



This is the Author's version of the paper published as:

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Title: Students' perceptions of clinical attachments across rural and metropolitan settings

Year: 2008

Journal: Assessment and Evaluation in Higher Education

Volume: 33

Pages: 63-73

ISSN: 0260-2938

URL:

<http://www.informaworld.com/smpp/content~content=a779269912~db=all~order=page>

Keywords: Clerkships, Rural, Medical undergraduate, rural clinical school, questionnaire

Abstract: For many years, medical students at the University of Sydney undertook their clinical clerkships in traditional metropolitan teaching hospitals, which were regarded as the 'gold standard' for clinical training. In 2001 the university established a rural clinical school at which increasing numbers of students now complete a significant proportion of their medical education. The aim of the study reported here is to examine students' perceptions of what facilitates their learning in clinical settings and to compare their perceptions across rural and metropolitan settings. Focus groups were conducted to collect students' views on their experiences of learning in clinical settings. The findings were used to generate a questionnaire with items designed directly from focus-group data ensuring content validity. The questionnaire was sent to all students in the 2004 cohort. Exploratory factor analysis was used to provide evidence of construct validity. The internal consistency reliability of the questionnaire was assessed using Cronbach's alpha. Factor scores were computed to compare students' perceptions across the two settings. Four factors were extracted: (1) clinical teachers' orientation to teaching; (2) opportunities to develop clinical skills; (3) supportiveness of the clinical setting; and (4) student confidence and sense of self-efficacy. Students rated the rural experience more highly and positively than the metropolitan hospital experience with regard to all four factors. This study highlights the positive role that rural attachments can play in providing an educationally sound learning experience. The findings are important in the context of both the drive, among medical programs worldwide, to seek out additional and alternative settings for clinical education and the national agenda to foster student interest in rural careers through positive rural training experiences.

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**Lyon, P.M., McLean, R., Hyde, S., & Hendry, G. (In press.) Students’
perceptions of clinical attachments across rural and metropolitan settings.
*Assessment and Evaluation in Higher Education.***

ABSTRACT

INTRODUCTION

For many years, medical students at University X undertook their clinical clerkships in traditional metropolitan teaching hospitals which were regarded as the ‘gold standard’ for clinical training. In 2001 the university established a rural clinical school at which increasing numbers of students now complete a significant proportion of their medical education. The aim of the study reported here is to examine students’ perceptions of what facilitates their learning in clinical settings and to compare their perceptions across rural and metropolitan settings.

METHODS

Focus groups were conducted to collect students’ views on their experiences of learning in clinical settings. The findings were used to generate a questionnaire with items designed directly from focus group data ensuring content validity. The questionnaire was sent to all students in the 2004 cohort. Exploratory factor analysis was used to provide evidence of construct validity. The internal consistency reliability of the questionnaire was assessed using Cronbach’s alpha. Factor scores were computed to compare students’ perceptions across the two settings.

RESULTS

Four factors were extracted: (1) clinical teachers' orientation to teaching; (2) opportunities to develop clinical skills; (3) supportiveness of the clinical setting; and (4) student confidence and sense of self-efficacy. Students rated the rural experience more highly and positively than the metropolitan hospital experience with respect to all four factors.

CONCLUSION

This study highlights the positive role that rural attachments can play in providing an educationally sound learning experience. The findings are important in the context of both the drive, among medical programs worldwide, to seek out additional and alternative settings for clinical education and the national agenda to foster student interest in rural careers through positive rural training experiences.

Introduction

Medical education beyond the traditional teaching hospital

There is a trend within modern medical education to make use of a variety of clinical teaching settings as major teaching hospitals become tertiary referral centres characterized by super-specialisation, intense service pressures, a narrow patient mix and increased patient turnover. In addition, shifts to outpatient, day stay and community care have reduced the opportunity for medical students to learn at the bedside. Research suggests that rural practice settings may provide an effective and alternative learning experience for medical students and trainees.

A recent review of published reports of medical undergraduate courses from international medical schools (Hsueh *et al.*, 2004) identified ten rural training programs with established reputations for the quality of the education provided and which, moreover, have been successful in recruiting and retaining rural physicians. Eight of these are based in the United States. Some of these programs have been in place for many years, in one case sustaining enthusiasm from students, residents and faculty for more than three decades (Schwarz, 2004).

Research from Australia supports these findings. Price *et al.* (1994) report on students' positive perceptions of teaching and learning in rural settings in Queensland. Culhane *et al.* (1993) report on the significant contribution of the undergraduate rural attachment to the learning of basic practical and emergency procedural skills among medical students at the University of Western Australia. Kamien (1996) followed this up with a further study in Western Australia comparing the experiences of matched pairs of students in rural specialty and metropolitan teaching hospital practice. Almost

all of the rural students were certain that they had a better educational experience than their city counterparts. They reported having seen double the number of medical conditions, and assisted in or performed six times as many procedures as their 'matched' student. Moreover, they performed as well as their city counterparts at examination.

In 2000 the Australian Government allocated budget monies to nine universities (with medical faculties) for the establishment of rural clinical schools. The aim was to facilitate the development of a national rural education and training system to underpin a sustainable rural medical workforce, and thus redress, in time, the shortage of rural doctors. Some educational research on the implementation and outcome of this initiative has now been reported in the academic literature from university medical schools in South Australia and Western Australia (Worley *et al.*, 2004a; Worley *et al.*, 2004b; Denz-Penhey *et al.*, 2005; Adams *et al.*, 2005). Research from the medical school at Flinders University in Adelaide demonstrates that the rural primary care settings in South Australia and the secondary care setting at Darwin Hospital in the Northern Territory provide high quality clinical and educational experiences (Worley *et al.*, 2004a; Worley *et al.*, 2004b). The authors conclude that their findings in relation to academic performance, experience, and self reported competence among students allocated to these settings challenge the orthodoxy of a tertiary hospital education being the gold standard for undergraduate medical students. They go so far as to suggest that the opportunities for experienced supervision and patient-based learning are inversely related to the level of complexity, medical technology and cost per episode of care at the teaching site, and call for further research to determine the generalisability of their findings to other institutions.

University X established a rural clinical school in 2001 at which increasing numbers of students complete a significant number of clinical attachments. The aim of the study reported in this paper is to examine students' perceptions of key features that facilitate their learning in clinical practice environments and to compare their perceptions across rural and metropolitan settings.

The setting for the study

University X offers a four year graduate-entry medical program. The first two years of the problem-based learning (PBL) curriculum are delivered on campus for the most part, with one day per week spent in the respective clinical school environment in metropolitan teaching hospitals. The last two years are spent predominantly in the clinical schools.

Year 3 consists of eight four-week attachments to the main medical and surgical ward services and associated ambulatory clinics at affiliated hospitals. Each student is allocated to one of six major tertiary referral hospitals (>450 beds) in the greater Sydney region. From these major hospitals Year 3 students may spend short placements (generally four weeks) at smaller peripheral or rural hospitals within the relevant area health service region.

The rural clinical school is based in Dubbo, 400 kilometers northwest of Sydney, with a second campus at Orange 250 kilometers west of Sydney. This is now called the School of Rural Health (SRH). The geographic area of the SRH extends from Bathurst in the east to Broken Hill in the west, from Collarenebri in the north to

Cowra in the south, and covers about one-third of the geographic area of the state of New South Wales, an area greater than that of Germany. The larger towns of Dubbo and Orange have populations in the order of 40,000, and base hospitals of between 120 and 150 beds. Each hospital serves a regional population between 150,000 and 200,000.

In 2002 small groups of students began spending eight weeks (2 x four-week attachments) at the SRH undertaking general medical and surgical terms as part of their 32-week program of clinical attachments with student numbers increasing year by year. In 2004, almost one quarter (51 students) of the year's cohort spent 50% of their clinical attachments (16 out of 32 weeks) in the base hospitals at Dubbo and Orange.

Methods

Background to selection of methods.

Instruments to measure the clinical learning environment have already been described in the literature (Rotem *et al.*, 1996; Pololi & Price, 2000; Parsell & Bligh, 2001). Too often evaluation questionnaires have been based on what medical faculty managers and teachers think are important, but as some commentators have pointed out, there must be an assessment of what is important to students, to take advantage of their knowledge of what is essential to facilitate their learning (Harvey, 1999; Krantz-Girod *et al.*, 2004). Similarly, Boud (2005, p. 6) argues that in order to examine student learning on placements we must 'view everything through the lens of the learner's experience'. It is this approach to evaluation that led us to develop a questionnaire directly from student focus group data, capturing the clinical environment through

students' eyes, and thus ensuring content validity. Interestingly, their discussion centred on the complex social processes of interaction around teaching, learning, and work in the medical setting, not on the quality of teaching sessions, e.g. lectures, bedside tutorials, seminars etc. that are more commonly the focus of faculty designed questionnaires.

Student focus groups

Students undertaking a 16 week placement at the Dubbo Base Hospital were invited to join an 'exploratory' focus group (Morgan & Krueger, 1998). Whilst all students agreed to participate, 6 of the 9 students were available on the scheduled day. A subsequent focus group was held at a major metropolitan tertiary teaching hospital. Ten students formally accepted the invitation to attend but 15 students in all turned up to participate in the group on the day.

The focus groups began with an open-ended invitation for them to tell us about their experiences of the clinical setting, allowing them to direct the discussion to matters that they thought were important in terms of their learning. Students at both sites spent most of the discussion talking about teaching and supervision and their opportunities to develop skills and knowledge.

Students at both sites gave examples of high quality and poor quality learning experiences. Comments in both groups were often related to the size and busyness of the hospital and its effect on teaching and support. Aspects that were viewed positively included the ready availability of senior clinicians, the friendliness and approachability of teachers that students got to know well, and the sense of

community, while negative aspects included long training queues and supervisors who had little contact with them, some of whom had little idea of what to expect of the student and gave little feedback or encouragement.

Survey

Questionnaire items were designed to capture the issues students had chosen to focus on in *their* account of what helps them to learn, using the common words and phrases they had used to describe their experiences.

It was clear from the focus groups that students had encountered a range of qualitatively different educational experiences on different ward attachments. It would have been inappropriate to ask them to generalize their experiences across these attachments on an attitude scale. For this reason a behavioural scale was used with five points defined by adjectival labeling with unipolar categories representing frequency, ranging from 1 - 'True little or none of the time in my experience at this hospital' to 5 - 'True all or almost all of the time in my experience at this hospital'.

Response rates

Students who had spent 16 weeks at the SRH in 2004 completed the questionnaire on the basis of their rural attachment (just before completing the attachment) and then again on the basis of their 16 week's experience at their allocated metropolitan teaching hospital (again just before the end of the attachment). Forty-four of the 51 students who had spent time at the SRH completed the questionnaire on their rural experiences (86% response rate) whilst 43 of the 51 students completed the questionnaire on their metropolitan hospital experiences (84% response rate).

The questionnaire was also distributed to the 185 students of the Year 3 cohort who had spent no time at the SRH. Of these, 123 completed the survey (66% response rate). Students were asked to identify their metropolitan teaching hospital and to respond to the questionnaire on the basis of their attachments only at this site, making up a total of 166 students from the year's cohort who gave feedback on their metropolitan experiences (73% response rate).

Data analysis

The data were analysed using SPSS PC version 12. The aim was to use factor analysis to identify interpretable constructs that explained the correlations among the measured variables as well as possible (Preacher & MacCallum, 2003), and to provide evidence of construct validity. Exploratory factor analysis was chosen since there was no predefined structure in the questionnaire. The scree plot, factor loadings and interpretation indicated that a four factor solution was the best fit for the data.

The factor solution was rotated using oblique rotation to allow for correlation between the factors. Individual loadings of 0.30 or greater were used in the factor designation (see Table 1). The four factors were named by examining the items loading on each factor. Cronbach's alpha was used to estimate the internal consistency of the items making up each factor.

Factor scores were computed and the Mann-Whitney U test was used to compare scores for rural and metropolitan experiences on each of the derived factors. It was

also used to compare the metropolitan experiences of students who had spent time at the SRH with students who had not.

Results

Four factors were extracted, accounting for 63.2% of the total variance, and rotated using direct oblimin (see Table 1 for rotated factor loadings). Cronbach's alpha exceeded 0.7 for each factor, shown below together with factor correlations:

Factor 1 (Cronbach's Alpha = 0.94; $r_{1,2} = 0.40$; $r_{1,3} = 0.65$; $r_{1,4} = 0.56$). This scale was made up of 12 items measuring students' perceptions of *clinical teachers' orientation to teaching and to students as learners*. For the purpose of reporting in tables, and in subsequent discussion, this factor will be referred to by the shortened name *good clinical teaching*.

Factor 2 (Cronbach's Alpha = 0.75; $r_{2,3} = 0.31$; $r_{2,4} = 0.38$). This scale was made up of three items measuring students' perceptions of the *opportunities to develop clinical skills*.

Factor 3 (Cronbach's Alpha = 0.85; $r_{3,4} = 0.46$). This scale was made up of six items measuring students' perceptions of the *supportiveness* of the clinical setting.

Factor 4 (Cronbach's Alpha = 0.82). This scale was made up of five items measuring students' perceptions of *increasing confidence and self-efficacy* as a consequence of their clinical experiences.

The quality of educational experience offered at the SRH was rated more positively than the experience in the metropolitan teaching hospitals (see Table 2 & Figure 1). Students who had spent 16 weeks at the SRH rated their experiences very highly (see Table 2). In response to the items in Factor 1, more than 80% of students indicated that these key features of good clinical teaching occurred '*all or almost all*', or '*most*' of the time at the SRH. Similar high ratings for rural experiences were given on each of the other three factors.

In relation to all four factors, comparisons of rural experiences (n=44) with the combined responses for the metropolitan teaching hospitals (n=166) showed significant differences (see Table 3). In the case of students who had experienced and completed a questionnaire on both settings, the same pattern of differences between ratings of rural and metropolitan experiences was found on all factors (Factors 1, 3, 4 $p < 0.001$; Factor 2 $p < 0.01$).

In relation to ratings for the metropolitan experiences only, there were no significant differences between students who had attended the SRH and those who had not. This suggests that the differences between the quality of the rural and the metropolitan experiences was a real difference and cannot be accounted for by any differences in the personality, character, or pre-disposing attitude of students who spent time at the SRH and those who did not.

An examination of the Year 3 assessment results indicated that students who had spent 16 weeks at the SRH performed equally as well as students who had spent all or most of their clinical attachments at the metropolitan tertiary sites.

Discussion

The items in Factor 1 describe a positive orientation among clinical staff towards teaching and to students as learners in the medical workplace. This factor includes some of the teaching strategies represented in the model of ‘cognitive apprenticeship’ such as ‘modeling’, ‘coaching’, and ‘scaffolding’ (Collins *et al.*, 1989). It includes qualities attributed to an ideal teacher by medical students, as reported in the literature, such as willingness to provide help and feedback, to observe student-patient encounters, enthusiasm and approachability (Parsell & Bligh, 2001; McLean, 2001; Van der Hem-Stokroos *et al.*, 2003). It includes the development of trust and positive relationships between staff and students (Pololi & Price, 2000) and the flexibility on the part of the clinician to adjust teaching to meet the learner’s needs (Dolmans *et al.*, 2002).

The predominant focus of learning in the clinical years is the development of skills in history taking and physical examination through involvement in patient care. The items in Factor 2 measure the students’ assessment of the opportunities to develop these skills.

Factor 3 describes the extent to which students felt supported, accepted, recognized and valued by peers and clinical school staff, and the sense they had of belonging to a community. A review of the literature on the stressful, hostile, and intimidating nature of medical school education puts into perspective the significance given by students to the friendliness and supportiveness of their teachers and peers (Baldwin *et al.*, 1991; Cleave-Hogg *et al.*, 1991; Kassebaum & Cutler, 1998; Seabrook, 2004). One author

has described the experience of studying in medical schools as analogous to belonging to an abusive and dysfunctional family (McKegney, 1989). Engagement with learning in practice requires relationships founded on trust, that allow students to take risks with their learning, to explore different ways of making sense of new knowledge, and to reflect on experiences without fear of ridicule.

The items in Factor 4 describe the developing sense of confidence and self-efficacy that comes from participation in patient care. This factor includes socialization into professional practice through opportunities to engage in tasks which are peripheral, but authentic to the medical workplace. This is the process of 'legitimate peripheral participation' (Lave & Wenger, 1991). Longer clinical rotations allow students to become known to their teachers who are then able to easily assess the type of contribution appropriate for their level of skill and knowledge (Denz-Penhey *et al.*, 2005). It is about teachers having sufficient trust, through knowledge of the student, to allow him/her to be actively involved in patient care. Active involvement enhances the development of powerful conceptual structures (Irby, 1994) and builds confidence in students' own worth. Kamien (1996) has similarly reported how the hands-on experiences and newly acquired competencies of the rural-based students in the Western Australian study contributed to a new-found confidence in their ability to eventually become a competent doctor.

Rural experiences and metropolitan experiences

The significant differences found between 'rural experiences' and 'metropolitan experiences' have something of a parallel in research from the UK which suggests that students who undertake clinical attachments in district general hospitals or

peripheral hospitals experience a qualitatively different and more positive learning environment compared with students based in tertiary teaching hospitals. Doctors in district general hospitals are more likely to model positive teaching attitudes such as showing interest in students and providing feedback (Johnston & Boohan, 2000). Compared to teaching hospitals, district general hospitals have more approachable teachers, offer a friendlier and more supportive learning climate, with greater opportunities for hands-on practical experience (Parry *et al.*, 2002). In a similar and much earlier study from the UK, students reported greater involvement and a more encouraging climate in peripheral hospitals, with greater exposure to practical procedures (Wakeford, 1983).

Parry *et al.* (2002) found the size of the 'firm' to be a key element in students' ratings of an attachment with some concern expressed that increasing numbers of students and trainees might affect the quality of teaching. Students in our focus groups also expressed this concern and clinicians will often mention the difficulty in creating an effective learning environment if there are too many students. The SRH is certainly characterized by lower numbers of students and trainees compared to the metropolitan teaching hospitals. The development of the instrument reported in this study will enable staff at the SRH to monitor the quality of the students' experience over the coming years as student numbers increase. It is interesting though, to note the findings from Dolmans *et al.* (2002) who conclude that the effectiveness of clinical rotations depends on the quality of supervision and the patient mix but not the number of students. They argue that the key is high quality supervision and recommend faculty development initiatives focused on helping clinicians create a supportive environment

for learning, providing constructive feedback, and teaching to students' learning needs.

Rural recruitment and retention

Increasing the exposure of medical students to rural medical practice is part of a national strategy to broaden students' perspectives and reinforce their potential choice of a career in rural medicine. In a systematic review of 12 national and international published reports, rural undergraduate training was associated with current rural practice in 4 of the 5 studies reporting on it, with most odds ratios approximately 2.0 (Wilkinson & Laven, 2003). Reports from a national study of 2414 doctors in Australia (Wilkinson *et al.*, 2003) and another using data from Queensland (Wilkinson *et al.*, 2004) indicate that rural clinical schools have a positive impact on rural practice choices.

It was encouraging then, to find in our study that the majority of students (86%) who had attended the SRH would consider returning to work in a rural hospital or rural setting on the basis of their clinical experiences in the SRH. Further follow-up research will be needed to establish whether these students do indeed return to the SRH. In the Western Australian study similar findings were reported with half of the rurally based students claiming their experience had reinforced their interest in country medicine, with an early intention to apply for country terms in their residency years (Kamien, 1996). In our study the lack of randomization to the SRH may have introduced a bias and some students may have already been committed to a career in rural practice prior to their rural attachment.

Conclusion

It is clear from students' ratings that the SRH places a high value on teaching and learning and provides an excellent setting for quality educational experiences. The findings demonstrate the value of the rural clinical school attachment as a credible alternative to the traditional metropolitan hospital. There is no evidence that academic standards have been compromised. The study provides empirical evidence to support further development and funding of university rural placements. Program directors faced with the need to expand clinical teaching from established tertiary hospitals should find positive encouragement in its findings.

This study makes a significant contribution to our understanding of 'learning in practice' through the eyes of medical students as 'peripheral' (Lave & Wenger, 1991) members of the healthcare team, using a questionnaire that captures the students' social and cognitive experience of learning in the medical workplace.

3,475 words

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Table 1: Questionnaire items and factor loadings

Item	Factor loading
Factor 1: Good clinical teaching	
1 Clinical staff were keen to get me involved in the team	0.67
2 The clinical teachers were enthusiastic about teaching	0.85
3 Clinical staff were approachable and willing to provide help and guidance	0.66
4 Senior clinicians took a direct role in teaching students	0.90
5 I felt accepted and valued as a member of the team	0.50
6 The staff made me feel comfortable about being a novice in the team	0.43
7 Staff here take an interest in the personal welfare of students	0.58
8 Clinical teachers took the time to observe my skills in the ward/clinic	0.46
9 I received useful feedback on my progress	0.54
10 The teachers adjusted their teaching to learners' needs	0.59
11 The clinical teachers created an atmosphere of trust so that I felt I could be open and honest about my level of knowledge	0.49
12 I got the sense that staff here wanted me to do well	0.51
Factor 2: Opportunities to develop clinical skills	
1 I had lots of opportunities to examine patients with interesting signs	0.36
2 I got plenty of opportunities to develop my history taking skills	0.76
3 I got plenty of opportunities to develop my physical examination skills	0.89
Factor 3: Supportiveness	
1 Students care and 'look out' for each other at this teaching hospital	0.54
2 I got to debrief and reflect on my experiences with fellow students	0.43
3 The staff in the clinical school went out of their way to make students welcome	0.88
4 The clinical staff were friendly	0.68
5 The clinical staff helped me to feel I had what it takes to become a competent junior doctor	0.64
6 I had a sense of belonging to a community here which enriched my experience of learning	0.37
Factor 4: Confidence and self-efficacy	
1 I felt that I was learning what I need to learn to become a competent professional	0.43
2 There was sufficient trust for staff to ask me to help with patient care	0.50
3 I got plenty of opportunities to develop procedural skills (drips, catheters, suturing etc.)	0.51
4 My clinical experiences increased my confidence in my own worth as a member of the team	0.69

5	I felt confident I would be able to recall the content of the teaching	0.54
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Table 2: Aggregated student responses (%) by factor by location

	Factor 1 Good Teaching		Factor 2 Opportunities to develop clinical skills		Factor 3 Supportiveness		Factor 4 Confidence and self-efficacy	
	Rural %	Metro %	Rural %	Metro %	Rural %	Metro %	Rural %	Metro %
True all or almost all of the time in my experience at this hospital	44.6	4.9	41.7	20.7	68.9	21.4	37.3	5.7
True most of the time	39.4	30.6	38.6	47.5	21.6	39.8	39.1	33.9
True about half of the time	11.0	32.2	18.9	23.5	5.7	19.6	16.8	35.2
True some of the time	5.0	23.4	.8	8.0	3.8	14.8	6.8	19.2
True little or none of the time0	8.9	.0	.2	.0	4.4	.0	6.0

Figure 1: Factors and Locations vs Frequency of Occurrence

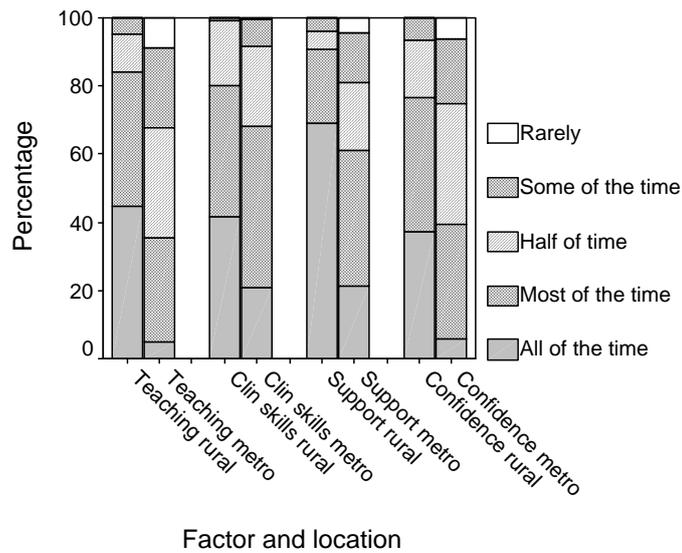


Table 3: Rural experiences compared with metropolitan experiences

	Factor 1	Factor 2	Factor 3	Factor 4
Mann-Whitney U	408	2391	776	1512
Wilcoxon W	14269	16252	14637	15373
Z	-9.052	-3.519	-8.025	-5.971
<i>p</i>	< 0.001	< 0.001	< 0.001	< 0.001

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