
Scoring Guide:

Race Attributes in Clinical Evaluation (RACE) Scale and Genetic Variation Knowledge Assessment Index (GKAI)

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1. GKAI Scale

Scale Introductory Statement: *The first group of questions is about human genetic variation. Please check the answer that indicates whether the statement is true, false or you do not know.*

ITEM #	QUESTION	ANSWER
1	The DNA sequences of two randomly selected healthy individuals of the same sex are 90-95% identical.	False
2	Most common diseases, such as diabetes and heart disease, are caused by a single gene variant.	False
3	Common structural genetic variation (changes in the human genome such as deletions, duplications and large-scale copy-number variants) is important in health and disease.	True
4	All the genetic variation in an individual can be attributed to either spontaneous (i.e., de novo) or inherited changes in the human genome.	True
5	The variation in the human genome includes both disease-causing gene variants and variants that have no effect on health and disease.	True
6	Individual genetic variants are usually highly predictive of the manifestation of common disease.	False
7	Prevalence of many Mendelian diseases differs by racial groups.	True
8	Self-reported race is informative of a racial groups genetic ancestral background.	True

NOTE: Responses: 1 = True, 2 = False, 999 = Don't Know

1.1 Scoring

1.1.1 General Scoring Guidance

- Recode – correct answer = 1, incorrect answer = 0, Don't know = 0
- Scale can only be calculated for respondents with nonmissing data on all items and one response per item

1.1.2 Physicians

- Calculate percent correct of 6 items (exclude items 3 and 5; in our representative sample >90% of physicians answered these items correctly)

- Sum 6 recoded items, divide by 6, multiply by 100

1.1.3 Nurses and Nurse Practitioners

- Calculate percent correct of all 8 items
 - Sum all 8 recoded items, divide by 8, multiply by 100

1.1.4 To compare nurses, nurse practitioners, and physicians

- Calculate percent correct of all 8 items
 - Sum all 8 recoded items, divide by 8, multiply by 100

1.2 Scale Statistics

1.2.1 Physicians

6-item scale (n=771)	<ul style="list-style-type: none"> • Mean=54.6% • SD=19.46% • Median=50% • Min=0% • Max=100% • Data is unimodal but not normally distributed (Shapiro-Wilk test of normality-p=0)
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8-item scale (n=771)	<ul style="list-style-type: none"> • Mean=63.7% • SD=15.81% • Median=62.5% • Min=12.5% • Max=100% • Data is unimodal but not normally distributed (Shapiro-Wilk test of normality-p=0)
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1.2.2 Nurse Practitioners

8-item scale only (n=67)	<ul style="list-style-type: none"> • Mean=47.38% • SD=22.77% • Median=50.00% • Min=0 • Max=87.5 • Data is unimodal but not normally distributed (Shapiro-Wilk test of normality, W=.91, p = .0001)
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1.2.3 Nurses

**8-item scale
only
(n=620)**

- Mean=45.44%
- SD=24.84%
- Median=50.00%
- Min=0
- Max=100
- Data is unimodal but not normally distributed (Shapiro-Wilk test of normality, $W=.95$, $p < .0001$)

2. RACE Scale

Scale Introductory Statement: *The next set of questions is about your clinical practice and decisions you make in your practice. Check the answer that best describes your consideration of your patient's race in clinical decisions.*

ITEM#	QUESTION
1	I consider information from patients about their racial background.
2	I consider my patients race to better understand their genetic predispositions.
3	PHYSICIANS: I consider my patients race when making decisions about which medications to prescribe. NURSES: I consider my patients race when administering medications.
4	I consider my patients race in determining genetic risk for common, complex diseases (e.g. kidney disease, hypertension, or diabetes).
5	PHYSICIANS: I consider my patients race in making medication dosage decisions. NURSES: I consider my patients race when checking medication dosages as prescribed.
6	I consider my patients race when determining age of initiation of screening for certain diseases.
7	I consider my patients race in determining how aggressively to treat particular diseases.
8	I consider my patients race in determining genetic risk for single gene conditions (e.g. cystic fibrosis or sickle cell disease).
<p>NOTE: Responses: 0 = None of the time, 1 = A little of the time, 2 = Some of the time, 3 = Most of the time, 4 = All of the time</p> <p>Physicians: Items 1-7</p> <p>Nurse Practitioners: Items 1-8</p> <p>Other Nurses: Items 1-5, 8</p>	

2.1 Scoring

- When examining each group alone, take the mean of all items for that group.
- When combining two or more groups, use only the items common across groups to calculate the scale
 - Physicians and Nurse Practitioners: Items 1-7
 - Physicians and Other Nurses: Items 1-5

- Nurse Practitioners and Other Nurses : Items 1-5, 8
- Physicians, Nurse Practitioners, and Other Nurses: Items 1-5
- High or low scores are a measure of explicit use of race in clinical care. The RACE scale is not a quantitative assessment whether the use of race in clinical care is appropriate or not.
- Scale can only be calculated with nonmissing data on all items and one response per item.

Citing a RACE Scale

When using RACE scale, cite: Bonham VL, Sellers SL, Woolford S. Physicians' knowledge, use, and beliefs about race and genetic variation: New measures and new insight. BMC Health Serv. Res, 14:456, 2014 to describe the measures' formative research and psychometric research

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2.3 Publications

- Bonham VL, Sellers SL, Woolford S. Physicians' knowledge, use, and beliefs about race and genetic variation: New measures and new insight. BMC Health Serv Res, 14:456, 2014. [PMC 4283084]
- Cunningham BA, Bonham VL, Sellers SL, Yeh HC, Cooper LA. Physicians' anxiety due to uncertainty and use of race in medical decision making. Medical Care, 52(a)783-33, 2014. [PMC 421436]
- Coleman G, Calzone KA, Jenkins J, Paniagua CI, Rivera R, Hong OS, Spruill, Bonham VL. Multi-ethnic minority nurses' knowledge and practice of genetics and genomics. Journal of Nursing Scholarship, 10(7), 2014. [PMC 3866033]
- Sellers SL, Moss M, Calzone KA, Abdallah KA, Jenkins J, Bonham VL, Nurses' use of race and consideration of genomics in clinical decision-making Journal of Nursing Scholarship, 48(6):577-586, 2016. [PMC5621045]
- Bonham VL, Umeh N, Cunningham BA, Abdallah KA, Sellers SL, Cooper LA, Physicians' Collection, Comfort, and Use of Race and Ethnicity in Clinical Practice., Health Equity, 1(1):118-126, 2017. [PMC5621603]
- Sellers SL, Cunningham BA, Bonham VL. Physician Knowledge of Human Genetic Variation, Beliefs About Race and Genetics, and Use of Race in Clinical Decision-making. J Racial Ethnicity Health Disparities. doi:10.1007/s40615-018-0505-y, 2018 Jun 20. [Epub ahead of print]
- Sellers SL, Cunningham BA, Bonham VL. Physician Knowledge of Human Genetic Variation, Beliefs About Race and Genetics, and Use of Race in Clinical Decision-making. J Racial Ethnicity Health Disparities. Erratum 2019 Jun;6(3):647-648. doi: 10.1007/s40615-019-00579-8.
- Abdallah KE, Calzone KA, Calzone, Jenkins JF, Moss ME, Sellers SL, Bonham VL. A Comparison of Physicians' and Nurse Practitioners' Use of Race in Clinical Decision-Making. Ethnicity & Disease 2019 Jan 17;29(1):1-8. doi: 10.18865/ed.29.1.1. eCollection 2019 Winter [PMC6343547]

- Kokas M, Fakhoury JW, Hoffert M, Whitehouse S, Van Harn M, Baker-Genaw K. Health Care Disparities: A Practical Approach to Teach Residents about Self-Bias and Patient Communication. *Journal of Racial and Ethnic Health Disparities*. 2019 Oct;6(5):1030-1034. doi: 10.1007/s40615-019-00604-w. Epub 2019 Jun 18.
- Okah E, Thomas J, Westby A, Cunningham B. Colorblind Racial Ideology and Physician Use of Race in Medical Decision-Making. *J Racial Ethn Health Disparities*. 2021 Sep 7. doi: 10.1007/s40615-021-01141-1. Epub ahead of print. PMID: 34491564.
- **Please provide notice of any publications using GKAI or RACE to: bonhamv@nih.gov**