



The ambiguity of “we”: Perceptions of teaming in dynamic environments and their implications

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ABSTRACT

In healthcare, organizations increasingly call on clinicians and staff to team up fluidly to deliver integrated services across disciplines and settings. Yet little is known about how clinicians and staff perceive of team membership in healthcare environments where team boundaries are often ambiguous and continually shifting. We draw on the context of primary care in the United States, where fluid multi-disciplinary teamwork is commonly exhorted, to investigate the extent to which clinicians and staff perceive of various roles (e.g., physician, front desk) as members in their teams, and to identify potential implications. Using a survey fielded within 59 clinics ($n = 828$), we find substantial variation in individuals' perceptions of the roles they consider as team members during an episode of care (e.g., mean team size = 10.60 roles; standard deviation = 5.09). Perceiving more expansive sets of roles as team members exhibits a positive association with performance as measured by care quality ($b = 0.02$; $p < .01$) but a curvilinear association with job satisfaction. Separating an individual's perceived core (roles always perceived as part of the team) and periphery (roles sometimes perceived as part of the team), perceiving a larger core is positively associated with performance ($b = 0.03$ $p < .01$). In contrast, perceiving a larger periphery is marginally negatively associated with performance ($b = -0.02$, $p < .10$). This appears to be driven by divergence from the norm perception of the core, i.e., when individuals attribute to the periphery the roles that are considered by most others to be core. Our findings suggest that individuals viewing the roles they must team with more expansively may generate higher quality output but experience a personal toll. Delivering on the ideal of team-based care in dynamic environments may require helping team members gain clarity about their teammates and implementing policies that attend to job satisfaction as team boundaries shift and expand.

In many expertise-driven industries, organizations rely on teams to conduct complex work (Cummins, 2004; Dahlin et al., 2005), an approach that is increasingly seen as attractive in healthcare (Rosebaum, 2019). With growing numbers of clinicians and staff caring for patients across settings over time, the need for collaboration in patient care is great (Pham et al., 2009). Teamwork offers one pathway to help bridge differences, share information, and mutually adapt as needed (Bedwell et al., 2012) and is a key factor in integrating patient care (Kerrissey et al., 2022). Because of this, numerous expert panels, industry reports, and white papers over the past decade have urged organizing in “patient-centered care teams,” in which clinicians intentionally

collaborate with other disciplines to address the specific and often complex needs of each patient (Schottenfeld et al., 2016). In research, studies have indicated the value of team-based care efforts, finding associations with positive team dynamics and patient outcomes (Jackson et al., 2013; Song et al., 2017), and in practice, the term “team-based care” is widely familiar. However, this emphasis on team-based care has presumed a clear and consistent sense of who comprises the care team among clinicians and staff – an assumption that has not been directly interrogated and that may entail important implications for care delivery.

Prior research has noted the presence of uncertainty in primary care

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contexts about which roles comprise care teams (Chien et al., 2018), The very complexity and distributed interdependence that make teams attractive for healthcare environments are also the elements that make teams vexingly difficult to define and implement in this setting. Patients with multiple chronic conditions may visit as many as 16 different clinicians in a year, typically spanning multiple roles and care venues (Pham et al., 2007). On average, a primary care physician will interact annually with 229 other physicians across 117 practices (Pham et al., 2009) and see about 1200–1900 patients (Raffoul et al., 2016). This reality necessitates that primary care clinicians and staff work with a variety of care teams day-to-day, making stable teamwork with the same set of other individuals over time elusive. In this shifting and ambiguous context, clinicians and staff may exert substantial discretion in how expansively they perceive the set of other roles with whom they team, leading to differences in teaming perceptions that may be consequential for how care is delivered, such as the degree of information sharing that occurs.

Organizational scholarship has recognized the reality that multidisciplinary teams in dynamic, knowledge-based fields often do not resemble the stable, clearly bounded work teams of focus in much past team research (Edmondson, 2012; Hackman, 2002; Wageman et al., 2012). Past team research focused on team stability and boundedness because they are helpful for establishing climates and processes that facilitate information sharing and coordination (Hackman, 2002). In developing familiarity, teams come to learn how to draw on the expertise of their members and develop shared mental models (Lewis, 2004). Yet many teams today may not have the luxury of such clarity and stability because the complexity and dynamism of the work environments in which they exist call for them to be cross-boundary and fluid (Kerrissey et al., 2020). Teams in these contexts often come together to conduct complex and uncertain work, for which the teammates required may not be clear in advance or may shift over time as new needs and problems emerge. Scholars have used the terms “teaming” (Edmondson, 2012) and “dynamic participation” (Mortensen and Haas, 2018) to describe people collaborating flexibly, rather than in stable, clearly defined teams. In this paper, we use the term “teaming” (Edmondson, 2012) and refer to teammates in application to team-based care. Teaming in dynamic contexts may make factors that enable rapid coordination particularly relevant, such as swift trust (Meyerson et al., 1996) and relational coordination (Gittell, 2002, 2006), due to the need for more active and regular engagement across a large set of entities over time.

Research in dynamic settings has shown that perceptions of the environment, referred to as mental models, are important factors affecting teamwork. For example, mental models of who comprises a team can help people in teams with blurred boundaries know where to store and retrieve information (Mortensen, 2014) and may spur a sense of interdependence that facilitates collaborative behavior (Wageman et al., 2012). However, research in healthcare has not deeply investigated perceptions of team membership, potentially in part because teamwork in healthcare is so fluid (i.e., changing patient-to-patient), posing a challenge both to healthcare workers who must conceive of team members amid ambiguity and for researchers who seek to define and understand teamwork in this setting. For instance, in a recent conversation that one investigator had with a clinician about their team, the clinician remarked, “Well, it depends on what you mean by team.” And when probed about whom *they* consider as part of their team, they said, “Everyone ... at least sometimes.” As this example suggests, the team-based concept that is so important for ensuring diverse resources are brought together in service of patient care may often, in practice, be referred to and thought of in ways that are not meaningful – i.e., when different people use the term to refer to different individuals.

Attending to this ambiguity about the team and clarifying perceptions of team boundaries is important to delivering on the team-based care ideal that is broadly promoted in health policy. How clinicians and staff facing such ambiguity conceive of the roles with which they are

meant to team may have important implications for interaction in the care process. Because team interactions are vital to developing shared understanding of work (LeBreton and Senter, 2008), such choices may be notably consequential for care quality and job satisfaction. For instance, less expansive views on the roles that comprise one’s set of teammates may lead to less information being shared across disciplines, thereby harming care quality; or, too broad a perspective may make the team entity too diffuse to collaborate across, leading to gaps and process losses (Hackman, 1987). Similarly for job satisfaction, a more expansive view could be more rewarding and inclusive, or it could lead to collaborative overload and, ironically, feelings of loneliness and isolation as deeper relationships become rare (Hadley and Mortensen, 2021).

To investigate these questions in the context of primary care requires new ways of conceptualizing and measuring dynamic teamwork. In this study, we combine theory on mental models and role-based work to frame and measure how primary care clinicians and staff perceive of the teammates with whom they deliver care and to identify potential implications for care quality and job satisfaction. We build on the existence of clear roles in the context of primary care, as physicians, nurse practitioners, physician assistants, nurses, medical assistants, and front desk staff are expected to team together and with an array of other roles, such as therapists, specialists, and social workers. We draw on survey data to characterize how clinicians and staff describe the roles they team with and analyze their responses across multiple clinics to (1) describe variation in distinct measures categorizing how “expansive” individuals’ perceived care teams are (i.e., how many roles they include and how frequently) and (2) assess how these perceptions relate to care quality and individual job satisfaction.

This study makes three primary contributions. First, drawing on roles and mental models, we offer a new vantage point for shedding light on teaming in primary care, from the perspective of clinicians and staff, and we document great variation in their perceptions. This is important because different perceptions of who comprises the care team are likely to affect the type and intensity of coordination that occurs. Second, we find evidence that the expansiveness of these perceptions is related to both perceived care quality and job satisfaction, indicating that perceptions of the roles comprising one’s team may have material implications. Third, we highlight that while the relationship between teaming expansiveness and care quality appears linearly positive, the relationship between teaming expansiveness and job satisfaction is curvilinear in a concave direction, first positive, then negative. This suggests that an unexamined push toward team-based care in policy may come with unintended negatives for how clinicians and staff experience their work, signalling an opportunity for intentional design to improve team-based care implementation.

1. Theoretical background

To frame the conceptualization and measurement of perceptions of teaming in primary care, we draw on and combine literature on mental models and role-based work. Mental models provide a way of conceptualizing the perceptions that people have of who comprises their team (Mortensen, 2014), while role-based work offers a way of applying the mental model notion to teamwork in the highly fluid and ambiguous team context of primary care where professional roles are central (Valentine and Edmondson, 2015). We thus suggest that “role-oriented mental models of who is on a team” is a helpful conceptualization for team-based care – because it can capture more flexible teaming experiences like “the social worker is sometimes part of the care team” rather than seeking to define stable, personalized team representations (i.e., “Nancy is my teammate”) as is more typical in team measurement.

1.1. Mental models

A mental model refers to one’s psychological representation of the environment and how it is expected to operate (Hobfoll, 1989).

Individuals develop and rely on mental models to interpret their surroundings and the events that occur within them and to guide their actions in response (Rosenbaum, 2019; Woehr et al., 2015). Though research on mental models in dynamic settings is limited, there is evidence that individuals working on teams with ambiguous boundaries (in software development) can perceive of their team membership differently, even from others who are purportedly on the same team (Mortensen, 2014). Research on teams of this nature tends to use lists of specific employee names to describe and verify team membership (e.g., providing an employee with a list of names thought to be on their team and asking them to verify, or asking an employee to generate a list of names themselves). This approach of hand-crafted name-based team mental models has limited application in the context of primary care because the continuous shifting of teammates in care would typically render hand-crafted lists too rigid to reflect reality. One alternative is to use roles as a more flexible substitute in constructing mental models of teaming.

1.2. ROLE-BASED work

Role-based approaches are common in fluid, fast-paced contexts where groups often form temporarily to conduct joint work and/or individuals rotate frequently due to evolving needs or shift schedules, a conceptualization of work that has been applied to healthcare contexts in past research (Valentine and Edmondson, 2015). A key feature of role-based work is that roles can be defined with clear responsibilities of what the role is meant to do and be accountable for, such that any individual who has been trained in a role can substitute in to perform it (Bechky, 2006; Klein et al., 2006). Because of this, role-based structures can enable coordination in groups without depending on the identity of the specific individual occupying each role – known as a ‘de-individualized’ form of coordination (Klein et al., 2006). In healthcare, the primacy of role-based approaches is evident in the dominant focus on professional education and licensure (e.g., nursing, physician) alongside more recent efforts to promote interprofessional collaboration.

Yet, while role-based work describes the basis of how much of primary care continues to be structured and approached, there has been an intentional policy shift over the past decade to move beyond interprofessional training toward a focus on team-based care (e.g., Schottenfeld et al., 2016). Practically, team-based approaches are seen as attractive in primary care due to primary care physician shortages and a need to rely on multiple roles to meet demand (Bodenheimer and Smith, 2013). Beyond this material need, a team-based approach also offers the advantage of helping to establish greater collective accountability, shared understanding of the work, and norms that facilitate cooperation among the set of individuals involved, which are believed to be central features of integrating services and improving care quality (Kerrissey et al., 2022). There is a great need to identify the conditions under which various roles in primary care come to think and act in a team-like way and understanding the extent to which individuals view other roles as part of their teams is one important step in doing so.

1.3. ROLE-ORIENTED mental models of teaming

In this paper, we examine mental models of teaming that are oriented to roles – i.e., defined by the set of roles with which individuals consider themselves to team. These perceptions are important to understand because they are likely to influence how people act. Past research has shown that frequent membership change on teams is disruptive to interpersonal processes, but that teams that adapt effectively can mitigate these challenges (LeBreton and Senter, 2008). In dynamic environments, more expansive mental models of teaming may help team members adapt and use coordination mechanisms that are appropriate to the context. For example, they may be able to better rely on relational coordination among core members on whom they most rely for their work, heightening factors like frequency of communication and respect

(Gittel, 2006; Gittel et al., 2000). For more peripheral team members who may interact only episodically, mechanisms that enable rapid teaming may be particularly relevant, such as the ability to establish swift trust (Meyerson et al., 1996) or joint problem-solving orientations (Kerrissey et al., 2021).

We thus first set out to implement a novel measurement strategy that would enable comparable and consistent description of the expansiveness of clinician and staff perceptions of teaming in primary care, based on the concept of role-oriented mental models (namely, by surveying primary care clinicians and staff about the frequency with which they consider specific other roles to be part of the care team). Because the implications of these perceptual differences are unclear, we then tested two general hypotheses.

Our first hypothesis posits that teaming expansiveness relates positively to care quality, for both behavioral and processual reasons. Behaviorally, more expansive teaming perceptions may widen the perceived “in-group” and thus may make team members more likely to be inclusive of, and work productively with, a broader set of roles (Tajfel and Turner, 1986). From a process perspective, more expansive perceptions of the roles on one’s team may increase the likelihood and time spent in syncing up with them, which should enable learning about who knows what (Salas et al., 2008). We hypothesize this positive relationship to care quality to be present for both roles considered always on the team (core) and sometimes on the team (peripheral) due to the complex nature of the work in primary care and the need for multiple roles to be involved. For instance, ethnographic research has shown that cycles of coordinating with more peripheral roles are important to teamwork in intensive care units (Mayo, 2022), while other research has found that having an appropriate set of roles on a core team is particularly important for complex work (Vaulont et al., 2021).

Our second general hypothesis posits that teaming expansiveness exhibits a curvilinear relationship with job satisfaction, in a concave (inverted U) shape, such that greater expansiveness is initially beneficial but becomes harmful at higher levels. Some expansiveness in perception is likely to be beneficial if it helps people distribute burdensome workload or develop fulfilling relationships; for instance, research using electronic health records has found that greater physician well-being is associated with having a higher number of medical assistants within the close support team and a higher share of messages related to ambiguous diagnoses that presumably require more teamwork to solve (Escribe et al., 2022). Yet organizational scholars have also cautioned that large teams tend to bring higher demands and costs for coordinating (Hackman, 1987). Larger team sizes have also been found to harm the quality of group experience, in part spurring counterproductive behaviors such as social loafing, parasitism and interpersonal aggression (Aubé et al., 2011). As clinicians and staff strive to collaborate across so many entities in pursuit of team-based care, their emotional and cognitive resources may become depleted, leaving them to feel overwhelmed or exhausted (Hobfoll, 1989; Hobfoll and Freedy, 1993). These challenges may arise with size alone and may be further accentuated in settings with multiple professions, which tend to bring differences in norms, values and work approaches that can further engender conflict and process loss (Hall, 2005). Additionally, scholars have suggested that a sense of relatedness among people is vital to their feeling engaged and proactive (Ryan and Deci, 2000); more recently, others have described observing an ironic rise in loneliness as teams grow ever larger (Hadley and Mortensen, 2021). We thus hypothesize a curvilinear relationship between teaming expansiveness and job satisfaction.

2. Methods

Setting. To investigate role-oriented mental models of teaming and their implications, we study clinicians and staff in primary care clinics in the United States. This presented an ideal context for this study because individuals across the clinics faced similar work-based task demands and fluid team contexts – all sites were part of larger organizations (health

systems comprised of at least one hospital and one physician organization) and had percentages of patients on Medicare, ranging from 15% to 44% in the sample. Thus, while individual patient needs may differ, needs across the patient populations served by clinicians in this sample are likely sufficiently similar to call for multiple roles in care teams.

Sample and administration. Through consultation with managers from each of 59 clinics that agreed to participate in this study, we received a full list of the names and work e-mails of all clinicians and staff within their clinics. We then drew a random sample of up to 26 clinicians and staff from each clinic, stratified by role, including clinicians (physicians, nurse practitioners, physician assistants, registered nurses, licensed vocational nurses, licensed practical nurses, and others such as social workers and therapists) and administrative staff (e.g., receptionists, medical assistants, clerks). This resulted in a sample of 1360 clinicians and staff across 59 primary care clinics within 17 health systems across four states. We sent the survey to the sampled clinicians and staff directly through e-mail and by paper mail when needed (if no response by email). We administered the survey in English on a rolling basis as new sites were recruited, from December 2017 to October 2019, and we conducted up to five waves in each site (three by email, two by paper). The survey took about 12 min to complete. Clinic managers received a \$99 gift card or donation; respondents received a \$5 gift card. We received 828 completed responses (61% response rate) across 59 clinics. [Table 1](#) presents the sample.

Survey development. The survey questions used in this study were part of a larger survey measuring care delivery and work experience (citation suppressed). The survey was developed through extensive literature review and key informant interviews and underwent cognitive testing. The focus in this study pertains to a question asking about perceived care team membership, based on role: “When serving the same patient, how often do you regard the following types of provider or staff member as part of your team,” which was followed by a list of 16 role types (primary care physician, physician assistant/nurse practitioner, nurse/case manager, medical assistant, clerk/receptionist, health educator, pharmacist, social worker/therapist/counselor, clinical psychologist, psychiatrist, dentist, community health worker, visiting nurse, nutritionist/dietician, non-primary care specialist, hospitalist). Respondents chose from four response options: rarely/never, sometimes, usually/always, don't know/not applicable.

Measures. We constructed measures of role-oriented mental models of teaming by drawing on the above-described question about roles considered part of one's care team. We calculated distinct but related measures of teaming expansiveness. *Total expansiveness* is a count of the overall number of roles considered on one's team either sometimes or usually/always. *Core expansiveness* is a count of the roles considered usually/always on the team. *Periphery expansiveness* is a count of the roles considered sometimes on the team. For description, we also calculated *teaming concentration* as the percent of roles that the individual perceives as core (always) out of the total roles ever considered part of the team (always plus sometimes).

In follow-up analyses to explore a surprising finding pertaining to the

periphery, we further separated the periphery into two components reflecting whether the individual's perception of the periphery was divergent from others' views of the periphery, referred to as divergent or non-divergent. *Divergent periphery* is a count of the roles that the respondent included as periphery and that were mentioned as core by at least 60% of all other respondents to the survey. *Non-divergent periphery* is a count of the roles that the respondent included as periphery that less than 60% of other respondents included as core. The following five roles were included as core by at least 60% of respondents: primary care physician, physician assistant/nurse practitioner, nurse/case manager, medical assistant, and clerk/receptionist. Thus, anyone reporting one of these roles as part of their periphery would have that role count toward the respondent's divergent periphery size; reporting any other roles as part of their periphery would count toward a respondent's non-divergent periphery.

In addition to measures of perceived teaming expansiveness, we draw on the survey for two dependent variables in regression analysis, both using five-point agreement scales in which higher scores denoted more positive agreement: job satisfaction (“Overall, I am satisfied with my current job”) and perceived care quality within the clinic (“Compared to a year ago, our patients are receiving better quality of care”), adapted from prior measures of performance used in healthcare research ([Friedberg et al., 2014](#)). Control measures, also from the survey, include the respondent's duration of employment in the clinic, role, whether they are a supervisor (1 = yes), race (white = 1; nonwhite = 0), and, derived from the sample frame, the size of the clinic where they work (total number of clinicians and staff). We controlled for duration of employment because people become less satisfied as their tenure in the organization increases ([Dobrow Riza et al., 2018](#)) and show lower perceived quality ([Villas-Boas, 2020](#)). We controlled for professional discipline and supervisor/leadership role, as leaders tend to be less satisfied but also to perceive higher quality, and different roles tend to report different perceptions ([Singer et al., 2008](#)). We also controlled for race as an important demographic variable that was negatively associated with perceived quality of care in all models.

Analysis. We first conducted univariate and bivariate analyses, examining the frequency distribution of the teaming expansiveness and divergence variables for each role and each outcome variable, and we calculated the means, standard deviations, and correlations among all variables. We descriptively compared these variables across respondent roles.

We checked the appropriateness of examining perceived team boundaries from the individual (rather than clinic-level) perspective using intraclass correlation coefficients and a one-way analysis of variance using clinic as a grouping variable to test the consistency and reliability across responses ([LeBreton and Senter, 2008](#)). Clinic-level ICCs for roles perceived on a team ranged from 0.00 to 0.11 across each role type, falling below means used to justify group-level aggregation in the literature (which tend to range from 0.12 to 0.22, see [James, 1982](#); [Woehr et al., 2015](#)). ICC(2) ranged from 0.02 to 0.58, as compared to means in the literature which range usually from 0.40 to 0.66 ([Fleiss, 1986](#); [Woehr et al., 2015](#)).

To explore the relationship among the teaming perception and outcome measures, we used regression models. We assessed the relationship of each team measure to each outcome first using linear models. Given the nested structure of our data, individuals within clinics within organizations, we used multilevel mixed-model analyses that take into account that individuals in particular clinics may be more similar to each other (using the “mixed” procedure in Stata with clinic-level and health-system-level random intercepts). To test for the non-linear relationships hypothesized for job satisfaction, we then added a squared term for the expansiveness measure. We plotted curvilinear relationships at one standard deviation above and below their means ([Aiken et al., 1991](#)). All analyses were conducted using Stata Version (17). This research was approved by the relevant institutional review board.

Table 1
Sample characteristics.

Descriptive characteristics	n (%)
Total respondents	828
Clinic sites represented	59
Clinic size (mean)	59
Race (1 = white; 0 = not white)	470 (56.76)
Professional discipline	
Primary care physician	192 (23.19)
Physician assistant/nurse practitioner	73 (8.82)
Registered nurse/nurse case manager/LVN/LPN	139 (16.79)
Clerk/receptionist	91 (10.99)
Other	289 (34.90)
Length of time at clinic site 2+ years	590 (71.26)
Supervisor role	207 (25%)

3. Findings

We found evidence of variation in the roles that individuals perceive as part of their team in primary care, even for respondents in the same clinic and reporting role. As one illustration, Fig. 1 displays visually the differing responses from two physicians in the same clinic. Physician A views themselves as the only role to be always on the team, with physician assistant, nurse, and psychiatrist roles sometimes on the team and the remainder rarely on the team. By contrast, Physician B views nine other roles in addition to their own role as always on their team, with no one sometimes on their team and the remainder rarely on it.

Table 2 presents measure means, standard deviations and bivariate correlations. Overall, the mean perceived total teaming expansiveness – number of roles always or sometimes team members – was 10.60 roles out of the possible 16, with a standard deviation (SD) of 5.09. The core team (“always” roles) mean was 7.72 roles (SD = 5.01) and the periphery (“sometimes” roles) was 2.88 roles (SD = 3.69). Mean team concentration was 0.74, reflecting that on average 74% of the reported total teaming roles were considered always on the team (and 26% only sometimes on the team).

There were distinct patterns of differences in likelihood of being considered part of one’s team across the roles (Fig. 2). Primary care physicians were most frequently considered always part of the team (88.42%), followed by medical assistants (85.16%). Beyond the five roles included as core (“always” on the team) by at least 60% of respondents (primary care physician, physician assistant/nurse practitioner, nurse/case manager, medical assistant, and clerk/receptionist), there was a notable break with the remainder of roles. Following the least frequent role of the core team (nurses, with 63.21% always on the team), the next most often reported role to always be on the team was health educators (45.11%) followed by pharmacists (44.51%).

Table 3 presents regression results exploring relationships of perceived teaming expansiveness with perceived care quality and job satisfaction. We found support for our general hypothesis that total expansiveness is associated with greater care quality, and similarly for core expansiveness. As shown in Model 1a and 1b, total expansiveness and core expansiveness were positively associated with care quality in the clinic ($\beta = 0.02$, S.E. = 0.01, $p < .01$ and $\beta = 0.03$, S.E. = 0.01, $p < .01$ respectively). Team concentration was marginally significant and positively associated with care quality ($\beta = 0.27$, S.E. = 0.16, $p < .10$).

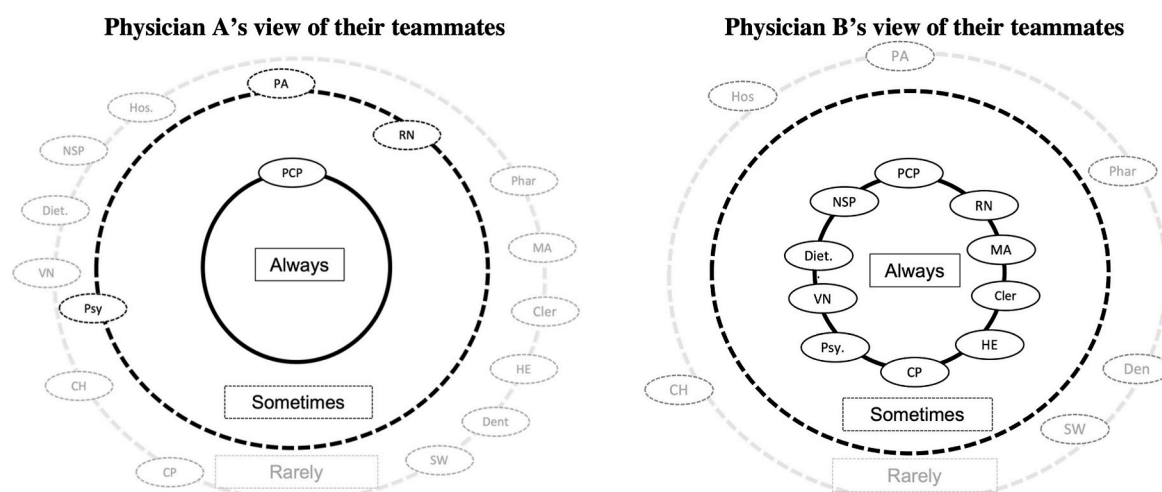
We did not find support for our hypothesis that periphery expansiveness would be positively related to care quality; on the contrary, the periphery measure displayed a marginally significant negative association with care quality ($\beta = -0.02$, S.E. = 0.01, $p < .10$). To explore this surprising negative finding, we compared the periphery when disaggregated into the divergent and non-divergent periphery (i.e., where divergent periphery is a count of the roles described as peripheral that at least 60% of other respondents described as core). We found that only the divergent periphery, not the non-divergent periphery, was significantly negatively associated with lower care quality ($\beta = -0.09$ S.E. = 0.04, $p < .05$). In other words, the negative association between periphery expansiveness and care quality is statistically significant only when roles that are generally considered core are being considered as periphery by the individual respondent.

We found partial support for our hypothesis regarding a curvilinear relationship between teaming expansiveness and job satisfaction. For core and periphery expansiveness as well as team concentration, there were statistically significant curvilinear relationships with job satisfaction ($\beta = -.01$, S.E. = 0.00, $p < .05$; $\beta = -.01$, S.E. = 0.00, $p < .05$; $\beta = -1.38$, S.E. = 0.54, $p < .01$; respectively); total expansiveness exhibited a positive association with job satisfaction with marginal statistical significance ($\beta = 0.06$, S.E. = 0.04, $p < .10$), and the quadratic term for total team expansiveness was at the cusp of marginal significant ($p = .098$). Fig. 3 depicts the relationship between the team measures and job satisfaction. Although not directly part of our hypothesizing, we also checked for curvilinear relationships between teaming expansiveness and care quality for comparison and confirmed that there were no statistically significant curvilinear relationships.

4. Discussion

Our findings reveal notable variation in how expansively clinicians and staff view the roles that comprise their care teams. While more expansive teaming perceptions were associated with higher care quality, there was a curvilinear relationship with job satisfaction. Amid calls for greater emphasis on team-based care, there is a deep need to account for and understand variation in mental models of teaming to promote effective and sustainable teaming behaviors.

The tendency to assume that team membership is unambiguous and commonly perceived has been observed in organizational research and



NOTES: The solid-line inmost circle represents roles the respondent considered “always” on the team; middle dotted black circle is for “sometimes” roles; outmost, dotted gray circle is for “rarely” roles. Physicians A and B had similar tenure in their organizations, but Physician B was a supervisor (Physician A was not). Acronyms: PCP primary care provider; RN nurse; MA medical assistant; Cler. clerical/front desk; Psy. psychiatrist; Diet. dietitian; PA physician assistant; Phar. pharmacist; Den. dentist; Hos. hospitalist; NSP non-primary care specialist; VN visiting nurse; HE health educator; CP clinical psychologist; SW social worker, therapist, counselor.

Fig. 1. Illustration of differences in perceptions of teaming expansiveness: A comparison of two physicians’ responses from the same clinic.

Table 2
Means, standard deviations and bivariate correlations of study variables.

Research Variables	Mean (S.D.)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Control variables													
(1) Time in clinic	0.75 (.44)	1.00											
(2) Supervisor	0.26 (.44)	0.12**	1.00										
(3) Race (white)	0.63 (.48)	0.05	0.00	1.00									
(4) Clinic size	014.1 (11.2)	0.03	0.15**	0.01	1.00								
Independent variables													
(5) Total teaming	10.60 (5.09)	-0.04	0.05	0.07	0.12**	1.00							
(6) Core teaming	7.72 (5.01)	-0.06	0.00	-0.03	0.04	0.73**	1.00						
(7) Periphery teaming	2.88 (3.69)	0.03	0.06	0.13**	0.10**	0.38**	-0.35**	1.00					
(8) Divergent periphery	0.45 (.981)	-0.01	0.02	0.04	0.04	0.08 ^a	-0.38**	0.62**	1.00				
(9) Non-divergent periphery	2.44 (3.18)	0.04	0.07	0.13**	0.10**	0.42**	-0.29**	0.97**	0.41**	1.00			
(10) Team concentration	0.74 (.29)	-0.04	-0.07	-0.10**	-0.10**	-0.13**	0.60**	-0.92**	-0.68**	-0.85**	1.00		
Dependent variables													
(11) Quality in clinic	3.86 (1.03)	-0.06	0.11**	-0.20**	-0.09**	0.05	0.10**	-0.07	-0.09 ^a	-0.05	0.09	1.00	
(12) Job Satisfaction	3.88 (1.01)	-0.03	0.00	0.04	-0.07	0.03	0.04	-0.01	-0.06	0.00	0.02	0.34**	1.00

^a $p < .05$; ** $p < .01$.

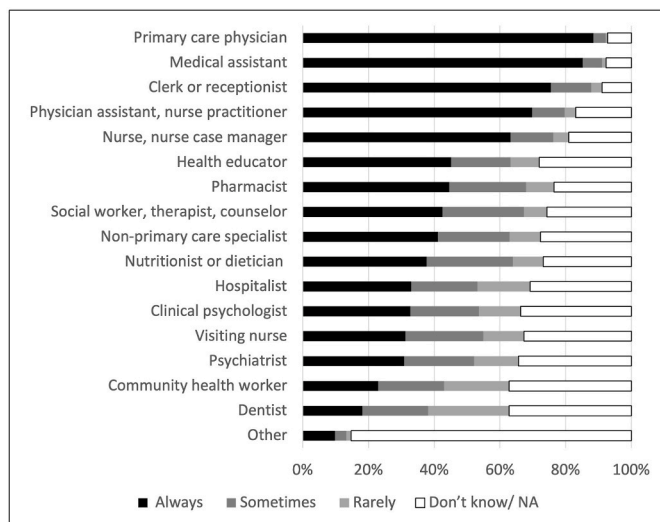


Fig. 2. Frequency of responses about inclusion in the team for each role.

challenged by the documentation of substantial divergence in mental models of teams in dynamic industries (Dahlin et al., 2005; Mortensen, 2014). Our findings suggest that a similar phenomenon is present in primary care, where calls for team-based care are often made amid ambiguous team contexts and thus may mask considerable variation in what is being conceptualized as a team from individuals' perspectives. That some clinicians and staff view their care teams more expansively than others lends evidence to the idea that team members exert discretion in how they perceive of their teams.

Our finding that more expansive teaming perceptions relate to greater perceptions of care quality suggests that there may be benefits to more inclusive mental models of teaming in primary care. Perceiving broader core teams may help generate the type of familiarity that is conducive to productive team dynamics such as psychological safety (Iyasere et al., 2022). More expansive perceptions may also aid care quality because viewing other roles as teammates spurs coordination, for example the enactment of aspects of relational coordination, such as having accurate and timely communication and exhibiting mutual respect, which have been found to enable performance (Gittell, 2002; Gittell et al., 2000). However, while broader perceptions of who is on the team may set the stage for psychological safety and coordination by ensuring the necessary cast interacts and by legitimizing investments in

building relationships, these broader perceptions by no means guarantee that positive teamwork dynamics will unfold. Leader and team member behaviors identified in past research that encourage conducive climates for speaking up and listening, such as leader inclusiveness (Nembrand and Edmondson, 2006), vulnerability (Coutifaris and Grant, 2022), and voice cultivation (Satterstrom et al., 2021), are likely highly relevant. Future research to document these other factors in relation to teaming perceptions is needed, as are efforts to study interventions that clarify and expand teaming perceptions.

Our findings also highlight that more expansive teaming perceptions may entail a cost to job satisfaction for clinicians and staff – a cost that could perhaps be mitigated through intentional action. Efforts to incorporate more roles in team-based care, while beneficial for patients, may at a point make clinicians and staff less satisfied with their jobs due to the complexity of functioning within larger teams and the effort required to do so. Research in other industries has similarly documented such challenges and suggested that the adage “the more the merrier” may not be apt in teaming at work (Aubé et al., 2011). Individuals may also lose their sense of relatedness when the mental model of the team is highly diffuse, which can lead to feelings of alienation (Ryan and Deci, 2000). Indeed, research has underscored the importance of teams in clinician experience and burnout (Bhanja et al., 2022). But these satisfaction challenges of broader teaming perceptions may not be a necessary consequence; thoughtful design and intentionally setting climates could mitigate them. Structures that might be helpful could include interventions to clarify and keep stable more limited core teammates, with more frequent updating and fluidity among the periphery. Climates might be enhanced by establishing joint problem-solving orientations that emphasize shared objectives (Kerrissey et al., 2021) or swift trust that minimizes the barriers to collaboration (Meyerson et al., 1996). With such updates, satisfaction could remain high or improve despite larger teams.

At the same time, our findings about the peripheries in teaming perceptions point to the importance of distinctions in the specific roles considered in teaming mental models, beyond simply having more or fewer roles included. We found a negative association of peripheral teaming with care quality when individuals assigned to the periphery the roles that are generally regarded as core. While we cannot observe an externally identified “accurate” teaming mental model in these data, the general assignment of roles to core and periphery across the entire sample of respondents offers a proxy – and that divergence from the general perspective helped to explain reduced levels of care quality suggests that teaming perceptions may be importantly differentiated along specific roles and how they are allocated within an individual's view. For practice, this implies that some individuals may attribute roles

Table 3
Multi-level regression models relating teaming expansiveness to care quality and job satisfaction (N = 828).

	Care Quality						Job Satisfaction			
	Model 1a	Model 1b	Model 1c	Model 1d	Model 1e	Model 1f	Model 2a	Model 2b	Model 2c	Model 2d
Control Variables										
Time in clinic	-.23** (.08)	-.23** (.07)	-.20* (.08)	-.20* (.08)	-.20* (.08)	-.20* (.08)	-.08 (.11)	-.09 (.11)	-.09 (.11)	-.07 (.11)
Supervisor role (yes)	.31**(.09)	.32**(.09)	.32**(.09)	.32** (.09)	.32**(.09)	.32**(.09)	-.00 (.07)	-.00 (.07)	.00 (.07)	-.01 (.07)
Race (white)	-.32** (.08)	-.30** (.08)	-.31** (.08)	-.31** (.07)	-.31** (.08)	-.31** (.08)	.13 (.11)	.14 (.10)	.14 (.11)	.13 (.12)
Professional discipline (primary care physician)	.03 (.10)	.04 (.10)	.05 (.10)	.04 (.10)	.04**(.10)	.05 (.10)	-.03 (.11)	-.03 (.11)	-.03 (.10)	-.01(.10)
Clinic size	-.01* (.00)	-.01* (.00)	-.01 (.00)	-.01† (.00)	-.01† (.00)	-.01* (.00)	-.00 (.01)	-.00 (.00)	-.00 (.01)	-.01(.01)
Independent Variables										
Total teaming	.02**(.01)						.06†(.04)			
Total teaming squared	-						-.00 (.00)			
Core teaming	.03**(.01)									
Core squared	-		.10** (.03)							
Periphery teaming				-.02† (.01)						
Periphery squared				-		.06*(.02)				
Divergent periphery				-.09* (.04)						
Non-divergent periphery						-.01 (.01)				
Teaming concentration							.27†(.16)		1.80*(.71)	
Cocentration squared							-		-1.38* (.54)	

Robust standard errors (SE) shown in parentheses based on random coefficient modeling based on multi-level modeling; †p < .10; *p < .05; **p < .01.

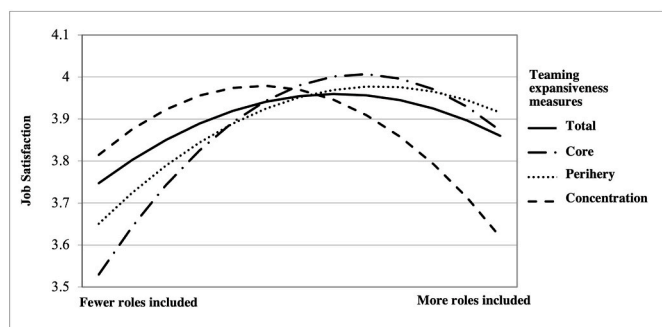


Fig. 3. Relationships of each teaming expansiveness measure with job satisfaction.

sub-optimally when left to their own discretion; being explicit and thoughtful about who is core and who is peripheral – and for what purpose – may be particularly helpful.

Designing interventions to establish structures and processes that help delineate who is part of the team, and whether they are core or peripheral, may be highly valuable. For instance, research in the emergency department setting has found that deliberate bounding of who is involved in a care episode using role-based “pods” can help establish shared accountability and belonging – and improve patient throughput (Valentine and Edmondson, 2015). In primary care, efforts to transform toward team-based care could include strategies to further clarify teams and their interconnections, such as by subdividing into smaller team units and then specifying shared staff across them (Chien et al., 2018). In parallel, processes such as team huddling can aid information sharing across multiple entities (Pimentel et al., 2021). For more peripheral teammates, less effortful methods may be beneficial, such as using whiteboards to share information, temporary co-location, or technology like patient relationship management systems that enable

teams to efficiently and continuously communicate with one another and with patients.

Our findings raise questions about the underlying reasons for the differences in perceptions of teaming that we document. Why would two physicians in the same clinic see their teammates so differently? Perceptions of teaming may be associated with antecedent factors pertaining to the individuals (e.g., demographics, personality type), their work (e.g., scope of individual responsibility, past work experience and training), and the specific environment in which they currently work (e.g., through exposure to peer subgroups that affect their perceptions). For instance, pertinent factors like perceptions of respect have been shown to vary across professional roles based on professional training and past experience (Hall, 2005). Comprehensively understanding these mechanisms underlying differences in teaming perceptions is vital for designing effective interventions, and this need calls for future qualitative or multi-method research that can uncover them.

Our findings have implications for measurement of teamwork in dynamic settings in general and specifically in primary care. As previous work has mostly focused on teams with stable structure and membership (Dibble and Gibson, 2018), most efforts to measure and describe teamwork in healthcare rely on survey measures that ask about one’s team generally. Our findings imply that when surveyed about their teams, clinicians and staff may be responding about notably different entities from one another (and from what those conducting the research are imagining). This lends empirical support for the need articulated in recent calls to integrate other modes of measuring and defining team entities in fluid environments, such as network methods (Bhanja et al., 2022). We hope that our methods of applying role-based mental models using survey-based measurement will be useful to future efforts to characterize and examine teaming in dynamic environments, including potentially in other contexts beyond primary care.

The benefits of this role-oriented approach to measuring teaming perceptions in healthcare settings does not negate the relevance of personalized representations (i.e., thinking about “Chris” rather than the

“Nurse” as part of the team). In care environments where teams are more bounded, using personalized representations may help to capture more meaningful affective bonds and may capture signals of productive team climates (e.g., if a doctor knows the name of the social worker, this may be a signal or a mechanism to generate better team relationships). Both personalized and role-based team representations have merit in healthcare research, and future research to examine these two approaches in parallel may help identify when and how each conceptualization can best be leveraged.

Furthermore, there is opportunity to extend the role-oriented mental model approach to capture levels of agreement within clinics. This study focused on role-based mental models of teaming from the perspective of individual clinicians and staff. A large body of research has suggested that shared understandings are vital (Luria, 2008; Schneider et al., 2002), and the sharedness of mental models has been found to be valuable for multiple aspects of work (Dahlin et al., 2005; Mortensen and Haas, 2018), in part because it facilitates the team’s understanding and use of members’ knowledge, helping them effectively store and retrieve information (Lewis et al., 2007; Moreland et al., 1996). Moreover, research on teams outside of healthcare has suggested that some shared sense of who is on or off the team can be advantageous to performance (Mortensen, 2014). However, we did not find strong clinic-level association in how teaming mental models were formed, though our clinic-level sample was limited in size. Future research to explore when and how role-based mental models of teaming are shared or not within clinics or their sub-groups (i.e., using variance-based agreement measures) may be enlightening and help elucidate the relationship between teaming perceptions and climates in clinics.

Our research involves limitations. First, our findings are cross-sectional, and causality can not be drawn from our findings. Moreover, given that teaming is dynamic in primary care, efforts to longitudinally track role-oriented perceptions are needed. Research using broader sets of contextual control measures is warranted; for example, while we control for size by personnel, we are not able to control for other clinic resources that might enable better performing clinics to sustain larger teams. Second, while our sample includes individuals from 59 primary care clinics across the US, the generalizability is limited. Other settings, both within and outside primary care may exhibit importantly different relationships. Third, we were limited to the subjective perceptions of our care quality and job satisfaction outcome measures; future research can explore use of externally collected quality data or personnel turnover to assess these relationships more fully. Fourth, we were not able to control for team-level structures, organizational features or norms that might affect how individuals conceive of teaming, such as being a patient centered medical home, using regular team huddles or broader team meetings, or having norms around meeting attendance; future research examining whether and how such factors alter perceptions would be fruitful.

The presence of ambiguous boundaries in teamwork is likely an ongoing feature of healthcare delivery. Future research to understand how individuals perceive their teammates in these contexts, how teaming boundaries can be clarified, and how leaders might intervene for improvement is vital to enabling high care quality and job satisfaction.

Credit author statement

Michaela Kerrissey: Conceptualization; Formal analysis; Investigation; Writing of original draft and editing, Zhanna Novikov: Formal analysis; Editing; Methodology; Visualization, Maike Tietschert: Editing; Methodology, Russell Philipps: Conceptualization; Review and Editing, Sara Singer: Conceptualization; Review and Editing; Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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