

### Editor's key points

- The theoretical framework of teamwork effectiveness in rural physician teams indicates that *team climate*, which is defined by decision making, communication, and conflict resolution, leads to *team efficacy*, which in turn leads to *team performance*, *team commitment*, and *intentions to stay*. The findings of this study were consistent with this framework, as team climate positively predicted team efficacy, which positively predicted team performance. This relationship held for both physician- and external observer-rated team performance.
- The effect from team climate to team performance was completely mediated by team efficacy, reinforcing the important role of team efficacy in this framework.
- This study provides novel evidence that improving the abilities of teams of physicians in their decision making, communication, and conflict resolution can lead to organizational benefits and thus better patient care.

# Teams of rural physicians matter

## Testing a framework of team effectiveness

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### Abstract

**Objective** To examine how rural physician team effectiveness predicts outcomes of team performance, team commitment, and intentions to stay.

**Design** Surveys measuring team climate, team efficacy, and team performance were sent to rural physician team members. Surveys measuring team performance were sent to external observers in supervisory positions.

**Setting** Northern Ontario communities.

**Participants** Rural physicians and external observers, the latter including hospital chief executive officers, family health team executive directors, and clinic managers.

**Main outcomes measures** Total scale scores were generated using mean substitution. Cronbach  $\alpha$  was used to assess internal consistencies of team member-level measures. Team-level measures were created by averaging the responses across team members, and intraclass correlation coefficients for each scale of each team of 2 or more members were calculated to yield a measure of rating consistency. A *t* test was used to assess the possible difference between team performance ratings by team members and external observers. Team-level relationships within the team effectiveness model were assessed using mediated regression, and generalized estimating equations were used to assess the relationships in the model between team-level (team efficacy) and individual-level (affective team commitment and intentions to stay) variables to address the nonindependence of these data.

**Results** Overall, 70 rural physicians from 26 Rural and Northern Physician Group Agreement communities with 2 or more physicians and 25 external observers from 19 of the 26 Rural and Northern Physician Group Agreement communities participated in the study. The findings showed that team climate (composed of decision making, communication, and conflict resolution measures) positively predicted team efficacy, which in turn positively predicted team performance. This fully mediated set of relationships held whether team performance was rated by the physicians themselves or by the external observers. Team efficacy significantly predicted affective team commitment (*b* value=0.69, standard error=0.08, Wald  $\chi^2_1=13.89$ ,  $P<.001$ ) in the first analysis and intentions to stay (*b* value=0.34, standard error=0.15; Wald  $\chi^2_1=5.42$ ,  $P=.020$ ) in the second analysis. However, when the other variables impacting physician retention were added to the model in predicting intentions to stay, team efficacy did not predict it above and beyond these additional predictors.

**Conclusion** The findings support initiatives that attempt to enhance physician team effectiveness in rural physician teams by influencing team decision making, communication, and conflict resolution to improve team performance, physician attitudes, and commitment.

# L'importance des équipes de médecins en milieu rural

## Faire l'essai d'un cadre de l'efficacité des équipes

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### Résumé

**Objectif** Examiner comment l'efficacité d'une équipe de médecins en milieu rural permet de prédire les résultats liés au rendement de l'équipe, à son engagement et à l'intention de rester en poste.

**Type d'étude** Les sondages qui mesuraient les données sur le climat au sein de l'équipe, son efficacité et son rendement ont été envoyés à des membres d'équipes de médecins en milieu rural. Les sondages qui mesuraient le rendement de l'équipe ont été envoyés à des observateurs de l'extérieur occupant des postes de supervision.

**Contexte** Des communautés du Nord de l'Ontario.

**Participants** Des médecins en milieu rural et des observateurs de l'extérieur. Parmi ces derniers, on comptait des présidents-directeurs généraux d'hôpitaux, des directeurs généraux d'équipes de santé familiale et des gestionnaires de cliniques.

**Principaux paramètres à l'étude** Le total des scores sur une échelle a été calculé à l'aide de la méthode d'imputation par la moyenne. L' $\alpha$  de Cronbach a été utilisé pour évaluer les cohérences internes des mesures au niveau de chaque membre de l'équipe. Les mesures au niveau de l'équipe ont été produites à partir de la moyenne des réponses par tous les membres de l'équipe, et les coefficients de corrélation interne pour chaque échelle de chaque équipe de 2 membres ou plus ont été calculés pour produire une mesure d'évaluation de la cohérence. Un test  $t$  a été utilisé pour évaluer la différence possible entre les taux de rendement de l'équipe évalués par l'équipe et les taux évalués par les observateurs de l'extérieur. Les relations au sein de l'équipe à partir du modèle de l'efficacité des équipes ont été évaluées à l'aide d'une régression par médiation, et des équations d'estimation généralisée ont servi à évaluer les relations dans le modèle entre les variables au niveau de l'équipe (efficacité de l'équipe) et au niveau individuel (engagement affectif de l'équipe et intention de rester en poste) pour examiner la non-indépendance de ces données.

**Résultats** Dans l'ensemble, 70 médecins en milieu rural dans 26 collectivités rurales desservies en fonction de l'Entente relative au groupe de médecins en milieu rural et dans le Nord par des équipes de 2 médecins ou plus, et 25 observateurs de l'extérieur venant de 19 des 26 collectivités rurales visées par cette entente ont participé à l'étude. Les constatations indiquent que le climat au sein de l'équipe (composé des mesures relatives à la prise de décisions, à la communication et au règlement des conflits) a prédit positivement l'efficacité de l'équipe, ce qui, en retour, a positivement prédit le rendement de l'équipe. Cet ensemble entièrement médié de relations est demeuré le même, qu'il soit coté par les médecins eux-mêmes ou par les observateurs de l'extérieur. L'efficacité de l'équipe a prédit de manière statistiquement significative l'engagement affectif de l'équipe (valeur  $b=0,69$ , erreur type=0,08,  $\chi^2$  de Wald=13,89,  $p<,001$ ) dans la première analyse et l'intention de demeurer en poste (valeur  $b=0,34$ , erreur type=0,15;  $\chi^2$  de Wald=5,42,  $p=,020$ ) dans la deuxième analyse. Par ailleurs, lorsque les autres variables influant sur la rétention des médecins étaient ajoutées au modèle dans la prédiction de l'intention de demeurer en poste, l'efficacité de l'équipe ne le prédisait pas davantage que ces facteurs de prédiction additionnels.

**Conclusion** Les constatations corroborent l'utilité des initiatives qui visent à améliorer l'efficacité des équipes de médecins en milieu rural en influençant la prise de décisions, la communication et le règlement des conflits en équipe pour améliorer le rendement de l'équipe, ainsi que les attitudes et l'engagement des médecins.

### Points de repère du rédacteur

► Le cadre théorique de l'efficacité du travail en équipe dans les équipes de médecins en milieu rural indique que le *climat au sein de l'équipe*, qui est défini par la prise de décisions, la communication et le règlement des conflits, mène à l'*efficacité de l'équipe* qui, à son tour, entraîne le *rendement de l'équipe*, l'*engagement de l'équipe* et l'*intention de rester*. Les constatations de cette étude concordaient avec ce cadre, puisque le climat au sein de l'équipe a prédit positivement l'efficacité de l'équipe, qui a prédit positivement le rendement de l'équipe. Cette relation valait pour l'évaluation du rendement de l'équipe à la fois par les médecins et par les observateurs de l'extérieur.

► L'effet produit par le climat au sein de l'équipe sur le rendement de l'équipe était complètement médié par l'efficacité de l'équipe, ce qui met en évidence le rôle important de l'efficacité de l'équipe dans ce cadre théorique.

► Cette étude a permis de dégager de nouvelles données probantes étayant que l'amélioration des aptitudes des équipes de médecins à prendre des décisions, à communiquer et à régler des conflits peut se traduire par des avantages organisationnels et, par le fait même, par de meilleurs soins aux patients.

Rural Canada struggles with recruiting and retaining physicians.<sup>1</sup> Many factors that affect this work force, such as remuneration and career development opportunities, are recognized,<sup>1-9</sup> but leveraging these has yet to remedy this issue.<sup>10,11</sup> Some have suggested creating teams of physicians to help improve the health resource challenge.<sup>12</sup> Implemented in 37 northern Ontario communities, the Rural and Northern Physician Group Agreement (RNPGA) is a physician payment plan encouraging local doctors to work together.<sup>13</sup> Physician signatories take on mutual accountability for shared responsibilities such as providing primary care services to a geographic population. This encourages teamwork, interdependent work behaviour, and the affective, cognitive, and motivational states that emerge during that work (such as trust, learning, and collective drive).<sup>14</sup> Effective team functioning is linked to important outcomes such as performance and workplace attitude.<sup>15-17</sup> These findings have been supported for interprofessional health care teams<sup>18-21</sup> but not yet for teams of physicians.

The purpose of this study was to examine how physician team effectiveness can play a role in enhancing physician retention in rural areas. To examine these outcomes through a “team” lens,<sup>22</sup> the theoretical framework in **Figure 1** was adopted. Based on Ancona and colleagues’ model of team effectiveness,<sup>15</sup> which translates well to the medical paradigm, the figure provides a graphic representation of the following hypothesized relationships assessed in this study.

*Team climate* leads to *team efficacy*, which leads to outcomes of *team performance*, *team commitment*, and *intentions to stay* with the organization (**Appendix 1**, available from **CFPlus\***). *Team climate* is members’ shared perceptions and interpretations of the multi-dimensional aspects of the work environment in terms of their psychological meaning and relevance.<sup>22</sup> We define it in 3 dimensions: decision making,<sup>23</sup> communication,<sup>23-25</sup> and conflict resolution.<sup>26</sup> *Team efficacy* is “a shared belief in a group’s collective capability to organize and execute courses of action required to produce given levels of goal attainment.”<sup>27</sup> It develops when teams are interdependent, are

interactive, and coordinate their tasks appropriately.<sup>27,28</sup> Thus, climate surrounds the team and efficacy is the team’s belief it can carry out its tasks within that climate.

Team efficacy is pivotal in predicting team performance,<sup>29-31</sup> job satisfaction,<sup>32</sup> commitment,<sup>33</sup> and intentions to stay,<sup>34</sup> which are linked to actual turnover<sup>35-37</sup> based on the Theory of Planned Behavior.<sup>38</sup> Knowing that team effectiveness can be improved,<sup>39</sup> establishing a physician team effectiveness framework provides avenues to impact physician attitudes and retention, with subsequent positive effects on patient access.

We hypothesize, through the study of RNPGA groups, that physician team climate, mediated by physician team effectiveness, leads to enhanced team performance and higher levels of organizational commitment and intentions to stay.

## — Methods —

### Physician sample, procedure, and measures

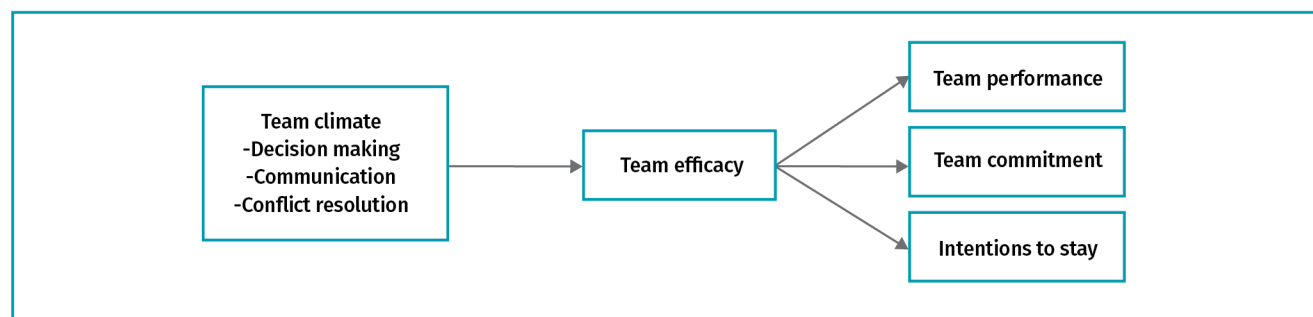
We developed a survey for RNPGA physicians that included demographic and construct measures. Items were all worded in a positive manner<sup>40,41</sup> and were responded to using a 5-point Likert scale. Team-level constructs were assessed with validated measurement tools: team climate was measured in 3 domains (decision making,<sup>23</sup> communication,<sup>23</sup> and cooperative conflict resolution<sup>42</sup>); team efficacy was measured using the team as the referent<sup>43</sup>; and team performance was measured with a 6-item measure.<sup>44,45</sup> Validated tools were also used to assess individual-level member measures (including team commitment,<sup>46</sup> with physician team as the referent) and intentions to stay.<sup>47</sup>

To control for their effects, physician retention constructs (drawn from the existing literature) were assessed in the areas of preparedness to practise rural medicine, career enhancement opportunities, integration into the community, working conditions, and partner support (**Appendix 2**, available from **CFPlus\***).

Surveys were mailed with a \$20 incentive. To mitigate low physician response rates,<sup>48</sup> \$100 incentives were sent for completed surveys. Nonrespondents received another survey request if we did not hear from them after 1 month.

Ethics approval was obtained from the Lakehead University Research Ethics Board.

**Figure 1. Framework for teamwork effectiveness in rural physician teams**



\***Appendices 1 and 2** are available from <https://www.cfp.ca>. Go to the full text of the article online and click on the **CFPlus** tab.

## External observer sample, procedure, and measures

We sent separate surveys to external observers in RNPGA communities to gain external perspectives on local physician group functioning; this included hospital chief executive officers, family health team executive directors, and clinic managers. Surveys were sent via mail with a \$30 incentive. Nonrespondents received another survey request after 1 month.

External observers rated RNPGA team performance using the same 6-item measure from the physician survey to check the possibility of common method variance. Demographic data were also captured.

## Data preparation and analyses

Since very few data were missing (0.3% from the physician surveys and 2.0% from the external observer surveys) and there was seemingly no pattern to the missing data, total scale scores were generated using mean substitution. Cronbach  $\alpha$  was used to assess the constructs' internal consistencies, as it is a reliability measure that indicates how well the items of the construct function as a group, and it is generally robust (.70 or higher) for research purposes.<sup>49</sup>

Team-level measures were created by averaging the responses across team members. To justify this, intra-class correlation coefficients (ICCs) for each scale of each team of 2 or more members were calculated using the reliability program in the SPSS data analysis package to yield a measure of rating consistency. The ICC is used to measure the level of agreement across multiple observers rating the same stimuli. The values should be high enough to justify generating averaged values across observers. Single team respondent data were used to represent that team.

Descriptive statistics, including correlations between variables, were provided to enhance an understanding of the data. A *t* test was used to assess possible differences between team performance ratings by team members and external observers.

Team-level relationships within the team effectiveness model were assessed using mediated regression as outlined by Baron and Kenny.<sup>50</sup> Generalized estimating

equations<sup>51,52</sup> were used to assess the relationships in the model between team-level (team efficacy) and individual-level (affective team commitment and intentions to stay) variables to address the nonindependence of these data.

## — Results —

Overall, 70 physicians from 26 RNPGA communities with 2 or more physicians returned surveys. Participants had been practising in their community for a mean (SD) of 11.60 (10.47) years. Age category frequencies were younger than 30 (*n*=4), 30 to 39 (*n*=12), 40 to 49 (*n*=18), 50 to 59 (*n*=19), 60 to 69 (*n*=14), and 70 or older (*n*=2). One participant did not respond to this question. The number of responses per team ranged from 1 to 7; the frequencies are as follows: 1 (*n*=5), 2 (*n*=11), 3 (*n*=5), 4 (*n*=1), 5 (*n*=1), 6 (*n*=2), and 7 (*n*=1).

In terms of the external observer sample, 25 external observers who were part of 19 of the 26 RNPGA communities surveyed provided their perspective on 16 different teams.

## Description

**Individual-level physician data.** The response rate for physicians was 79% (70 of 89 total physicians). Descriptive statistics of variables analyzed at the individual level are shown in **Table 1**. When physicians were asked if their RNPGA group functioned as a team, 58 (84%) agreed, 5 (7%) were neutral, and 6 (8%) disagreed (1 nonrespondent).

**Team-level physician data.** **Table 2** shows the descriptive statistics of the variables analyzed at the team level. Although some of the ICC values are lower than the desirable average, the overall ICC across all scales and teams was 0.46, which is just under the level considered to be "fair"<sup>53</sup> by some standards and acceptable by others.<sup>54</sup> These values are not unexpected given the conservative nature of the ICC test and the small number of physician participants.

Team climate was created by averaging the scores of decision making, communication, and conflict resolution,

**Table 1. Individual-level variable data descriptive statistics: Variables were measured using a 5-point Likert scale.**

INDIVIDUAL PHYSICIAN VARIABLES (N=70)	MEAN (SD)	CRONBACH $\alpha$
Rural practice preparedness	3.27 (0.82)	.73
Career opportunities	3.68 (0.87)	.66
Working conditions	3.62 (0.63)	.85
Community integration	3.70 (0.68)	.79
Partner support (single item)	4.14 (0.88)	NA
Intentions to stay	3.96 (1.00)	.94
Organizational commitment	3.66 (0.75)	.87
NA—not applicable.		

as these variables are theoretically part of a broader construct and are highly intercorrelated (ranging from 0.87 to 0.97) (Table 2).

**Team-level external observer data.** The response rate for the external observers was 74% (25 of 34 total external observers). Team performance rating by external observers showed a mean (SD) of 3.52 (0.75) on a 5-point Likert scale and had a high internal consistency (Cronbach  $\alpha=.93$ ).

When 2 external observers rated performance for a team, their ratings were averaged across observers. For the 16 teams with both physician and external observer team performance, there was a high correlation between the ratings ( $r_{14}=0.69$ ,  $P=.003$ ). In addition, there was no difference between the means of physician

and external observer ratings of team performance ( $t_{15}=0.98$ ,  $P=.34$ ). Table 3 shows the descriptive statistics of the team-level variables for the 16 teams with external observer data.

### Team-level model analysis

Tables 4 and 5 show the correlation matrices for the team effectiveness measures using physician-rated and external observer-rated team performance. The samples on which these are based are slightly different, as not all teams had external raters.

The mediated regression analyses revealed that team climate positively predicted team efficacy, which positively predicted team performance. The relationship between team climate and team performance was fully mediated by team efficacy. This is shown by the path

**Table 2. Team-level variable data descriptive statistics: Variables were measured using a 5-point Likert scale.**

PHYSICIAN TEAM VARIABLES (N=26)	MEAN (SD)	CRONBACH $\alpha$	AVERAGE ICC
Decision making	3.96 (0.74)	.93	0.46
Communication	3.81 (0.85)	.93	0.60
Conflict resolution	3.92 (0.71)	.96	0.51
Team efficacy	4.02 (0.60)	.91	0.35
Team performance (physician rated)	3.55 (0.44)	.89	0.51
Team climate	3.90 (0.74)	NA	NA

ICC—intraclass correlation coefficient, NA—not applicable.

**Table 3. Team-level variable data descriptive statistics with external observer data: Variables were measured using a 5-point Likert scale.**

TEAM AND EXTERNAL OBSERVER VARIABLES	MEAN (SD)
Decision making	4.10 (0.68)
Communication	3.89 (0.88)
Conflict resolution	4.05 (0.63)
Team efficacy	4.17 (0.49)
Team performance (external observer rated)	3.52 (0.75)
Team climate	4.01 (0.70)

**Table 4. Zero-order correlation matrix of team-model variables using physician-rated team performance**

VARIABLE	TEAM CLIMATE	TEAM EFFICACY	TEAM PERFORMANCE
Team climate	NA	NA	NA
Team efficacy	0.774	NA	NA
Team performance	0.554	0.858	NA

NA—not applicable.

**Table 5. Zero-order correlation matrix of team-model variables using external observer-rated team performance**

VARIABLE	TEAM CLIMATE	TEAM EFFICACY	TEAM PERFORMANCE
Team climate	NA	NA	NA
Team efficacy	0.829	NA	NA
Team performance	0.565	0.844	NA

NA—not applicable.

between team climate and team performance, which is statistically significant before the addition of the mediator (team efficacy), and becomes nonsignificant in the presence of the mediator. These relationships held whether physician teams were rated by their own members or by external observers (Figures 2 and 3).

### Team-level to individual-level model analyses

Team efficacy significantly predicted affective team commitment ( $b$  value=0.69, standard error=0.08, Wald  $\chi^2=13.89$ ,  $P<.001$ ) in the first analysis and intentions to stay ( $b$  value=0.34, standard error=0.15; Wald  $\chi^2=5.42$ ,  $P=.020$ ) in the second analysis.

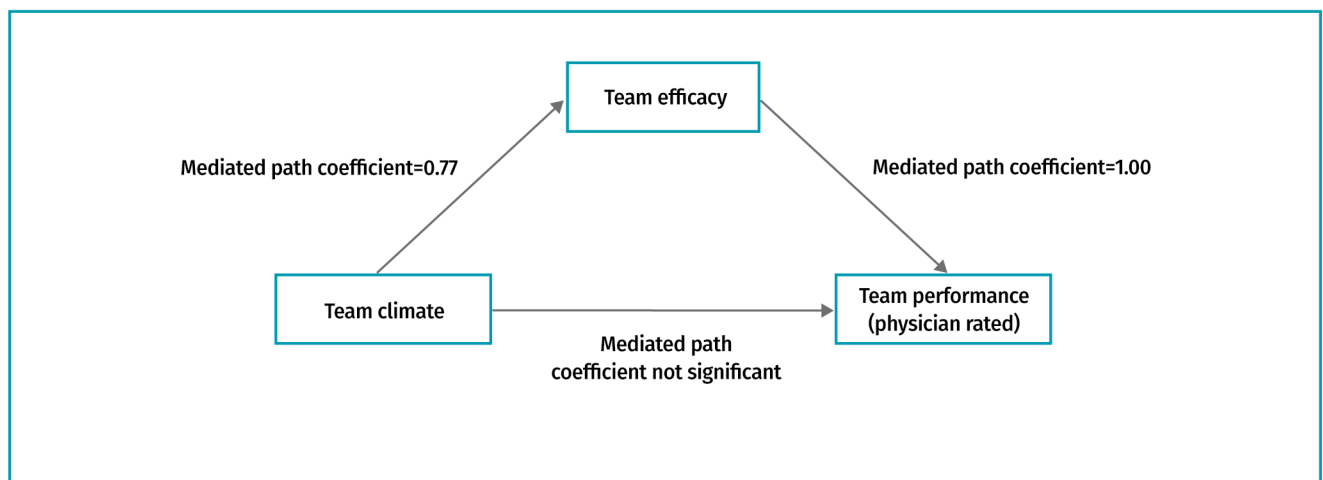
When the other variables impacting physician retention were added to the model in predicting intentions to stay, team efficacy did not predict it above and beyond these additional predictors. These additional analyses were conducted 2 times, first using all cases ( $N=70$ ) ( $b$  value=0.11, standard error=0.15; Wald  $\chi^2=0.54$ ,  $P=.464$ ),

and second using only those cases for which partner support was relevant ( $N=59$ ) ( $b$  value=0.05, standard error=0.12, Wald  $\chi^2=0.21$ ,  $P=.649$ ). In order to provide additional information as to the relationships under investigation, Tables 6 and 7 present the results of all the individual predictors of intentions to stay and the zero-order correlations between them. However, the team efficacy zero-order correlations are not corrected for the unit-level difference (team vs individual) in their reference, although individual-level ratings of team efficacy were used in these correlations.

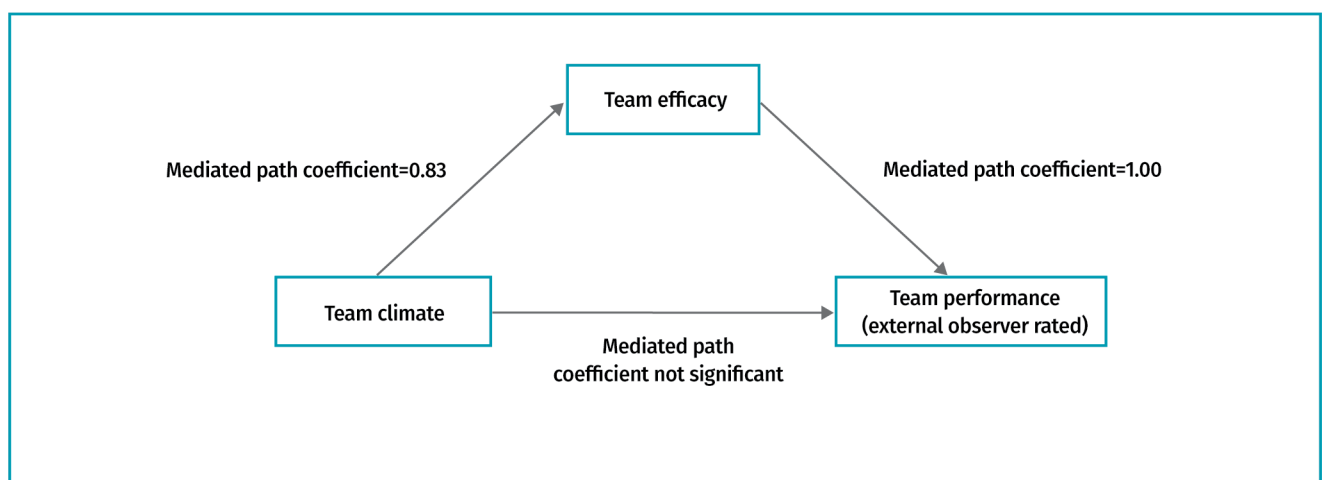
## — Discussion —

Most RNPGA doctors reported that they functioned as a team of physicians, supporting our investigation of a theoretical model of physician team effectiveness. Consistent with the proposed model, team climate positively predicted team efficacy, which had a positive link to team

**Figure 2.** Path correlation matrix of team-model variables using physician-rated team performance: The ICC path value from team climate to team performance is not significant in the presence of a mediator (team efficacy).



**Figure 3.** Path correlation matrix of team-model variables using external observer-rated team performance: The ICC path value from team climate to team performance is not significant in the presence of a mediator (team efficacy).



**Table 6. GEE parameter estimates predicting intentions to stay and corresponding zero-order correlations: N=70.**

PARAMETER	b VALUE	STANDARD ERROR	HYPOTHESIS TEST		ZERO-ORDER CORRELATION
			Wald $\chi^2_1$	P value	
Team efficacy	0.110	0.1509	0.535	.464	0.30*
Rural practice preparedness	0.206	0.1052	3.839	.050	0.38*
Career opportunities	0.570	0.0925	37.983	<.001	0.43*
Community integration	0.189	0.1108	2.925	.087	0.56*
Working conditions	0.107	0.1620	0.438	.508	0.49*

GEE—generalized estimating equation.  
\*Statistically significant at  $P<.01$ .

**Table 7. GEE parameter estimates predicting intentions to stay and corresponding zero-order correlations: N=59.**

PARAMETER	b VALUE	STANDARD ERROR	HYPOTHESIS TEST		ZERO-ORDER CORRELATION
			Wald $\chi^2_1$	P value	
Team efficacy	0.053	0.1158	0.208	.649	0.36†
Rural practice preparedness	0.191	0.1142	2.785	.095	0.38†
Career opportunities	0.310	0.0747	17.271	<.001	0.33*
Community integration	0.522	0.1076	23.546	<.001	0.51†
Working conditions	0.192	0.1472	1.699	.192	0.48†
Partner support	0.194	0.1116	3.024	.082	0.25*

GEE—generalized estimating equation.  
\*Statistically significant at  $P<.05$ .  
†Statistically significant at  $P<.01$ .

performance. This relationship held whether using physician- or observer-rated team performance; this is a notable observation, as self-ratings are typically higher.<sup>55</sup> This self-knowledge of performance alleviates some of the concern over common method variance that can create spurious correlations between constructs. The effect from team climate to team performance was fully mediated by team efficacy, reinforcing this construct's central role in team effectiveness models.<sup>31</sup>

The finding that team climate is predictive of team efficacy has important implications for research and practice<sup>56</sup> in that interventions in decision making, communication, and conflict resolution strategies should improve overall team effectiveness. Consistent with current literature, team efficacy predicted affective team commitment levels<sup>57</sup> and intentions to stay with the organization. While team efficacy has touted importance in team performance,<sup>56</sup> these findings demonstrate that it is also important in affective domains.

The team efficacy to intentions to stay effect was not significant after the introduction of several other constructs previously linked to physician retention. However, team efficacy's role in overall physician team effectiveness should not be underestimated. The outcome of team performance is highly important to patients and the health care system. Commitment to the team has substantive value to organizations in that it has been shown to be positively related to organizational citizenship behaviour,<sup>58</sup> work motivation,

and job satisfaction,<sup>37</sup> and negatively related to withdrawal behaviour and turnover intentions.<sup>58</sup> Additionally, team efficacy was a positive contributor to intentions to stay.

## Limitations

This study had a number of limitations. The team-level sample size was somewhat small, although a fairly large number of physicians took part in this study. Despite this, the model of team performance was supported. Although intentions to stay are not the same as actual turnover, they are predictive of turnover,<sup>35</sup> and given the low base rate phenomenon of turnover in a short period of time, this was a suitable variable to use. Patient perception of physician team performance was not evaluated, though it would have been a valuable perspective.

## Conclusion

Rural northern physician groups were examined to study the effect of team effectiveness on predicting performance, organizational commitment, and professional retention. The team effectiveness framework proposed was generally supported and provides the basis for further investigations. Consistent with the literature, the variables of rural practice preparedness, career opportunities, community integration, and partner support all showed positive relationships with physician retention. This study provides novel evidence that improving the abilities of teams of physicians in their decision

making, communication, and conflict resolution can lead to organizational benefits and thus better patient care. 🌿

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#### Contributors

All authors contributed to the concept and design of the study; data gathering, analysis, and interpretation; and preparing the manuscript for submission.

#### Competing interests

None declared

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