Measurement of Social Capital among Clinical Research Trainees

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Abstract

While physical and human capital are established as important predictors of success among early-career clinical investigators, less is known about the role of social capital. The authors aimed to develop a brief scale to assess social capital in this population and test its reliability and validity. A three-item assessment was developed based on a conceptual framework and measures of social capital from other fields and was administered to 414 clinical research trainees at the University of Pittsburgh in 2007–2012. The measure exhibited good internal consistency reliability ($\alpha = 0.71$) and a normal distribution. On a 10-point scale, mean social capital was 6.4 (SD = 1.7). Social capital was significantly associated with 7 of the 9 expected constructs: sex, age, confidence in research skills, work-related motivation, burnout, and social support. Exploratory multivariable regression analysis demonstrated that social capital was most strongly associated with higher research confidence ($\beta = 0.35$, $p < 0.001$), higher extrinsic motivation ($\beta = 0.50$, $p = 0.003$), and lower burnout ($p_{trend} = 0.02$). This three-item scale measures social capital in this population with adequate internal consistency reliability, face validity, and construct validity. This brief assessment provides a tool that may be valuable to benchmark social capital of clinical research trainees and to better contextualize programmatic and trainee outcomes. Clin Trans Sci 2014; Volume 7: 33–37

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Introduction

Success among early-career clinical and translational science trainees is known to be associated with physical capital (such as funding and technology),[1,2] human capital (such as education and skills),[3] and individual constraints (such as time and intelligence).[4] However, less is known about the role of social capital, which can be measured in a multitude of ways,[5] but is generally defined as "a set of relationships and shared values created and used by multiple individuals to solve collective problems in the present and future."[6]

Social capital is now established as an important predictor of public health outcomes including lower mortality[7,8] and better overall physical and mental health.[9,10] Within the medical field, findings suggest that greater social capital is associated with less emotional exhaustion in nursing and medical practice[11,12] and that it improves organizational outcomes within medical groups, primary care practices, and other businesses.[13–15]

It may be that social capital is similarly valuable for success among early-career clinical research trainees. In fact, it may be especially salient in this population, for whom the development of multidisciplinary and/or collaborative work opportunities are particularly valuable.[16] Elucidating associations between social capital and career success in this population would help inform programming in proliferating clinical research training programs. However, there is currently not an adequate tool to measure social capital in this population. While social capital has been intensively measured among individuals residing in the community[17–19] and business professionals,[15] instruments used to assess social capital in these contexts are often lengthy, intensive, and/or highly specialized for their intended audiences.

The purpose of this study was to develop a brief measure of social capital among early career clinical researchers. We then aimed to examine the measure's internal consistency reliability and construct validity by examining bivariable associations between scale values and nine constructs with which we hypothesized social capital should conceptually be related. First, we examined three sociodemographic factors: sex, race/ethnicity, and age. Based on related research,[20–22] we expected that social capital may be lower for females (compared with males) and underrepresented minorities (compared with Caucasians). We also expected that social capital would increase with age, due to expanding social networking. We also examined six personal factors with which we expected social capital to be related, including confidence with research skills, intrinsic motivation, extrinsic motivation, burnout, social support, and major life events. As an exploratory aim, we examined independent associations between all of these factors simultaneously to determine which ones were most strongly associated with social capital.

Methods

Participants and setting

Participants were medical students, residents, fellows, predoctoral trainees, and faculty enrolled in degree-granting and/or career development programs at the Institute for Clinical Research Education, part of the Clinical and Translational Science Institute at the University of Pittsburgh. Of the 657 trainees who matriculated from 2007 to 2012, 451 trainees (69%) provided informed consent and completed a baseline assessment. The current study included 414 of the 451 trainees (92%) who had complete data for our outcome of interest (social capital). The study was approved by the Institutional Review Board of the University of Pittsburgh.

Measures

Social capital

We developed a three-item measure, based on published conceptual frameworks of social capital and items adapted

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from general measures. The conceptual underpinnings of social capital measurement arose from the work of the Australian Institute of Family Studies (AIFS), which reported extensively on the measurement of social capital in communities as well as workplace environments.[23–25] The AIFS working group particularly emphasized measuring social capital across broadening contexts (e.g., informal networks, generalized relationships, and institutional relationships). They also deemed of particular importance the multidimensional nature of social capital (e.g., including trust and reciprocity) by utilizing an item stem such as "most people in my neighborhood can be trusted" and "people around here are willing to help each other out" to establish typologies of social capital. Therefore, two core items in our scale utilized stems from AIFS reciprocity items to assess broadening contexts in a collegial sense (e.g., reciprocity at this institution and reciprocity at other institutions), and the third item assessed how well networked individuals were within their fields in a global sense. The final scale had three items: (1) To what extent are you and your work colleagues at the University of Pittsburgh willing to help each other out? (2) To what extent are you and your work colleagues at other institutions willing to help each other out? (3) How well networked are you in your field? Each item was assessed on a Likert-type scale with 11 response options from 0 (labeled "not at all") to 10 (labeled "completely"), which was also based on AIFS precedents.[23–25]

Sociodemographic factors

The three relevant demographic factors for this study included age, sex, and race/ethnicity. Self-reported race/ethnicity was trichotomized as underrepresented racial and/or ethnic minority (African American, Hispanic, and/or Native American), Caucasian, or Asian. We treated age, which was normally distributed, as a continuous variable.

Confidence with research skills

We measured confidence with research skills using the 88-item Clinical Research Appraisal Inventory (CRAI). This measure provides scores along eight subscales that measure self-efficacy in various research related tasks, defined as: study design and data analysis, funding a study, reporting and presenting, conceptualizing a study, responsible conduct of research, collaboration with others, managing project staff, and organizing a study.[26] For the purposes of the current study, the overall CRAI score was used as a general indicator of research self-efficacy. Scores were normally distributed and were scaled from 0 to 10 for analysis.

Intrinsic and extrinsic motivation

Intrinsic motivation is defined as finding satisfaction or meaning in performing a task and enjoyment of the work itself. Extrinsic motivation is defined as finding satisfaction in external rewards such as promotion and financial remuneration.[27,28] These constructs were measured using the 30-item Work Preference Inventory,[29] which is divided into two 15-item sections focused on the two different constructs.[30] Respondents use a 4-point scale (0 = never or almost never true of me, 3 = always or almost always true of me) to report the degree to which each item describes them. Both the intrinsic and extrinsic scale responses were normally distributed and were treated as continuous variables from 0–3 for the purposes of this analysis.

Burnout

We assessed burnout by asking participants to endorse one of these statements: "(1) I enjoy my work. I have no symptoms of burnout; (2) Occasionally I am under stress, and I do not always have as much energy as I once did, but I do not feel burned out; (3) I am definitely burning out and have one or more symptoms of burnout, such as physical and emotional exhaustion; (4) The symptoms of burnout that I am experiencing would not go away. I think about frustration at work a lot; or (5) I feel completely burned out and often wonder if I can go on. I am at the point where I may need some changes or may need to seek some sort of help." Scores were transformed into a trichotomous variable including no burnout, (options 1–2), some burnout (option 3) and a lot of burnout (options 4–5). This single item has been shown to have strong validity when measured against the more intensive, previously validated 22-item Maslach Burnout Inventory.[31] Additionally, this item has been shown to have reliability and validity in a population of early career researchers.[32]

Social support

Social support was assessed with the following question: "In times of trouble, how many people do you have nearby that you can count on for help (e.g., offering advice, looking after your belongings for a period of time, or helping out if you are sick)?" Participants recorded the number of individuals meeting this criterion in a blank space. To normalize the distribution for analysis, responses were grouped by quartile (Quartile 1 = 0–2; Quartile 2 = 3–4; Quartile 3 = 5–6; Quartile 4 = 7–30).

Major life events

Participants indicated the presence or absence of major life stressors during the past year. Stressors included divorce, birth of a child, serious personal illness or injury, serious illness or injury of a loved one, death of a loved one, marital separation, moving, marriage, miscarriage or stillbirth, spouse began or stopped work, financial difficulties, starting a new job or significant changes in responsibilities in current job, death of a child, or "other." We generated a raw score by summing the number of positive responses. To normalize the distribution for analysis, responses were grouped by quartile. (Quartile 1 = 0; Quartile 2 = 1; Quartile 3 = 2; Quartile 4 = 3 and above).

Analysis

We first examined descriptive statistics for the sample and summarized all variables. We used bivariable regression to assess the association between each independent variable and social capital. Because the social capital scale was continuous, we used linear regression, and because values were normally distributed (*Figure 1*), no transformation of the outcome variable was necessary. For the ordered categorical variables (burnout, social support, and major life events), we also tested significance of the trend by examining the *p*-value for the independent variable when it was treated as continuous. Finally, we used multivariable linear regression to achieve our exploratory aim of examining independent associations between all of these factors simultaneously to determine which ones were most strongly associated with social capital.

Results

Of the 414 participants, 51% were female, and 63% were Caucasian, 13% were Asian, and 24% were from underrepresented minority groups (*Table 1*). Mean age was 30.6 (SD = 5.9).
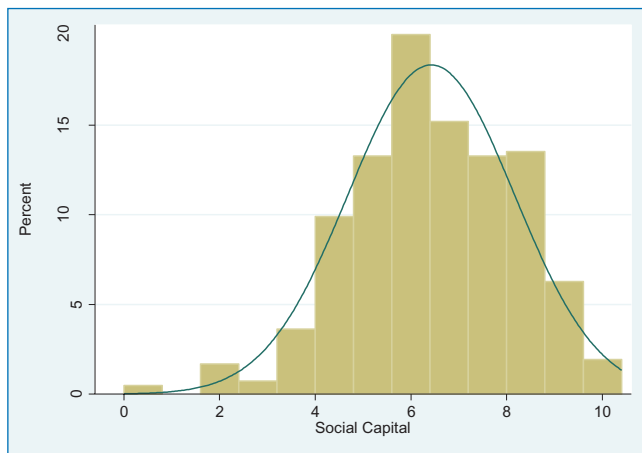
Figure 1. Histogram for social capital among 414 clinical research trainees at the University of Pittsburgh School of Medicine's Institute for Clinical Research Education in 2007–2012.

Variable	N (%)*
Sex	
Male	199 (49)
Female	207 (51)
Race/ethnicity	
White	243 (63)
Asian	52 (13)
Underrepresented minority†	92 (24)
Age (m, SD)	30.6 (5.9)
CRAI (m, SD)	5.2 (2.0)
WPI, intrinsic (m, SD)	2.2 (0.5)
WPI, extrinsic (m, SD)	1.4 (0.5)
Burnout	
None	78 (19)
Some	259 (63)
A lot	74 (18)
Social support	
Q1 (least)	96 (24)
Q2	104 (26)
Q3	108 (27)
Q4 (most)	96 (24)
Major life events	
Q1 (least)	88 (21)
Q2	110 (27)
Q3	94 (23)
Q4 (most)	121 (29)

CRAI = Clinical Research Appraisal Inventory; WPI = Work Preference Inventory; Q = Quartile.

*Percentages may not sum to 100 because of rounding.

†Includes African Americans and Hispanics.

Table 1. Sociodemographic and other characteristics of 414 clinical research trainees at the University of Pittsburgh School of Medicine's Institute for Clinical Research Education in 2007–2012.

The three-item measure had good internal consistency reliability ($\alpha = 0.71$). Individual item means were 7.9 (SD = 1.8), 6.9 (SD = 2.1), and 4.5 (SD = 2.5), respectively, for each of the three items: (1) To what extent are you and your work colleagues at the University of Pittsburgh willing to help each other out? (2) To what extent are you and your work colleagues at other institutions willing to help each other out? (3) How well networked are you in your field? The overall social capital score calculated as an average of the three items was 6.4 (SD = 1.7) and was normally distributed (*Figure 1*).

Social capital was significantly associated with 7 of the 9 expected constructs: sex, age, confidence in research skills, intrinsic and extrinsic motivation, burnout, and social support (*Table 2*). Although associations with the other two constructs (race/ethnicity and major life events) were in the hypothesized direction, they were not statistically significant (*Table 2*).

We conducted exploratory multivariable regression to determine which independent variables were most strongly associated with social capital. The resulting model suggested that social capital was independently associated with higher research confidence ($\beta = 0.35$, $p < 0.001$), higher extrinsic motivation ($\beta = 0.50$, $p = 0.003$), and lower burnout ($p_{trend} = 0.02$).

Discussion

We found that social capital was reliably measured in this population with a brief three-item scale. We also found that this measure was significantly associated with 7 of 9 expected constructs. Social capital, as measured in this study, was most strongly associated with extrinsic motivations to work, greater confidence in research abilities, and lower burnout.

Having a reliable and valid way of measuring social capital may help researchers in academic medicine determine whether there are associations between social capital and important distal outcomes such as publications, maintenance of funding, overall career success, and overall career satisfaction.[33] If there are prospective benefits of social capital for this population, it is something that can be cultivated within training programs via various means, including mentoring, didactic material, and seminars.

It is valuable that the scale is brief. Although a longer scale may have captured finer-grained information, brevity is beneficial in this case because there are important related constructs which training programs often wish to assess simultaneously, such as prior training, mentoring, research experience, motivation, personality, creativity, institutional support, and life circumstances outside of work.[33] Therefore, concise measures can alleviate respondent burden and improve data quality.

Race/ethnicity and major life events were hypothesized to be associated with social capital. While point estimates for β coefficients were in the hypothesized direction, these associations were not statistically significant in the present study. There are several possibilities for these results. For race, the sample of non-Whites may have been too small to detect significant differences among groups. Alternately, the present conceptualization of social capital may be less related to racial or ethnic background than was expected. With regard to major life events, we originally supposed that those who had more life events may be forced to reduce their interaction with colleagues in order to attend to those events. Because our result was in the hypothesized direction, it is possible that we did not have sufficient power to detect a difference. However, it is also possible that our original conception

Variable	Bivariable regression			Multivariable regression*		
	β	P	P_trend	β	P	P_trend
Sex						
Male						
Female	−0.41	0.02		−0.20	0.22	
Race/ethnicity						
White						
Asian	0.32	0.22		0.04	0.86	
Underrepresented minority†	−0.15	0.46		−0.24	0.19	
Age (years)	0.04	0.01		0.02	0.26	
CRAI (range: 0–10)	0.41	<0.001		0.35	<0.001	
WPI, intrinsic (range: 0–3)	0.78	<0.001		0.23	0.19	
WPI, extrinsic (range: 0–3)	0.72	<0.001		0.50	0.003	
Burnout			.005			0.02
None						
Some	−0.57	0.01		−0.42	0.04	
A lot	−0.78	0.006		−0.60	0.02	
Social Support						
Q1 (least)			.005			0.06
Q2	−0.08	0.75		−0.19	0.40	
Q3	0.22	0.36		0.10	0.63	
Q4 (most)	0.64	0.01		0.34	0.13	
Major Life Events						
Q1 (least)			.33			0.27
Q2	−0.02	0.93		0.29	0.20	
Q3	−0.23	0.37		0.10	0.68	
Q4 (most)	−0.18	0.45		0.32	0.16	

CRAI = Clinical Research Appraisal Inventory; WPI = Work Preference Inventory; Q = Quartile.
*Controlling for all variables in the table.
†Includes African Americans and Hispanics.

Table 2. Bivariable and multivariable associations between independent variables and social capital among 414 clinical research trainees at the University of Pittsburgh School of Medicine's Institute for Clinical Research Education in 2007–2012.

may be flawed. In retrospect, for example, it may be that, at least for some people in some situations, when certain life events occur they receive more attention and/or support from colleagues.

As expected, age was not independently associated with social capital in the multivariable model. We consciously opted to utilize general items—such as "To what extent are you and your work colleagues willing to help each other out?"—which would be stable across level of academic experience. In particular, whether the respondent is a third-year medical student or a junior faculty member, she is likely to respond to the item while considering "work colleagues" at the same level.

It is interesting to note that the means for the three social capital items were lower at each wider level of social context. In other words, the item assessing social capital within the University of Pittsburgh was more highly endorsed than the other two items, and the broadest context of "how well networked are you in your field" was endorsed at the lowest level. This may be because research trainees have not yet had the opportunity to develop interuniversity social networks that may come with more

posttraining research collaboration. Thus, it may be valuable for mentors, program directors, and/or other faculty to encourage mentees to broaden their networks early in training.

In the exploratory multivariable model, social capital was most strongly associated with research confidence, burnout, and extrinsic motivation. It makes sense that social capital might be particularly strongly associated with research confidence, both because (1) such confidence may encourage individuals to reach out to their colleagues at their home institution and throughout the research community, and (2) those with higher social capital may leverage their relationships to improve their skills and/or confidence in their skills. Similarly, it makes sense that those who are burned out may have particularly poor social capital, both because (1) being burned out leads to less desire for initiation and/or maintenance of relationships with colleagues, and (2) less social capital may lead to isolation and subsequent burnout.

The finding with regard to extrinsic motivation is particularly interesting, because intrinsic motivation was not as strongly associated with social capital (i.e., it was associated with social

capital in the bivariable model but not in the multivariable model). One explanation for this pattern is that it may be that those with more intrinsic motivation are content to simply focus on their immediate work, while those with extrinsic goals (e.g., promotion and financial rewards) recognize the importance of maintaining a social network which can facilitate those goals.

Limitations

It is important to emphasize that no one study can definitively determine reliability and validity of a scale. Thus, while these results are promising, it will be valuable for future research to triangulate these results by determining other aspects of reliability (e.g., test–retest reliability) and validity (e.g., criterion-related validity). One challenge for determining criterion validity of this measure is that there is not, at present, a true "gold standard" measuring this construct. However, other intensive efforts at its measurement may occur in the future, and at that time, it may be interesting to compare our Likert-type items with a more intensive "gold standard" qualitative assessment. It is also important to emphasize that this research was conducted at one large research institution, and thus external generalizability to other populations may be limited. Finally, because this study was cross-sectional, directionality of associations cannot be determined.

Conclusion

This three-item scale measures social capital in a research trainee population with adequate internal consistency reliability, face validity, and construct validity. The availability of a brief measure of this construct may help researchers and program directors assess the success of curricular components aimed at improving social capital. It may also help guide future research determining associations between social capital and important outcomes for clinical research trainees.

Acknowledgments

References

1. Brand RA, Hannafin JA. The environment of the successful clinician-scientist. *Clin Orthop* 2006; 449: 67–71.

2. Williard R, O'Neil E. Trends among biomedical investigators at top-tier research institutions: a study of the Pew Scholars. *Acad Med.* 1998; 73(7): 783–789.

3. Meyers FJ, Begg MD, Fleming M, Merchant C. Strengthening the career development of clinical translational scientist trainees: a consensus statement of the Clinical Translational Science Award (CTSA) Research Education and Career Development Committees. *Clin Transl Sci.* 2012; 5(2): 132–137.

4. Harris JP, Ariessohn ML. Economic, family, and length-of-training issues that influence the selection of a clinician-scientist career path in otolaryngology. *Otolaryngol Head Neck Surg* 2008; 139(1): 100–104.

5. Lochner K, Kawachi I, Kennedy BP. Social capital: a guide to its measurement. *Health & Place* 1999; 5(4): 259–270.

6. Ostrom E. What is social capital? In: Bartkus VO, Davis JH, eds. *Social Capital: Reaching Out, Reaching*. Northampton, MA: Edward Elgar Publishing Inc.; 2009: 17–38.

7. Veenstra G. Social capital and health (plus wealth, income inequality and regional health governance). *Soc Sci Med.* 2002; 54(6): 849–868.

8. Oksanen T, Kivimäki M, Kawachi I, Subramanian SV, Takao S, Suzuki E, Kouvonen A, Pentti J, Salo P, Virtanen M, Vahtera J. Workplace social capital and all-cause mortality: a prospective cohort study of 28,043 public-sector employees in Finland. *Am J Public Health.* 2011; 101(9): 1742–1748.

9. Murayama H, Fujiwara Y, Kawachi I. Social capital and health: a review of prospective multilevel studies. *J. Epidemiol. (Jpn Epidemiol Assoc.).* 2012; 22(3): 179–187.

10. Song L. Social capital and psychological distress. *J. Health Soc. Behav.* 2011; 52(4): 478–492.

11. Kowalski C, Ommen O, Driller E, Ernstmann N, Wirtz MA, Köhler T, Pfaff H. Burnout in nurses: the relationship between social capital in hospitals and emotional exhaustion. *J Clin Nurs.* 2010; 19(11–12): 1654–1663.

12. Mascia D, Cicchetti A. Physician social capital and the reported adoption of evidence-based medicine: exploring the role of structural holes. *Soc Sci Med.* 2011; 72(5): 798–805.

13. Hoelscher ML, Hoffman JJ, Dawley D. Toward a social capital theory of competitive advantage in medical groups. *Health Care Manage Rev.* 2005; 30(2): 103–109.

14. DiCicco-Bloom B, Frederickson K, O'Malley D, Shaw E, Crosson JC, Looney JA. Developing a model of social capital: relationships in primary care. *ANS Adv Nurs Sci.* 2007; 30(3): E13–E24.

15. Lee R. Social capital and business and management: setting a research agenda. *Int J Manage Rev.* 2009; 11(3): 247–273.

16. Perzynski AT. Multidisciplinary approaches to biomedical research. *JAMA.* 2010; 304(20): 2243–2244.

17. Burdine JN, Felix MR, Wallerstein N, Abel AL, Wiltraut CJ, Musselman YJ, Stidley C. Measurement of social capital. *Ann NY Acad Sci.* 1999; 896: 393–395.

18. Lochner K, Kawachi I, Kennedy BP. Social capital: a guide to its measurement. *Health & Place.* 1999; 5(4): 259–270.

19. De Silva MJ, Harpham T, Tuan T, Bartolini R, Penny ME, Huttly SR. Psychometric and cognitive validation of a social capital measurement tool in Peru and Vietnam. *Soc Sci Med.* 2006; 62(4): 941–953.

20. Bakken LL, Sheridan J, Carnes M. Gender differences among physician-scientists in self-assessed abilities to perform clinical research. *Acad Med.* 2003; 78(12): 1281–1286.

21. Pololi L, Conrad P, Knight S, Carr P. A study of the relational aspects of the culture of academic medicine. *Acad Med.* 2009; 84(1): 106–114.

22. Fang D, Moy E, Colburn L, Hurley J. Racial and ethnic disparities in faculty promotion in academic medicine. *JAMA.* 2000; 284(9): 1085–1092.

23. Stone W, Gray M, Hughes J. Social capital at work: how family, friends and civic ties relate to labour market outcomes. *Aust Inst Family Stud.* 2003; 31: 1–26.

24. Stone W, Hughes J. Social capital: empirical meaning and measurement validity. *Aust Inst Family Stud.* 2002; 27: 1–41.

25. Stone W. Measuring social capital: towards a theoretically informed measurement framework for researching social capital in family and community life. *Aust Inst Family Stud.* 2001; 24: 1–35.

26. Mullikin EA, Bakken LL, Betz NE. Assessing research self-efficacy in physician-scientists: the Clinical Research Appraisal Inventory. *J Career Assess.* 2007; 15(3): 367–387.

27. Campbell N, McAllister L, Eley D. The influence of motivation in recruitment and retention of rural and remote allied health professionals: a literature review. *Rural Remote Health.* 2012; 12: 1900.

28. Cvek M, Hren D, Sambunjak D, Planinc M, Mackovic M, Marusić A, Marusić M. Medical teachers' attitudes towards science and motivational orientation for medical research. *Wien Klin Wochenschr.* 2009; 121(7–8): 256–261.

29. Amabile TM, Hill KG, Hennessey BA, Tighe EM. The Work Preference Inventory: assessing intrinsic and extrinsic motivational orientations. *J Pers Soc Psychol.* 1994; 66(5): 950–967.

30. Amabile TM, Hil KG, Hennessey BA, Tighe EM. The Work Preference Inventory: assessing intrinsic and extrinsic motivational orientations: correction. *J Pers Soc Psychol.* 1995; 68(4): 580.

31. Rohland BM, Kruse GR, Rohrer JE. Validation of a single-item measure of burnout against the Maslach Burnout Inventory among physicians. *Stress Health.* 2004; 20:75–79.

32. Primack BA, Dilmore TC, Switzer GE, Bryce CL, Seltzer DL, Li J, Landsittel DP, Kapoor WN, Rubio DM. Burnout among early career clinical investigators. *Clin Transl Sci.* 2010; 3(4): 186–188.

33. Rubio DM, Primack BA, Switzer GE, Bryce CL, Seltzer DL, Kapoor WN. A comprehensive career-success model for physician-scientists. *Acad Med.* 2011; 86(12): 1571–1576.