification with professional values, behaviors, and norms (Becker et al., 1961; Konner, 1987).

Prior literature has explored the inertial forces that inform individuals' commitment to the profession and associated values, norms and behaviors. Important among these forces are the economic benefits of maintaining membership in a relatively closed social entity that regulates new entry and collectively negotiates terms and conditions on behalf of its members (Weber, 1978; Weeden, 2002). However, beyond the economic benefits, there are two major, interlinked inertial forces that physicians are subject to: their socialization into the profession and their self-identification as physicians.

A rich body of research has explored the process of socialization whereby individuals are shaped into members of a professional community (Hafferty, 2008; Konner, 1987) and learn how to navigate the profession's system of hierarchy and power (Becker et al., 1961). During the socialization process, the professional acquires the motives, values, ethical standards, and norms of where, how, and on whom to practice (Schein, 1971). For physicians, much of this socialization happens during medical school, is reinforced via mentoring and the influence of role models (Henry-Noel et al., 2019), and continues even as the professional matures (Schein, 1971). Socialization has a neutralizing effect with respect to prior social differences among entrants into the profession, in the sense that they are encouraged to believe that markers such as class or ethnicity should not be relevant in professional conduct (Beagan, 2000).

An important outcome of the socialization process is the internalization of what are considered appropriate values, attitudes, and behaviors in the course of carrying out professional duties (Chao et al., 1994; Shahr et al., 2019). Equally important, socialization has a variety of consequences, such as enhanced job satisfaction, that in turn increase an individual's commitment to the profession (Bauer and Erdogan, 2012; Moradi et al., 2017).

1.2. Professional identities and identification

Closely related, as individuals are socialized into the profession, their sense of self evolves accordingly. Prior studies have elaborated how physicians in training actively shape their occupational or professional identity, defined as the self-definition or meaning related to being a member of the profession (Skorikov and Vondracek, 2011). Pratt et al. (2006) found that medical residents modified their professional identities to better fit the demands of their work. Variation in training experiences further contributed to differences in the resulting professional identity: for example, some residents identified with their specialty while others identified more closely with the profession in general.

Social identity theory suggests that identities, such as organizational or professional identities, have a lasting impact because they are co-constituted with a sense of membership in groups which becomes an important component of one's self-definition (Greco and Kraimer, 2020; Hogg et al., 1995; Ashforth and Mael, 1989). Identification with a larger collective is defined by a sense of oneness with the group, and creates meaningful distinctions between in and out-groups that contributes to a sense of belonging and is an important source of self-esteem. In other words, assuming a professional identity as part of one's self-identity becomes a valued element in itself, and individuals will therefore seek to avoid disruptions of their professional identity. Meta-analysis of studies that capture various types of identification, including professional and organizational identification, find that they are significant in informing outcomes such as commitment to the entities with which people identify (Greco et al., 2022).

1.3. Physicians and entrepreneurship

The theoretical developments discussed above leave unexplained how and why physicians would engage in new behaviors not resulting from their socialization and not constituent of their identity. Engagement in entrepreneurial activities, broadly speaking, may serve as a case in point. The values, norms and behaviors that define the medical profession do not typically involve an explicit orientation towards entrepreneurial objectives and activities. This is in contrast to the nineteenth century when doctors entrepreneurially devised their own treatments without rigorous testing and actively marketed themselves as healers (Starr, 1982). As the medical profession became more institutionalized, driven by national medical associations in concert with educational institutions and the State, the work of physicians has become more and more integrated within large-scale, organized health systems (Carlos and Hiatt, 2022). This professionalization of medical practice is facilitated by educational standards favoring scientific foundations, state licensing and admission procedures (Weeden, 2002).

Reihlen and Werr (2012) have argued that professionalization is about cognitive standardization which does not commonly make entrepreneurship and professionalism close companions. Abbott (1988) has argued that the purest form of professionalism excludes activities, such as running a company, that fall outside the technical core of the profession and those fully employing their expert knowledge are usually positioned at the top of the status ladder within their profession. Entrepreneurship is guided by a market logic which implies physicians

can leverage innovation ideas to prioritize financial return and views patients as consumers with demands and preferences to be met (Reay et al., 2017). Entrepreneurial ventures by physicians that scale beyond their individual practice are rejected by vocal critics because the creation of economic wealth not based on engaging in direct patient care can undermine the public's trust in the profession and erode their status and claims for autonomy (Relman, 1986).

As a result, the incidence of entrepreneurship amongst physicians is difficult to explain from extant theory. This applies particularly to types of entrepreneurship that diverge from classical professional practice such as establishing general or specialist clinical practices (Greenblatt, 2021). Such "private practice" is common among physicians, though its incidence has been declining in health care systems including the UK and the US (Commission on the Future of Health and Social Care in England, 2014; Kane and Emmons, 2013). Our notion of entrepreneurship is distinct from private practice in that it involves the commercialization of products and services, often into the healthcare market, rather than exercising physicians' specialty in a for-profit context.

When physicians form biotechnology, information technology and medical device companies – as a proportion of physicians do (Greenblatt, 2021) – they are deviating from established and proscribed career patterns. As a result, an interest in entrepreneurship may delay expected progression in medical training (Rizan et al., 2019). Efforts particularly by early career physicians to engage in business founding activity calls into question the implicit assumption that physicians are steadily socialized into their profession and concomitantly strengthen their identification with the profession.

It should be added that the kind of autonomy and independence emphasized within the medical profession, and professions in general, applies to the exertion of the professional activity as it relates to patient care and treatment rather than entrepreneurial efforts at founding companies. While autonomy in professional decision-making is a firm component of physicians' identity, founding companies that scale beyond an individual practice is outside the mindset that tends to be instilled into medical professionals in their formation, in a similar way that academic entrepreneurship is extraneous to the conventional identity of most academics (Jain et al., 2009).

Against this background of prior research, we explore how those physicians who decide to engage in entrepreneurship navigate the ensuing tensions with respect to their professional commitment and trajectory. This question is particularly topical as healthcare organizations have started to regard initiatives comprising both intrapreneurial and entrepreneurial activities as facilitative for more innovation and dynamism in the sector. Leaders are attracted by the idea that, due to their interaction with patients, employed medical professionals can be a highly promising source of innovation in the way in which health care is provided (Small et al., 2017). But given the nature of professional socialization and identification as outlined above, the question is how physicians respond to these initiatives whilst simultaneously handling the inertial forces that propel them to adhere to the trajectory proscribed by their profession.

Our focus is on early career physicians because for them, any deviation from the pathways that are proscribed for their profession is likely to have more profound consequences for how they progress whilst also being more challenging given their subordinated position in the medical hierarchy. At the same time, the degree to which they are socialized into the profession may be less pronounced, partly because their identity is still malleable and open to influences. As a result, we can expect our examination to yield insights both into how these professionals seek to reconcile entrepreneurial activities with their commitment to the profession and how they may simultaneously change the way in which they fulfil this commitment.

We ask: How do early career physicians embrace entrepreneurial activities and how do they integrate them into their unfolding careers? The subjects of our study were early career physicians in the UK National Health Service (NHS) drawn from the first two cohorts of the Clinical Entrepreneurship Programme. Below, we describe our choice of context and methodological approach combining a qualitative component and a survey which operationalizes key constructs identified in the inductive study.

2. Study context and data

2.1. Context

We studied early career physicians participating in the Clinical Entrepreneur Programme (CEP), a training program offered by the education arm of the UK National Health Service. The NHS is a publicly funded healthcare system founded in 1948 that encompasses hundreds of organizations including hospitals, community health service providers, emergency ambulance services and mental health providers. The NHS has been guided by the principle to provide healthcare to all based on clinical need rather than the ability to pay and is free at the point of delivery.

Early career physicians are typically referred to in the NHS as junior doctors, and broadly correspond to US medical interns and residents. Junior doctors have completed their medical degree and foundation training, can have up to eight years of working experience as a hospital doctor and work under the supervision of a senior doctor.

At the time the NHS was formed, consolidation of disparate and fragmented health providers was expected to raise healthcare quality and provide an infrastructure by which medical innovations, such as life-saving vaccinations, could be diffused. As these expectations were largely fulfilled, the NHS grew in size and complexity, and a variety of reforms were undertaken by successive governments in response to the criticism that it had become overly bureaucratic, as indicated by the growth of non-clinical managers, and lacking in responsiveness (Klein, 2006). The NHS can thus be viewed as the supra-organization encompassing multiple subordinate organizations including foundation trusts which include hospitals engaged in service delivery and enable local decision-making and greater patient involvement. Commitment to devolution and greater stakeholder involvement by local authorities and patients has been partial in light of prevailing forces at the center, for greater accountability and clearer managerial levers in the face of fiscal constraints. Centralizing top-down initiatives include the creation of organizational units with an oversight function and administrative roles that enable central control (Klein, 2006). Control has also been facilitated by the imposition of performance measurement systems that enable the monitoring and assessment of doctors who deliver healthcare services (Adler and Kwon, 2013; Harrison, 2009; Reay and Hinings, 2005). More generally, institutional changes brought by government policies and legislation have led to decreased physician authority and autonomy (Currie and Spyridonidis, 2016).

In addition to initiatives aimed at achieving greater responsiveness to patients and efficiency by UK public sector organizations (Battilana, 2011; Newman, 2001; Le Grand, 2002), NHS decisionmakers have also made efforts to improve the innovativeness of system. A host of initiatives were launched to enable individuals within the NHS to pursue opportunities for new and improved processes, products and services (Currie et al., 2008). These include mentorship support, competitions for prize money awarded to promising innovators, grants for innovation and improvement projects, access to 'test beds', i.e., experimental contexts in which innovation can be trialed.

Among these initiatives is the Clinical Entrepreneur Programme (CEP), which provides the context for our study. The program was launched by the NHS in 2016 with the goal of providing "opportunities to junior doctors and wider health professionals to develop their entrepreneurial aspirations during their clinical training period." Sponsored by Health Education England and several organizations such as Deaneries charged with providing medical training, the program was advertised broadly by email to NHS physicians and presented on a dedicated webpage accessible through the NHS England website. The

program at the time of the study only included physicians but has since expanded to include other health professionals.

Most applicants were assessed, interviewed and accepted into the program after providing a description of their projects or ventures. The first two cohorts of our study were largely comprised of physicians employed by the NHS in a full-time capacity; however, those on professional leave of absence (e.g., pursuing a PhD) or were working on locum contracts (temporary work assignments) were also accepted into the program.

Participants could attend a series of 1.5-day workshops duplicated across several cities in England over an 11-month period that focused on topics related to start-up activity, including the principles of lean start-up, team formation, sources of financing and legal issues associated with hiring and IP protection. Participants were assigned mentors drawn largely from the private sector and heard presentations by experts including founders. Those who volunteered to present brief oral presentations or pitches received feedback aimed to help them recruit team members or access resources. Despite introducing additional flexibility into medical training, the fellowship program was unpaid; participants had to attend the workshops at their own cost, personal time and without financial compensation.

The CEP setting provided an opportunity to access physicians undertaking entrepreneurial activities who would otherwise be difficult to identify and thus contact regarding their activities. By capturing their perceptions at the early stages of venture founding in real time, the likelihood of hindsight bias and success bias were reduced. In addition, because most doctors in the program were in the early stages of their career development, this facilitated comparisons across cohorts.

2.2. Qualitative data collection and description of participants

One of the authors conducted field work in an observer-as-participant role at eight meetings of the CEP, which included conversational interviews with 25 program participants, and observed participant presentations as well as breakout group discussions. The sampling approach employed for the interviews was non-random and exploratory in nature, relying on convenience sampling to select meeting participants as they were readily accessible. We held three further conversational interviews with the clinician spearheading the program and two mentors. We summarized all communication into detailed memo documents – comprising 13,000 words in total – during and immediately after each event.

Over the course of the program but when meetings were not being held, we further conducted 22 formal semi-structured interviews with program participants lasting 30–60 min. We first asked interviewees to describe their entrepreneurial idea and what developmental steps they had taken so far. We then asked them about the specific organizational and personal circumstances in which they had generated their idea, and what initial steps they had taken to progress their plan. This allowed us to probe the degree to which respondents had considered and chosen intra-organizational pathways for developing their idea, as opposed to choosing to found a venture. We probed for motives for pursuing the entrepreneurial project, and the degree to which the organization facilitated its progress. We also queried their perception of the compatibility of both clinical and entrepreneurial roles within their current work context, and personal intentions held regarding their further professional and/or entrepreneurial career. All formal interviews were recorded and transcribed, to a total count of 110,000 words, and after each interview, we wrote a memo summarizing the main insights gained.

2.3. Qualitative data analysis

We analyzed our qualitative data (interview transcripts and event memos) using inductive coding techniques. Epistemologically, we used guidelines from the grounded theory tradition to understand how our subjects attached meaning to entrepreneurial activities and their organizational position, and the actions they took while performing these activities (Glaser and Strauss, 1967; Creswell and Poth, 2016). In doing this, our ground assumption was that organization members are knowledgeable members and construct their organizational reality which we were then seeking to understand from our interviews and observations (Gioia et al., 2013).

Using the software package Atlas-Ti, we first openly coded all of our text for instances where the participants provided information about key aspects of the entrepreneurial process: their motivation and steps taken for initiating an entrepreneurial project, their perceived relationship with the organization and changes thereto, development of the venture, and personal goals and outlook. Open coding meant that we sought to adhere faithfully to the informant's terms (Gioia et al., 2013).

Typical examples of first-order (open) codes included "wanting to make a difference to the organization" or "perceiving current role as constraining" (See Fig. 1 for the data structure, and Table A1 in the appendix for illustrative data excerpts). We retained first-order codes only if they emerged multiple times across multiple interviewees. We then proceeded to inductively group the first-order codes into second-order themes (Gioia et al., 2013); each of which encapsulated either an activity stream (e.g. "role breaching") or an attitudinal or dispositional characteristic of an employee entrepreneur's state of mind (e.g. "improvement intent within organization"). At this step of the process, our contribution as analysts came to the fore more strongly, compared to the open coding stage where we sought to let categories emerge inductively from the statements of our informants. We further consolidated these themes into higher level constructs – for instance "externalizing the opportunity" – this formed the backbone for the process model we developed.

2.4. Survey data collection

Building on observations generated from the interviews, we developed and conducted a voluntary survey targeting all program participants. We emailed the survey to all 219 participants in the first and second cohorts at five months after the first meeting of the Clinical Entrepreneur Programme (February 2017 and March 2018, respectively) and received 90 completed responses (42% response rate). Our sample characteristics based on their age, proportion of female respondents and professional grade (in training or completed a qualification as General Practitioner or Consultant or seeking a PhD) are detailed in Table 1.

We conducted t-tests of survey items between those who replied solely to the survey ($N = 69$) and our interviewees ($N = 21$). These tests show no significant difference on our key variables of interest which we discuss below. The similarity of the two groups gave us greater confidence that the qualitative findings could be extended to the broader group of respondents. However, those who are interviewed are slightly younger compared to those who only responded to the survey (31 versus 34 year of age).

Survey items included pre-existing validated measures for perceptions of organizational identification which assessed the extent of perceived oneness with the identification target (Bergami and Bagozzi, 2000). We also used 4 items to assess taking charge (Morrison and Phelps, 1999) and 3 items to assess physician-entrepreneur role conflict (Hoang and Gimeno, 2010; Tompson and Werner, 1997) and summed responses to the 7-point Likert scale items. In addition, we asked respondents to assess their likelihood of leaving or returning to the organization depending on their current employment status with the NHS. We also sought to identify the top sources for the idea respondents are pursuing as their entrepreneurial initiative. Conducting a survey allows us to triangulate key insights that emerged from our semi-structured interviews and inform possible avenues for future research.

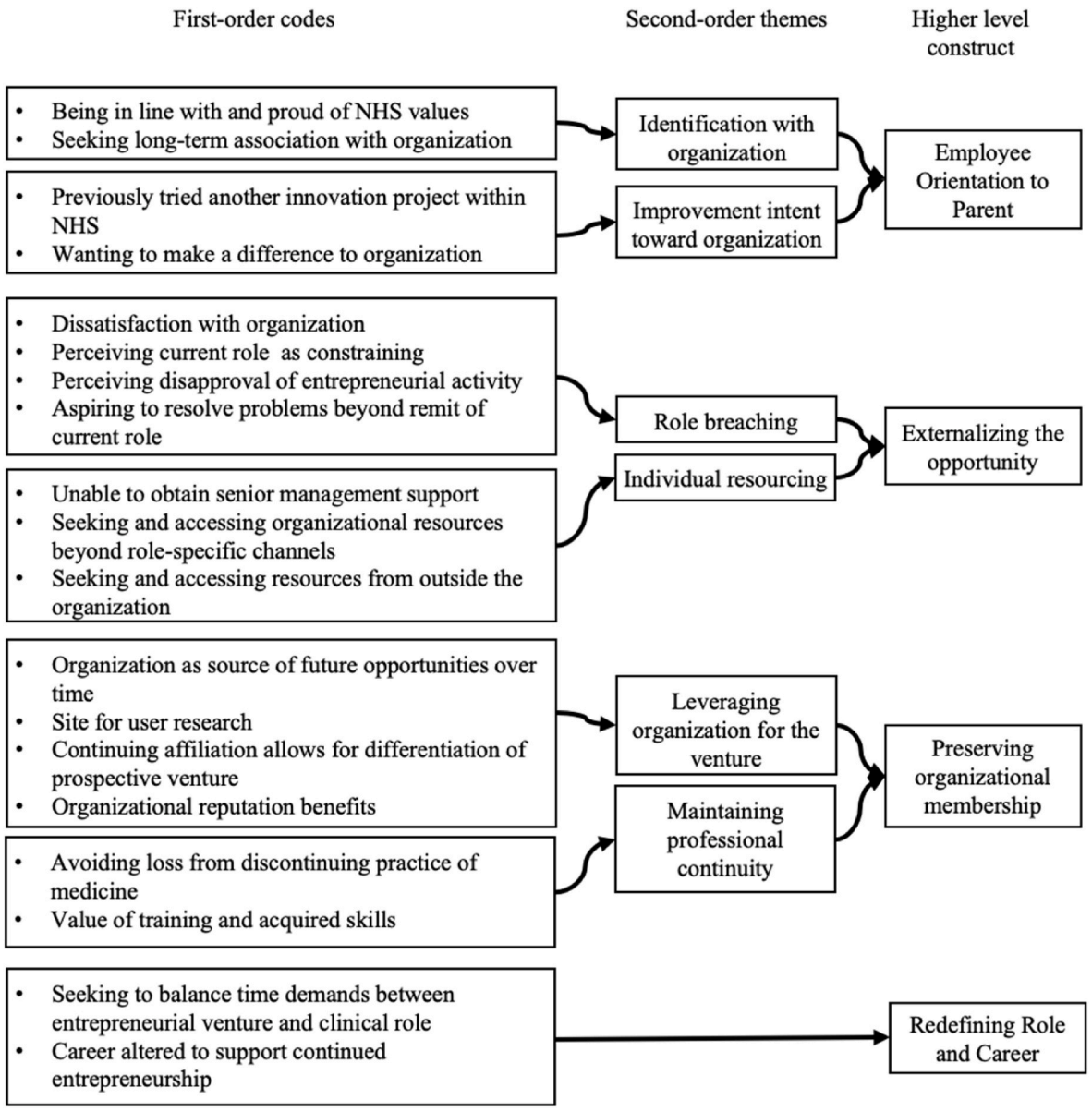


Fig. 1. Coding structure.

Table 1
Profile of survey respondents (N = 90).

Description	Average (SD)	Proportion
Age	33.31 (6.25)	
Female		0.12
Physician Grade		
Foundation year 1st/2nd		0.23
Core trainee/Specialty trainee[a] 1st/2nd year		0.20
Specialty trainee 3rd to 7th years		0.32
PhD or Finished Training: GP/Consultant		0.25
Top sources of entrepreneurial idea[b]		
Thinking about a particular clinical problem		0.74
Thinking about improving a particular practice or system		0.67
Discussions with family or friends		0.33
Developed from another idea I was considering		0.24
Research project or academic study		0.20

[a] Specialty trainees include specialty registrars (who focus on a hospital specialty).
[b] Multiple sources of entrepreneurial idea may be identified.

3. Findings

A screening of the entrepreneurial ideas pursued by participants in the Clinical Entrepreneurship Programme suggests that the majority were conceived to address medical or health problems by, for example, "bringing a free video GP service to those who need it right now." One venture was "devoted to making clinical trial match and enrolment more interactive for clinicians and patients and to increase the match success of patients to suitable trials." Another sought to provide "an interactive electronic dashboard to aid clinicians during cardiac arrest and other life-threatening emergencies." Others sought to fill a gap in medical or public health education. Many of these project descriptions were publicly available on the NHS England Clinical Entrepreneur Programme website.

The projects were typically at an early stage of development. Among our formal interviewees, the majority of the projects were at pre-incorporated stage but typically the physician would have spent several months to a year developing their idea, sometimes using organizational resources and at other times personal resources. A significant minority of projects were incorporated in a company, with some still

relying on personal resources and others having raised small amounts of seed funding (£50,000 - £100,000).

The above examples indicate the degree to which many entrepreneurial projects were closely linked to the broad mandate of the NHS. From our interviews and subsequent inductive coding exercise, we noted how the physicians' orientation towards the NHS animated their efforts to develop their ventures. This orientation had two distinct facets.

3.1. Employees' orientation to parent

Innovative Intent. When probing the circumstances under which these projects emerged, interviewees recounted that their entrepreneurial project had originated in attempts aimed at contributing innovations to the organizational system represented by the NHS and developing solutions to problems they perceived at work. As one physician explained: "if I come up with something, that could have impact on millions of people (…) you've almost got a duty to do what is best for the greater good". Another said:" I just think that if we can do things better, so let's do it". Their preparedness to improve had led many of the respondents to identify innovation opportunities that in their view would benefit the organization. As one clinical entrepreneur stated: "[my view is] what can I do to make it a better place, and more efficient, what can I do to actually help patients?"

Identification with NHS. When probing their motives for identifying problems and seeking potential solutions, we found that respondents' engagement in these activities tended to be underpinned by their attachment to the NHS system of organizations. Respondents declared that they shared the values that the NHS represented, with some expressing their enthusiasm for the organization in evocative terms. One respondent stated, for instance: "… I love the NHS. I think it's one of the greatest things. It's about the whole concept to provide healthcare to anyone for free". Another explained: "I believe in the NHS' values, and how care should be delivered", and echoed by a colleague: "It's a fantastic organization. It saves people's lives and I want to be a part of it for the foreseeable future." These quotes suggest that these doctors viewed their own participation in the organization that delivered this vital public service was a central aspect of their professional work.

Support of a public service facing increasing cost pressure and funded through general taxation necessarily raises challenges to maintaining the quality of the service and accessibility. Clinical entrepreneurs were able to identify through their direct experience when there were shortfalls which led to a search for solutions including with new cost-effective technologies. Thus, many of our respondents had initiated their entrepreneurial project as an intraorganizational effort to develop an innovation or improve the organization. Yet, for many respondents this intent did not translate smoothly into a realized innovation or improvement project. Limited by their position within the organization, both with respect to role responsibilities and resource access, they resorted to specific tactics that were aimed at pursuing a perceived opportunity outside the organization's regular channels.

3.2. Externalizing the opportunity

Role breaching. As individuals initiated their entrepreneurial project, many found that the role they inhabited in the organization was too restrictive. They perceived a mismatch between their innovation aspirations and the remit of their current role, and subsequently made efforts to break out from their perceived role-specific limitations. We refer to this as role breaching.

Individuals' detachment was often triggered by dissatisfaction with specific aspects of the organization. This dissatisfaction primarily originated from a perception that the organization provided insufficient support for the kind of goals they championed. In their view, the organization failed to encourage and stimulate activities and projects that would be conducive to designing novel solutions to existing problems and improving the organization in a systematic, planned way. As one individual said: "I do feel that at the minute, people are just putting out fires, there's no time for improvement, there's no time for really restructuring".

Following from this sense of dissatisfaction was the realization on the part of individuals that their role was not to engage in innovation, but rather, efficiently and repeatedly carrying out certain tasks. For instance, one respondent said: "For me it's a question of what's the biggest difference I can make; is it by bringing innovation to the NHS that saves it money or rather my day-to-day contribution? I want to do the former". Similarly, another stated: "My job is going to be more a sausage factory; my job is being routinized. So, this is less for me. I want to be more autonomous".

For the above reasons, respondents decided to devote energy to activities that went beyond fulfilling their duty inside the routine-driven healthcare machine that they considered the NHS to be. Rather than being a "cog in the machine" (as per one respondent), many individuals aspired to, and engaged in, creating solutions that would be applicable on a larger scale, and bring innovations and systematic improvements to the organization. As one respondent recounted: "[feeling limited as a clinician], I realized this kind of entrepreneuring and innovation was both my personal interest as well as had potential to improve the system on a wider scale."

Reactions from other organizational members appeared at times to confirm that individuals were in fact breaching their role: "It [my entrepreneurial project] felt like a bit of a dirty secret. I heard consultants [senior physicians] saying 'you know that's a distraction from training', and it was seen as quite a negative thing actually. They were like: 'why are you messing around with this project and why aren't you just focusing on your training?'". Another individual stated: "Generally it feels like the NHS and the innovation side are completely apart; like oil and water (…) it's a perception there's a conflict of interest."

Summarizing, our respondents engaged in role breaching as they oriented themselves away from the day-to-day tasks required by their role, and toward more novel activities that they saw as instrumental to pursuing their entrepreneurial project.

Individual resourcing. As individuals' activities started breaching the roles as provided by the organization, they started bypassing the channels offered by the organization in their attempt to acquire resources needed to develop their business ideas. Instead, they used their own personal individual networks to mobilize important resources.

Individual resourcing took place both within and outside the organization. Intraorganizational resourcing was often the response to the inability of our respondents to obtain senior manager approval or acquire resources to pursue their innovation attempts. One respondent recounted: "There were so many hurdles that we faced that we realized maybe this [trying to obtain senior management support] isn't the most efficient way of doing this." In response, individuals started mobilizing resources by searching for support suitable for advancing their projects. For instance, one participant procured herself a grant from an entity inside the organization that provided resources to innovators. She intended to use this resource to help her transition to starting a venture: "I'm looking to change, I'm looking to pivot, as they say, and want to work out how I can start my own businesses". Another participant stopped his medical training career and took up a position as a doctoral researcher in a university associated with the NHS via a teaching hospital. While his academic research was not directly functional for his innovation effort, the research position provided sufficient slack for his entrepreneurial activities.

Individuals also sought to attract resources from outside of the organization. Most often, they mobilized their network to identify cofounders or other key collaborators who were interested in an entrepreneurial project and had the required skills. As one respondent recounted: "When I started thinking about doing this [entrepreneurial project] myself, looking for opportunities, I met my co-founder. I went to one of these [well-known tech company] meetups and he was just

amazing, we got talking. So he's a data scientist, he works as a data science consultant and he's got a PhD in physics." Another individual – after fruitlessly attempting to persuade the IT department at his hospital to program an application for him – remembered that "we knew a friend app developer and we asked him to make the app". Another respondent acquired financial resources to build prototypes and minimum viable products with the aim that these early-stage products would subsequently be trialed and tested within the NHS on their initiative and under their leadership.

Overall, respondents engaged in individual-level resourcing of their project, typically after failing to attract resources via the standard organizational channels available to them as part of their role. We subsumed role breaching and individual-level resourcing under the aggregate dimension labeled "externalizing the opportunity" given both elements represented the first step to move an incipient entrepreneurial venture external to the organization.

3.3. Preserving organization membership

While individuals moved toward an externally focused development of the intraorganizational opportunity they had identified, they simultaneously took care to preserve their membership in the organizational system. To an extent, individuals cited instrumental reasons for maintaining their association with the NHS. These reasons were often linked directly to attempts to leverage their continued association with the organizational system to develop the entrepreneurial opportunity they were pursuing. This occurred in two ways.

Leveraging organizational affiliation for the venture. The aspiring entrepreneurs intended to instrumentally deploy their NHS affiliation to aid their entrepreneurial project. On one hand, respondents regarded this affiliation as an important source of inspiration and insight. As one individual stated: "(…) being in the NHS has been getting me lots of experience, lots of understanding, lots of leadership experience, lots of relationships. I am kind of building my project". Being "inside" provided access to problem contexts and allowed for the requisite research to develop an early-stage product: "Yes, I wouldn't have been able to do it if I hadn't been really close to problem. I'm solving it, [be]cause I deal with that problem every day".

On the other hand, many respondents pointed out that being affiliated with the NHS provided intangible advantages, such as reputation, that they could exploit as they developed their venture. They generally perceived that operating from within the NHS was an asset that differentiated them and their venture from others due to the reputational value of the NHS as an institution: "The NHS is well respected around the world, and I've heard this from a few entrepreneurs who have been through the cycle where they say: prove your technology in the NHS". In addition, respondents reasoned that external parties would value the fact that they were a practicing NHS physician: "But being a doctor helps. It opens the door and gives you reputation; it's a 'noble' trusted profession".

Maintaining professional continuity. While acknowledging the instrumental benefits that arise from remaining associated with the NHS, individuals also emphasized the importance of maintaining continuity in their professional role. Individuals sought to avoid the loss they would experience from discontinuing their practice and shifting to a full-time start-up entrepreneur: "As soon as you leave completely, then you lose that unique aspect that you are in fact like". Some respondents acknowledged that despite being attracted to an entrepreneurial career, they were hesitant to take the plunge as they considered the psychological cost of doing so. Typical statements include: "I am not a businessperson. I am a clinician", "I would be very uncomfortable not to be a doctor", and "[leaving your job] is like removing part of your body, because it's so engrained in medicine." As individuals were highly committed to their role as a physician to which they strongly identified ("I do love the job as a doctor, so I think I find it very difficult to give that up completely"), they sought to maintain an association, despite initiating an entrepreneurial venture.

The quest for maintaining continuity also arose from the perceived ongoing usefulness of their training and acquired skills. Their training in medicine allowed them to propose solutions that they were pursuing. As one respondent noted, "I would say I would always want to keep a clinical footing, I'd always want to practice, that's what I trained in, that's what's allowed me actually to come up with several new concepts and ideas." Because their skills and knowledge were valuable to the organizational system as well, they sought to carve a career path within it that would support future entrepreneurial ambitions.

Overall, aspiring entrepreneurs had both instrumental and professional rationales for staying close to the organizational system from which they were preparing to launch a start-up firm. They expected the NHS to aid the venture as this allowed them to access expertise and reap reputational benefit. They were also strongly motivated to maintain their ties, as it allowed them to continue their practice and maintain their professional credentials. As a result, they commonly thought of shifting their employment relationship to a part-time engagement. Where this was perceived as not possible or inappropriate, individuals usually preferred to retain their full-time employment status while pursuing their entrepreneurial project in their personal time, rather than exiting the organization.

3.4. Role and career redefinition

For many individuals, there was a conscious effort to balance their entrepreneurial project with their existing organizational role, while others sought to redefine their role in ways that altered their career trajectory. Some aspired to remain associated with the organization via part-time employment. They saw continuing employment, not merely as insurance against venture failure, but as a professional option even if their venture was to be successful. For instance, one doctor stated: "I am more likely to take a less than full-time training program and do a couple of days a week with a medical role etc. and run the company at the same time".

To maintain continuity, individuals reshaped their professional training and career path in ways they regarded as compatible with remaining affiliated with the organization while developing their venture. In a typical manner, a respondent explained that they aimed to be a general practitioner as this position offered sufficient flexibility and time for them to pursue entrepreneurial ambitions: "So in terms of specialty I will be doing primary care. For pragmatic reasons: short training program. I can do it quickly." Other respondents were looking to shift their careers more substantially by looking to embark on a research-based career or by applying for special innovation fellowships that allowed them to fully focus on their project for a specific amount of time.

Those who envisioned a permanent integration of entrepreneurial activity within their career emphasized the value of affiliating themselves with the NHS, not merely for their current project, but for any future entrepreneurial initiatives: "I would like to stay [in the organization] because it gives you an insight and an understanding into healthcare". In fact, some saw their future professional role not as leaders of entrepreneurial companies, but as medical innovators able to repeatedly create and launch ventures. According to one entrepreneur: "I'm probably better off going back to clinical practice and coming up with the next idea. That can be done for the business, and then license it, patent it, and get that one up and running, and then back to clinical practice." From this perspective, exiting the NHS was considered unattractive: "[if you leave] you won't know about all the things that need innovating about …".

Summarizing, the involvement in an entrepreneurial project led individuals to take steps to redefine how they conceived their organizational role and their career trajectory. To avoid the loss of NHS affiliation, they worked to redefine the latter in a way that rendered it more compatible with their intent to become an entrepreneur.

3.5. Survey results

Our findings suggest that when an entrepreneurial role is viewed as incompatible with the demands of the professional role, there may be tension and dissatisfaction. We explored this tension by undertaking a survey which asks program participants to characterize themselves using validated measures that most closely reflected the concepts identified in our interviews. The means, standard deviation, and correlations of these measures are presented in Table 2.

The insights that we draw from the survey results are as follows. First, we observe that a majority of the respondents noted that "thinking about solving a clinical problem" (76%) and "thinking about improving a current practice or system" (67%) informed their business idea. The majority (75%) were undertaking their training while the remaining had a qualification as General Practitioner or Consultant or were pursuing a PhD.

We also observed a positive correlation between perceptions of role conflict and exit intentions ($r = 0.24$, $p < 0.05$). For all respondents, including those not currently employed with the NHS ($N = 8$) or were on locum contracts ($N = 14$), we asked about individuals' intention to leave the NHS and willingness to return if they had to leave for a period of time (reverse coded) along a 5-point Likert scale including 'Probably will leave'/'Definitely will leave' and 'Probably will not return'/'Definitely will not return' respectively. The survey responses point to the tensions between professional and entrepreneurial demands that may lead individuals to rethink their relationship with the NHS health system.

Organizational identification, measured by the extent to which individuals perceive an overlap between themselves and the organization, as depicted by the graphical scale developed by Bergami and Bagozzi (2000), appears to be a basis for preserving organizational membership. We related the degree of individuals' identification with the NHS to their likelihood of leaving the NHS and found a strong negative correlation ($r = -0.42$, $p < 0.001$). In addition, we assessed whether participants were willing to engage in behaviors that improve the organization by summing four items from the 'Taking Charge' scale developed by Morrison and Phelps (1999). One item for example assesses their willingness to 'implement solutions to pressing organizational problems'. Echoing our interviews, we found that 'Taking Charge' was positively associated to organizational identification ($r = 0.17$, $p < 0.1$) and negatively related to exit ($r = -0.18$, $p < 0.1$). These results are merely suggestive, as the data are affected by non-response bias, and thus meant to provide a general sense check of our findings from the qualitative study which we regard as primary. Due to the cross-sectional nature of the data, we cannot rule out reverse causality or other forms of endogeneity including the presence of confounders.

Table 2
Survey item means, SD, and correlations.

	N	Mean	Standard Deviation	(1)	(2)	(3)
(1) Role Conflict	90	13.01	3.73			
(2) NHS Identification	90	4.86	1.80	−0.02		
(3) Taking Charge	90	21.80	5.09	−0.15	0.18*	
(4) Intention to Leave	88	5.74	1.72	0.24**	−0.42***	−0.18*

Note: *p < 0.1, **p < 0.05, ***p < 0.001. Correlation between *Intention to Leave* and *NHS Identification* is computed as Spearman's rank correlation coefficient while all others are Pearson's correlation coefficient.

Role conflict measure based on sum of responses to 3 questions randomly drawn from these items: 1.Membership in one group or role has a very harmful or conflictual effect on the other; 2.Membership in one group or role takes up so much time and energy that it makes it hard to fulfill the expectations of the other group or role 3.The two groups or roles always expect conflicting behaviors and attitudes from me; 4.Membership in one group or role frees up time and energy for me to fulfill the expectations of the other group or role; 5. Membership in one group or role has a very facilitative or helpful effect on the other; 6.The two groups or roles always expect the same behaviors and attitudes from me. Items 4–6 are reverse coded such that higher values indicate role conflict.

Taking Charge measure based on sum of responses to Likert-scaled questions: 1.I often try to bring about improved procedures for the work unit or department; 2. I often try to institute new work methods that are more effective for the organization; 3.I often try to Implement solutions to pressing organizational problems; 4.I often try to introduce new structures, technologies, or approaches to improve efficiency.

4. Discussion

4.1. Summary of main insights

This study examines how early career physicians engaged in the process of entrepreneurship. Individuals conceived entrepreneurial projects as internal initiatives aimed at introducing new or improved products and services within the organizational system of the NHS and enhancing outcomes in this system. The individuals identified opportunities on the basis of their experience, skill or knowledge but found that key resources or support were lacking, leading them to tap external resources and contacts, and some of them to found start-up companies. Yet despite organizational shortcomings and rigidities, and either intending to become or becoming entrepreneurs, physicians placed continuing importance on being a member of this organizational system and were motivated to improve it and address its challenges. The latter finding echoes entrepreneurial research which highlights that, consistent with social identity theory, some entrepreneurs define themselves as members of a larger group or community. This in turn significantly influences how their ventures are developed so as to contribute value to the group or the broader community (Fauchart and Gruber, 2011).

A second regularity we observed from our study was that physician entrepreneurs also engaged in efforts to overcome the constraints of their existing work role and addressed conflicts that their entrepreneurial activities engendered. Moving these projects forward thus required them to break out of the roles they inhabited within the organizational system. As they perceived incompatibilities with their activity portfolios, many thought to redefine their work roles to integrate their concurrent entrepreneurial activities. Some physician entrepreneurs were able to integrate new behaviors and expand their work roles while maintaining career development continuity (Tims and Bakker, 2010). Others sought a role change in the organizational system to better accommodate their venture development activities which led to more significant career plan revisions. These individuals began to reimagine their future contributions to the NHS, from providing highly specialized contributions within well-established roles toward becoming innovators and agents of change. To strengthen our qualitative conclusions, we undertook a survey of a larger group of physicians which suggested the pathway we identified was not limited to our interviewees.

Our study also suggests interesting implications for how to understand the relationship between intrapreneurship (generating and implementing new ideas within an organization) and entrepreneurship *stricto sensu* (generating and implementing new ideas via a *de novo* organization), at least for organizational settings such as the one studied here. The majority of the projects performed by the participants were based on ideas for products or services that in principle could have been followed either intrapreneurial or entrepreneurial pathways. Most of them started as intrapreneurial projects because the originators were highly identified with the organizational system they were operating in, but many converted into entrepreneurial projects as the organizational system was not set up and resourced to systematically support intrapreneurship. This particular feature of our study setting allows us to outline a pathway by which physicians, rooted in an intrapreneurial desire to make a contribution to the organizational system, initiated entrepreneurial activity and undertook efforts to reconcile these

activities with their commitment to the profession.

4.2. Limitations

It should be noted that our sample of early career physician entrepreneurs were also participants in the NHS Clinical Entrepreneur Programme. Compared to other cohort-based accelerator programs which require participants to devote themselves to an intensive, short program of speakers and mentor introductions (Hallen et al., 2020) culminating in a formal presentation of their ventures to external funders, physicians were not required to stop work and attend a minimum number of sessions, nor were they required to present in the final pitch. As a result, the program's learning objectives such as introduction to the lean start up method were venture and client focused. The program did not explicitly include bolstering any of the behaviors we identified as being important in this study. Nevertheless, participation may have made being a member of the NHS more salient when reporting motivations to engage in entrepreneurial activity.

While these accounts of physician entrepreneurs in the NHS extend a limited empirical base, we cannot claim they are representative of a broader population of physicians who may be engaged in entrepreneurial activities but did not enroll in the program. Our findings may be affected by self-selection bias, potentially limiting the generalizability of our results. Our findings may also not capture aspects relevant to physicians who undertake entrepreneurial activity in later career stages. They have had more extensive socialization into the profession, greater wealth, networks, expertise and non-pecuniary motivations and concerns which may alter how entrepreneurial activity is pursued and how it is perceived in relation to their professional role. Finally, health systems are institutionally specific and hence our conclusions may not generalize to other institutional contexts, and in particular those health systems that are more market oriented such as the US system.

4.3. Contributions and future research

Our study contributes to an emerging stream of work on entrepreneurship in professional and in particular medical contexts (Carlos and Hiatt, 2022; Deng, 2017; Hodgson et al., 2022; Reihlen and Werr, 2012). Studies of socialization into the medical profession ignore activities and group memberships that are meaningful to the individual but are not considered relevant to learning and development within the profession. Our study allows us to observe in real-time junior doctors who experience the tension arising from adhering to the proscribed professional requirements and engaging in an extra-professional activity like entrepreneurship, and the ensuing choices they might consider for their future career in the profession.

Our findings extend prior research by showing how strong normative socialization in the medical profession can go hand in hand with seemingly extraneous activities such as entrepreneurial projects. We found the relative permissiveness of entrepreneurial activity is facilitated by two properties of the process. On one hand, entrepreneurial projects tend to be confined to those that contribute innovations and improvements to the organizational context in which the medical professionals work. A motivating force is physicians' identification with the healthcare system to which they belong that is also the context for their ongoing socialization. On the other, physicians tend to opt for personal career pathways that preserve their organizational belonging and allow them to continue exercising their profession rather than making a difficult choice to fully focus on their entrepreneurial attempt.

As a consequence, we observe how entrepreneurial behaviors can alter an individual's professional career trajectory by allowing for more complex identities than hitherto observed (Caza et al., 2018; Lepisto et al., 2015). This insight may be read against studies that suggest that the development of complex professional roles can bolster psychological and social resources for the individual that can lead to more engagement and professional satisfaction (Ramarajan, 2014). Moreover, healthcare leaders recognize the value of involving those in entrepreneurial efforts with clinical knowledge and patient interaction experience (Deng, 2017; Niccum et al., 2017). Hence there is need for longitudinal research to examine the strategies, and the identity work needed, that can facilitate these individuals' adjustment to more complex professional roles. As healthcare settings vary in the opportunities and support to undertake novel entrepreneurial activities, a complementary endeavor for future research is to develop a framework to characterize variation across contexts. Recent research has identified a small but rising number of innovation and entrepreneurship programs offered in medical schools (Niccum et al., 2017). The presence of such programs underlines that early career engagement in entrepreneurial behavior can unfold along a more structured pathway than identified in our context and influence the sequence of activities that are undertaken. Future research could also examine how these programs revise the knowledge, skills and values that are typically transmitted during the initial socialization process in medical school.

Recognizing possible scope conditions to our findings that can inform future work, we propose that additional groups of physicians are studied and characterized using valid and reliable survey measures that can facilitate comparison and build a cumulative body of knowledge on physician entrepreneurship. Such an approach is necessary to address the important concern that entrepreneurship negatively impacts healthcare provision and injects pecuniary motivations which can undermine professional values (Socha and Bech, 2011). The feasibility of a systematic approach is demonstrated by the survey we conducted with validated measures that were closely aligned with our qualitatively derived constructs.

The motivations of physician entrepreneurs in our study suggest that physicians can pursue entrepreneurship in relative complementarity with the parent organization's goals. Consequently, healthcare organizations can devise policies that support committed professionals who address organizationally relevant opportunities by allowing for greater flexibility in physician role definition and career trajectory. Should physician entrepreneurs leave clinical practice to devote themselves fully to their venture, organizations can establish ways to maintain a relationship with them in order to leverage direct and indirect benefits including access to innovations and organizational learning. Such policies would need to provision for risks and challenges such as conflicts of interest and governance of the interactions between parent and start-up. Despite these obstacles, supporting entrepreneurial initiatives could represent a viable and effective way for healthcare organizations to attract and retain talented professionals while benefiting from their innovative contributions. In addition to the venture's product or service being deployed within the organization, some scholars have noted the possibility of indirect benefits via organizational learning (Parhankangas and Arenius, 2003). When ventures are a vehicle for innovation, they may yield valuable new knowledge that better positions the organization in a challenging healthcare environment.

Data availability

The authors do not have permission to share data.

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APPENDIX

TABLE A1
Illustrative Data

Aggregate dimension	Second order themes and illustrative data
Employee orientation to parent	**Innovative intent aimed at organization** But in principle, in terms of contributing to it, I'm very much pro that. For me it's a question of what's the biggest difference I can make. Is it by bringing innovation back to the NHS that saves it money or is it my day to day work? I think it's the former! But in terms of improving how health care is delivered I felt limited as just the clinician. I explored a lot of different things during medical school things such as management in medicine or research, or clinical research, policy etc. And then I realized kind of entrepreneuring [sic] and innovation was both my personal interest as well as had potential to improve the system on a wider scale. Potentially, and the reason I say potentially is I very much see it's all about the greater good. As a GP, I might look after 25,000 people during my career. And if I come up with something, that could have impact on millions of people, be it babies or what else, then I think from an altruistic standpoint, you've almost got a duty to do what is best for the greater good. Having said that, I do still think that being part of the organization does give you access to further problems. **Identification with organization** I am hugely proud to be a member of this organization. [Because I believe in the values of the NHS] I would prefer to work with the NHS and its benefits whilst also driving innovation and making products which are sustainable and generate revenues. I feel like doing this business actually gives me the other side of NHS. Because when you're employed by the NHS whereas when you partner with the NHS it's completely different. Because I feel like doing business with them. I am a partner. My core values that I've been trying to define recently is being useful and helpful, openness, openness to change, trying new things and just improving system around me. So that's my motivation is that I just think that if we can do things better, so let's do it.
Externalizing the opportunity	**Role breaching** However at the same time for anyone who is trying to improve the system particularly without external investments where you need resources so you need someone in IT dept, or part of the manager's time or part of a clinician's time, all of these were very difficult. And also a bit of frustration, I think, generally, with just the clinical landscape. I think I just needed to look at other avenues, really. And I've been working for four years, so it was generated in the frustrations of the first year of working really. And you start to realize that actually being a doctor is not the glamorous thing that they make it out to be. [LAUGH] There's a lot of frustrations, a lot of things that you wish were different, and so that's how it [my project] was generated You're essentially rattling through about the 70 problems a day, maybe more, on an on a time limited basis. (…) I'm excited about doing other things and learning about new things (….) doing something totally on my own terms, I'm a little bit frightened by it as well. NHS does not think highly of innovation. It's very bureaucratic, and you can't get anything done. There's no clear pathway set up to take. So for instance, I need some help with medical devices, with a commercial strategy. And it's proving very time consuming to try and find the right place to get this advice. I think it was a feeling of a more of a purpose than one patient at once. So I've always been quite keen on medical leadership (…). Because for me that's the way to go, rather than impact one patient's life at a time, as I would as a working doctor, It's a way to impact lots of people's lives. **Individual resourcing** Yeah, so I spoke to my superiors then. And they felt that the IT department wouldn't be interested in creating another level of bureaucracy. They felt they needed to create a bureaucracy to be able to implement my app … So I went through that internal system but it didn't work. We've tried to ask for some support for our project from the NHS academic health care network, there is a local body that is paid by them to support innovation within hospitals For us to do this via NHS (e.g. get funding) would be too time -consuming and bureaucratic. Forget it, you can't wait 6 months or a year for getting things authorized (or for disclaimers). Better get money from the outside. So what we actually did is: we know a friend app developer. He made the app and then we went to the trust. We said: We're working on it in our own time. We are willing to give it to you for free if you let us trial it and help us get through the approval. So we applied for funding so there is this funding that [specific global technology company] releases every year to a charity, so many charities are applying for that funding, it's 150,000 pounds. I've always had him [my younger brother who is in business] as influence and for information (…) [involving him], I was trying to feed a little side project.
Preserving organizational membership	**Leveraging organization for the venture** And the other side is personal learning and development, so I'm learning a lot about how the NHS works. But even if this project is unprofessional or even if I kind of hand it over to someone in the medium to long term, then that gives me a useful learning that I can take into my future career or future project. Being in the NHS has helped me along this [entrepreneurial] process, I actually come up with several different concepts and ideas, and the only way that I am able to do that is by being in a challenging environment, by being in an environment that academically challenges me on a daily basis. But I've kind of have been a little more rocky about it, and kind of spent the past three years training and understanding the whole system. And I've been in increasingly senior leadership positions (…) it's kind of a simulation [of the entrepreneurial process]. So [when I am an entrepreneur] I will may still do one or two sessions a week in a clinical environment. And that will give me some perspective as well about the problems we may have in the NHS and how to develop better solutions to these problems. So I think the NHS is like kind of, it's a scope of ideas or testing many different problems or different solutions, and being part of this, it's a key motivator as well as developing all these solutions to these problems. I actually come up with several different concepts and ideas, and the only way that I am able to do that is by being in a challenging environment, by being in an environment that academically challenges me on a daily basis. I thinks it's about innovating in healthcare particularly I think is about being in some ways on the grassroots or at the frontline and you'd have to be a patient or you'd have to be a connection and I think once you lose that connection, you are unable to innovate successfully in the same way. I'm gonna give myself some slack to start my own businesses. … […]. I have to carve a space in my week, [be]cause my week is really cramped at the moment. And then say, right, I'm starting proper entrepreneurialism now. I would say, if my innovations became a success, then I would want to always continue my dental practice, even in that context. And because I believe that is key to creating good innovations down the line [Rather than stop being a doctor] I'm probably better than going back to clinical practice, and coming up with the next idea. But even if this project is unsuccessful or even if I kind of hand it over to someone in the medium to long term, then that gives me a useful learning that I can take into my future career or future project. I would say I would always want to keep clinical footing, I'd always want to practice, that's what I trained in, that's what's allowed me actually to come up with several new concepts and ideas, The second you stop working on the frontline NHS you lose the unique thing that you got if you work in healthcare. As soon as you leave completely then you lose that unique aspect that you are in fact like

(*continued on next page*)

TABLE A1 (*continued*)

Aggregate dimension	Second order themes and illustrative data
	… you have more kudos when approaching clients [when working in the NHS]. But being a doctor helps. It opens the door. Reputation; it's a "noble" trusted profession. The NHS is well respected around the world and I've heard this from a few entrepreneurs who have been through the cycle where they say: prove your technology in the NHS. Work with the NHS to run the trials to actually get that evidence in a regimented system and that gives you a big step up in terms of other countries: Oh look it has worked in the NHS! It is important that I stay in the NHS. I guess it is tied into the business, as well. For people to trust that I'm working on this, and that I'm a doctor. If there was a hospital that went into partnership with us; that would support our standing with other trusts or the private sector internationally. **Maintaining professional continuity** But more likely to take a take a less than full time training program and do a couple of days a week with a medical role etc. and run the company at the same time. I would like to be able to do the occasional shift, to be clinically active. I have enough of a passion for just the whole world and innovating and creating new business, that in the absence of this business, I would do another one and hope to have some clinical work on the side. And the way, my ideal scenario would be that the act is doing really well. It generates a lot of cash flow, that I would continue to work as a GP. I am likely to take a take a less than full time training program and do a couple of days a week with a medical role etc. and run the company at the same time. Personally, up to me, I would say I would always want to keep clinical footing. That's what I trained in. But I mean you can be a doctor in a loose sense of the word and you know do a minimal clinical stuff and do you know work on innovation within the NHS I want to do [remain a practicing doctor] for my own betterment. I went to medical school because I actually enjoy medicine and I enjoy helping people from that point of view. Being a doctor fulfils me. I am wrestling with this. I would be very uncomfortable not to be doctor. Therefore would still be a doctor part time. I know some colleagues who have left their job as doctors to pursue their enterprise. And they said that it was one of the most difficult things that they've had to do (…); they actually said it was like probably like one of the most painful things they had ever had to do in life (…).[Be]cause it's like removing part of your body, because it's so engrained in medicine. I think I'll always think of myself as a doctor, I think it will be key to it's the rest of this company and its lifespan and or any others, because it's just been a very early, key part of my life. And I do love the job as a doctor, so I think I find it very difficult to give that up completely. So, what I'm thinking is, to keep that going long term, just because it's been quite a big part of my life probably ever since I was in my teens. I don't want to leave practicing medicine because I love practicing medicine. But perhaps I want an arrangement whereby, maybe I work part time, Some teaching hospitals have innovation fellowships and I know somebody who is doing that [so I was considering that]. I really do like to have control over my time. And the way, my ideal scenario would be that the act is doing really well. It generates a lot of cash flow, that I would continue to work as a GP.
Redefining role and career	And then it would maybe consider a switch into something like general practice or outpatient medicine. Something that could be done even less frequently. I'm personally very keen to come back into clinical medicine. So in terms of specialty I will be doing primary care. for pragmatic reasons: Short training program. I could do it quickly When I first started this project I wondered if I did actually want to continue to be a doctor, and this project was almost the start of a way out. Then actually I've become much more happy with my clinical work since then.

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