"Zones of Tolerance" in Perceptions of Library Service Quality: A LibQUAL+™ Study

Colleen Cook, Fred Heath, and Bruce Thompson

abstract: One of the two major ways of interpreting LibQUAL+™ data involves placing perceived service quality ratings within the "zones of tolerance" defined as the distances between minimally-acceptable and desired service quality levels. The present study compared the zones of tolerance on the 25 LibQUAL+™ items across undergraduate, graduate student and faculty groups, and across institution types (i.e., community college, health science setting, four-year non-ARL university, and four-year ARL university). These data were generated during the 2002, third-phase of the LibQUAL+™ study. Data were provided by 63,285 students and faculty.

Libraries today confront escalating pressure to demonstrate impact. As Rowena Cullen recently noted, "focusing more energy on meeting . . . customers' expectations"[1] is critical in the contemporary environment, in part because the emergence of the virtual university, supported by the virtual library, calls into question many of our basic assumptions about the role of the academic library, and the security of its future.[2]

In this environment, as Danuta Nitecki has observed, "A measure of library quality based solely on collections [counts] has become obsolete."[3]

These considerations have prompted the Association of Research Libraries (ARL) to sponsor a number of "New Measures" initiatives. One New Measures initiative has been the LibQUAL+™ project, described in considerable detail in previous *portal* articles and elsewhere.[4] Within a service-quality assessment model, as Valerie Zeithaml, A. Parasuraman, and Leonard Berry emphasize, "only customers judge quality; all other judgments are *essentially irrelevant*."[5] Consequently, the selection of items employed with the LibQUAL+™ has been grounded in the *users' perspective* as revealed in a series of qualitative studies.[6]

LibQUAL+™ is a "way of listening" to users called a *total market survey*. As Leonard Berry explained,

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> When well designed and executed, total market surveys provide a range of information unmatched by any other method . . . A critical facet of total market surveys (and the reason for using the word 'total') is the measurement of competitors' service quality. This [also] requires using noncustomers in the sample to rate the service of their suppliers.[7]

Although (a) measuring perceptions of both users and non-users and (b) collecting perceptions data as regards peer institutions can provide important insights, LibQUAL+™ is only one form of only one (i.e., a total market survey) of the 11 "ways of listening" presented by Berry.[8]

LibQUAL+™ consists of 25 items. The 25 items measure perceptions of total service quality, as well as four subdimensions of perceived library quality: (a) *Service Affect* (9 items, such as "willingness to help users"); (b) *Library as Place* (5 items, such as "a haven for quiet and solitude"); (c) *Personal Control* (6 items, such as "website enabling me to locate information on my own"); and (d) *Information Access* (5 items, such as "comprehensive print collections" and "convenient business hours").

Using LibQUAL+™ Data

The LibQUAL+™ protocol is administered individually on the Web to library users selected by a given institution. Participation is available for a nominal institutional cost (e.g., $2,000 in 2002). The deliverables include (a) graphic and numerical summaries of a given institution's results as well as, for comparative purposes, similar reports across all institutions and (b) SPSS data files of the institution's data in case further local analyses are desired. LibQUAL+™ mechanics are described in more detail at: http://www.arl.org/libqual

Interested libraries do *not* have to hire a statistician or technician to (a) administer the survey or (b) interpret results. However, ARL has offered several training institutes to enhance related service quality assessment skills, including the week-long "Service Quality Assessment Academy".

In some cases LibQUAL+™ data may confirm prior expectations and library staff will readily formulate action plans to remedy perceived deficiencies. But in many cases library decision-makers will seek additional information to corroborate interpretations or to better understand the dynamics underlying user perceptions.

In some cases LibQUAL+™ data may confirm prior expectations and library staff will readily formulate action plans to remedy perceived deficiencies.

For example, once an interpretation is formulated, library staff might review recent submissions of users to suggestion boxes to evaluate whether LibQUAL+™ data are consistent with interpretations, and the suggestion box data may also provide user-proposed remedies. User focus groups too provide a powerful way to explore problems and their potential solutions. Colleen Cook[9] provided case study reports of how staff at various libraries have employed data from prior renditions of LibQUAL+™.

Of course, any use of LibQUAL+™ data requires an interpretation of what the scores mean. There are two primary methods of formulating these interpretations: (a) using score norms, and (b) using "zones of tolerance".[10]

LibQUAL+™ Norms

The LibQUAL+™ collection of such a huge number of perceptions has afforded us with the *unique* opportunity to create "norms" tables that provide yet another perspective on results. Norms tell us how scores "stack up" within a particular user group. For example, on the 1-to-9 ("9" is highest) scale, users might provide a mean "perceived" rating of 6.5 on an item, "complete run of journal titles." The same users might provide a mean rating on "minimum" for this item of 7.0. Consequently, we are able to derive a mean service-adequacy "gap score" (i.e., "perceived" minus "minimum") of -0.5.

The "zone-of-tolerance" perspective suggests that this library may not doing well on this item, because "perceived" falls below "minimally acceptable." This *is* important to know. But there is also a second way (i.e., normatively) to interpret the data. *Both* perspectives can be valuable.

A total market survey administered to tens of thousands of potential users, as was LibQUAL+™ in 2002, affords the opportunity to ask normative questions such as, "How does a mean 'perceived' score of 6.5 stack up among all *individuals* who completed the survey?", or ""How does a mean service-adequacy gap score of -0.5 stack up among the gap scores of all *institutions* participating in the survey?"

If 70% of individual users generated "perceived" ratings lower than 6.5, 6.5 might not be so bad. And if 90% of institutions had service-adequacy gap scores lower than -0.5 (e.g., -0.7, -1.1), a mean gap score of -0.5 might actually be quite good. Users simply may have quite high expectations in this area. They may also communicate their dissatisfaction by both (a) rating "perceived" even lower and (b) "minimum" even higher than they might if they were more satisfied.

This does not mean that a service-adequacy gap score of -0.5 is necessarily a cause for celebration. But a service-adequacy gap score of -0.5 on an item on which 90% of institutions have a *lower* gap score is a different gap score than the same -0.5 for a different item in which 90% of institutions have a *higher* service-adequacy gap score.

Only norms give us insight into this comparative perspective. And a local user-satisfaction survey (as against a total market survey) can never give us this insight.

Common Misconception Regarding Norms. An unfortunate and incorrect misconception is that norms make *value* statements. Norms do *not* make value statements! Norms make *fact* statements. If you are a forest ranger, and you make $25,000 a year, a norms table might inform you of the fact statement that you make less money than 85% of the adults in the United States.

But if you love the outdoors, you do not care very much about money, and you are very service-oriented, this fact statement might not be relevant to you. Or, in the context of your values, you might interpret this fact as being satisfactory and exactly what you expected.

LibQUAL+TM 2002 Norms Tables. Of course, the fact statements made by the LibQUAL+™ norms are only valuable if you care about the dimensions being evaluated by the measure. More background on LibQUAL+™ norms is provided by Cook

and Thompson and Cook, Heath and Thompson.[11] LibQUAL+™ norms for 2002 are available on the web at URL: http://www.coe.tamu.edu/~bthompson/libq2002.htm

Zones of Tolerance

A second way of interpreting LibQUAL+™ data invokes the concept of "zones of tolerance."[12] As on the related SERVQUAL measure, on LibQUAL+™ participants rate each item on a 1-(low)-to-9-(high) scale as regards (a) the minimally-acceptable service level, (b) the perceived level of service, and (c) the desired level of service.

A "zone of tolerance" can be defined as *the distance between "minimally-acceptable" and "desired" service levels*. Zones can be computed for a given rater, or for an institution by using institutional means on these two dimensions.

Ideally, perceived ratings will fall near the desired level. Perceived service quality should not be below minimally-acceptable levels of service. In other words, usually it is hoped that perceptions fall within the zones of tolerance. Thus, the zones can be used to interpret perceptions.

Absent information about the zones, an institution might have a mean perception rating of 7.0 on the 1-to-9 scale for an item (or a subscale). This might be interpreted as being favorable, because 7.0 is greater than the 1-to-9 scale midpoint of 5. However, if on this rating the zone of tolerance ranged from 7.5 to 8.5, the mean of 7.0 would be outside the zone of tolerance, and less than the minimally-acceptable service level.

And two items (or subscales) both with means of 7.0 might represent different perceptions. One mean might be less than the minimally-acceptable service level, while the other rating might not be.

Research Questions

The present study investigated the zones of tolerance for the 25 LibQUAL+™ items across different user groups. Specifically, the study addressed two research questions:

1. How comparable are the LibQUAL+™ zones of tolerance across undergraduate students, graduate students, and faculty?, and
2. How comparable are the LibQUAL+™ zones of tolerance across community colleges, health science center, four-year non-ARL universities, and four-year ARL universities?

Results

Participants

Participants in the LibQUAL+™ third phase (i.e., the spring of 2002) provided the data used to address the study's two research questions. Data were provided by 63,285 students and faculty. Included were data from three role groups: 26,483 undergraduate students, 17,735 graduate students, and 19,067 faculty. These 63,285 responses included data from 3,258 persons at community colleges, 10,388 persons at health science cen-

ters, 25,484 persons at four-year non-ARL universities, and 24,155 persons at four-year ARL universities.

Role-group Comparisons

Table 1 presents means for both minimally-acceptable and desired levels of service on the 25 LibQUAL+™ items across the three role groups. Standard deviations are presented in parentheses. The means of the 25 item means are also presented at the bottom of the table.

University-type Comparisons

Table 2 presents means for both minimally-acceptable and desired levels of service on the 25 LibQUAL+™ items across the four university types. Standard deviations are presented in parentheses. The means of the 25 item means are also presented at the bottom of the table.

Discussion

These data suggest a number of conclusions. Five conclusions warrant particular attention.

1. All 25 LibQUAL+™ items had high means on the desired scale across both user groups and university types. For example, as reported in Table 1, the means of the 25 mean desired ratings across the student and faculty groups were 7.83, 7.96, and 7.84, respectively. As reported in Table 2, the means of the 25 mean desired ratings across the four university types were 7.76, 7.87, 7.87, and 7.85, respectively.

The high desired ratings of all 25 items should be expected. When we previously selected these 25 items from the larger pool of candidate items,[13] one consideration was which service elements were most important to participants. Given that only a limited number of items can be used on a survey if high response rates are desired,[14] it only reasonable to focus on service issues of most concern to users, as reflected in high desired ratings.

The fact that desired expectations are so comparable across both user groups and university types is also noteworthy. This finding suggests that these various groups of users think about library service expectations in a somewhat similar manner, and thus data from these groups can be reasonably compared as "apples to apples."

2. The dimensions of *Personal Control* and *Service Affect* tend to be somewhat more important to users, across both role groups and university types, than are the dimensions of *Information Access*, and especially of *Library as Place*. For example, in Table 1, across the three user groups the lowest ratings for both minimally-acceptable and for desired service levels was on the *Library as Place* item, "place for reflection." This item was also rated lowest across the four university types.

We believe that perceptions on the *Library as Place* dimension may be governed by "cliff effects" dynamics. That is, as long as the physical library is reasonably usable, users "satisfice" and do not pay much attention to this dimension. It may be that only if these issues reach a critical juncture do users then focus on the dimension.

3. The widths of the zones of tolerance can also be compared. These are computed as desired scores for individuals (or means if groups are involved) minus mini-

Table 1

Comparisons of Zones of Tolerance Across Three User Groups

Item / Scale /Item Core	Minimum			Desired		
	Undergraduates (n = 26,483)	Grad Students (n = 17,735)	Faculty (n = 19,067)	Undergraduates (n = 26,483)	Grad Students (n = 17,735)	Faculty (n = 19,067)
5 PC electronic accessible	6.47 (1.80)	6.78 (1.70)	7.00 (1.66)	8.08 (1.28)	8.35 (1.10)	8.34 (1.14)
7 PC website enable me locate	6.63 (1.70)	6.92 (1.57)	7.09 (1.55)	8.12 (1.20)	8.32 (1.05)	8.32 (1.09)
17 SA knowledge answer questions	6.75 (1.66)	6.90 (1.55)	7.07 (1.50)	8.14 (1.19)	8.27 (1.06)	8.29 (1.06)
18 SA readiness to respond	6.63 (1.66)	6.82 (1.55)	7.05 (1.52)	8.02 (1.22)	8.18 (1.09)	8.23 (1.08)
16 PC independent use	6.49 (1.64)	6.74 (1.50)	6.92 (1.46)	7.99 (1.23)	8.19 (1.06)	8.22 (1.07)
12 PC easy-use tools to find	6.50 (1.64)	6.75 (1.50)	6.93 (1.46)	8.02 (1.22)	8.20 (1.07)	8.22 (1.06)
4 SA consistently courteous	6.57 (1.79)	6.70 (1.71)	7.04 (1.68)	8.03 (1.27)	8.12 (1.18)	8.21 (1.16)
25 PC convenient access	6.65 (1.67)	6.83 (1.55)	6.91 (1.53)	8.04 (1.22)	8.21 (1.08)	8.16 (1.12)
3 IA run of journal titles	6.05 (1.62)	6.60 (1.57)	6.69 (1.61)	7.61 (1.42)	8.16 (1.19)	8.10 (1.28)
6 PC easily access information	6.51 (1.65)	6.69 (1.53)	6.76 (1.56)	8.10 (1.18)	8.21 (1.08)	8.09 (1.20)
11 SA dependability handling	6.40 (1.53)	6.60 (1.44)	6.81 (1.46)	7.84 (1.22)	8.00 (1.13)	8.06 (1.14)
24 SA understand needs of users	6.45 (1.71)	6.57 (1.62)	6.80 (1.57)	7.87 (1.30)	7.98 (1.23)	8.05 (1.20)
19 IA convenient business hours	6.94 (1.72)	7.04 (1.60)	6.87 (1.62)	8.28 (1.16)	8.36 (1.04)	8.05 (1.26)
1 SA willingness help users	**5.84** (1.78)	6.13 (1.72)	6.47 (1.78)	7.70 (1.42)	7.96 (1.31)	8.05 (1.33)
8 IA timely document delivery	6.37 (1.48)	6.56 (1.46)	6.71 (1.56)	7.77 (1.20)	7.99 (1.11)	8.03 (1.21)
15 SA deal users caring fashion	6.44 (1.79)	6.46 (1.75)	6.64 (1.76)	7.86 (1.38)	7.85 (1.39)	7.85 (1.42)
22 IA comprehensive collections	6.37 (1.62)	6.52 (1.62)	6.50 (1.66)	7.78 (1.32)	7.95 (1.32)	7.84 (1.46)
14 SA giving individual attention	**5.83** (1.90)	**5.99** (1.82)	6.38 (1.72)	**7.32** (1.63)	**7.42** (1.58)	7.66 (1.46)

20 SA instill confidence	6.03 (1.83)	6.10 (1.78)	6.37 (1.76)	7.41 (1.54)	7.46 (1.55)	7.59 (1.53)
9 IA interdisciplinary needs	6.14 (1.43)	6.27 (1.39)	6.36 (1.48)	**7.40** (1.25)	7.54 (1.19)	7.54 (1.33)
21 LP comfortable location	6.32 (1.80)	6.19 (1.78)	5.99 (1.83)	7.96 (1.30)	7.83 (1.41)	7.48 (1.62)
2 LP space facilitate study	6.23 (1.84)	6.24 (1.85)	5.97 (1.94)	7.78 (1.47)	7.73 (1.61)	7.25 (1.89)
10 LP quiet and solitude	6.42 (1.91)	6.18 (1.94)	**5.70** (2.05)	7.79 (1.54)	7.56 (1.70)	**6.93** (2.03)
23 LP contemplative environment	6.06 (1.81)	**5.86** (1.86)	**5.57** (1.96)	7.55 (1.49)	**7.34** (1.68)	**6.88** (1.94)
13 LP place for reflection	**5.63** (2.00)	**5.45** (2.00)	**5.29** (2.03)	**7.17** (1.78)	**6.90** (1.91)	**6.54** (2.08)
Mean	6.35	6.48	6.56	7.83	7.96	7.84

Note. "PC" = "Personal Control"; "SA" = "Service Affect"; "IA" = "Information Access"; and "LP" = "Library as Place." The three highest values in each column are underlined; the three lowest values in each column are presented in **bold**. Standard deviations are presented in parentheses.

Table 2

Comparisons of Zones of Tolerance Across Four Library Types

	Minimum				Desired			
Item / Scale /Item Core	Comm College (n = 3,258)	Health Science (n = 10,388)	4 Yr, Not ARL (n = 25,484)	4 Yr, ARL (n = 24,155)	Comm College (n = 3,258)	Health Science (n = 10,388)	4 Yr, Not ARL (n = 25,484)	4 Yr, ARL (n = 24,155)
5 PC electronic accessible	6.73 (1.86)	6.91 (1.65)	6.62 (1.78)	6.73 (1.74)	7.84 (1.50)	8.39 (1.05)	8.16 (1.24)	8.31 (1.15)
7 PC website enable me locate	6.88 (1.81)	6.88 (1.56)	6.80 (1.66)	6.88 (1.61)	7.93 (1.39)	8.27 (1.09)	8.20 (1.14)	8.30 (1.09)
19 IA convenient business hours	7.02 (1.80)	6.93 (1.63)	6.95 (1.67)	6.94 (1.64)	8.01 (1.36)	8.23 (1.16)	8.25 (1.15)	8.25 (1.16)
17 SA knowledge answer questions	7.02 (1.72)	6.94 (1.51)	6.88 (1.61)	6.85 (1.58)	8.03 (1.28)	8.26 (1.05)	8.22 (1.12)	8.24 (1.12)
12 PC easy-use tools to find	6.82 (1.76)	6.75 (1.47)	6.66 (1.59)	6.71 (1.53)	7.88 (1.35)	8.16 (1.07)	8.10 (1.15)	8.18 (1.11)
25 PC convenient access	6.92 (1.74)	6.77 (1.55)	6.76 (1.62)	6.78 (1.57)	7.90 (1.34)	8.12 (1.14)	8.11 (1.18)	8.18 (1.11)
16 PC independent use	6.80 (1.75)	6.77 (1.49)	6.65 (1.58)	6.68 (1.54)	7.88 (1.32)	8.18 (1.09)	8.08 (1.16)	8.16 (1.11)
6 PC easily access information	6.84 (1.78)	6.74 (1.51)	6.60 (1.61)	6.60 (1.59)	7.98 (1.32)	8.20 (1.10)	8.11 (1.17)	8.13 (1.16)
18 SA readiness to respond	6.98 (1.71)	6.89 (1.53)	6.79 (1.62)	6.78 (1.58)	7.95 (1.31)	8.19 (1.09)	8.12 (1.15)	8.13 (1.15)
4 SA consistently courteous	7.14 (1.75)	6.87 (1.67)	6.74 (1.76)	6.64 (1.76)	8.10 (1.26)	8.20 (1.13)	8.11 (1.22)	8.07 (1.24)
3 IA run of journal titles	**6.21** (1.71)	6.63 (1.56)	6.25 (1.64)	6.48 (1.62)	**7.36** (1.55)	8.11 (1.19)	7.80 (1.37)	8.01 (1.31)
11 SA dependability handling	6.70 (1.67)	6.66 (1.45)	6.55 (1.51)	6.56 (1.47)	7.77 (1.33)	8.01 (1.13)	7.94 (1.18)	7.97 (1.16)
24 SA understand needs of users	6.86 (1.78)	6.61 (1.59)	6.60 (1.66)	6.53 (1.64)	7.88 (1.23)	7.98 (1.23)	7.97 (1.24)	7.94 (1.27)
8 IA timely document delivery	6.63 (1.64)	6.45 (1.45)	6.55 (1.50)	6.52 (1.51)	7.70 (1.33)	7.84 (1.18)	7.94 (1.15)	7.93 (1.19)
22 IA comprehensive collections	6.54 (1.73)	6.40 (1.66)	6.44 (1.62)	6.47 (1.62)	7.60 (1.44)	7.82 (1.41)	7.84 (1.34)	7.90 (1.35)
1 SA willingness help users	6.43 (1.85)	6.24 (1.75)	6.07 (1.79)	6.05 (1.77)	7.74 (1.48)	7.97 (1.36)	7.86 (1.36)	7.89 (1.37)
15 SA deal users caring fashion	6.90 (1.83)	6.55 (1.72)	6.57 (1.77)	6.38 (1.78)	7.94 (1.37)	7.87 (1.38)	7.91 (1.36)	7.78 (1.45)
21 LP comfortable location	6.70 (1.87)	6.13 (1.76)	6.24 (1.80)	6.07 (1.81)	7.83 (1.43)	7.74 (1.48)	7.84 (1.39)	7.72 (1.50)
2 LP space facilitate study	6.66 (1.89)	6.18 (1.87)	6.20 (1.83)	6.03 (1.91)	7.74 (1.50)	7.59 (1.72)	7.67 (1.56)	7.52 (1.75)

9 IA interdisciplinary needs	**6.37** (1.63)	6.25 (1.39)	6.25 (1.43)	6.22 (1.44)	**7.33** (1.44)	7.48 (1.24)	7.49 (1.24)	7.49 (1.27)
20 SA instill confidence	6.60 (1.83)	6.16 (1.77)	6.17 (1.80)	6.06 (1.80)	7.61 (1.50)	7.48 (1.54)	7.50 (1.50)	7.43 (1.58)
14 SA giving individual attention	6.52 (1.90)	6.12 (1.78)	**6.05** (1.86)	**5.93** (1.83)	7.59 (1.54)	7.50 (1.54)	**7.46** (1.57)	7.39 (1.60)
10 LP quiet and solitude	6.77 (1.96)	**6.00** (1.99)	6.26 (1.94)	5.99 (2.01)	7.73 (1.59)	**7.34** (1.86)	7.59 (1.69)	**7.36** (1.85)
23 LP contemplative environment	6.44 (1.88)	**5.72** (1.90)	**5.97** (1.83)	**5.72** (1.90)	7.48 (1.55)	**7.15** (1.81)	**7.40** (1.61)	**7.20** (1.78)
13 LP place for reflection	**6.17** (2.03)	**5.29** (1.99)	**5.59** (1.99)	**5.35** (2.02)	**7.26** (1.74)	**6.68** (2.00)	**7.04** (1.85)	**6.81** (1.99)
Mean	6.71	6.47	6.45	6.40	7.76	7.87	7.87	7.85

Note. "PC" = "Personal Control"; "SA" = "Service Affect"; "IA" = "Information Access"; and "LP" = "Library as Place." The three highest values in each column are underlined; the three lowest values in each column are presented in **bold**. Standard deviations are presented in parentheses.

mally-acceptable scores (or means). The mean gaps or zone widths on the 25 items across the three user groups were 1.48 for undergraduate students, 1.49 for graduate students, and 1.28 for faculty. Thus, faculty have somewhat narrower ranges of tolerance for variations in service quality.

As regards the four university types, the mean widths of the zones of tolerance for community college participants was 1.06, for health science participants, 1.40, for four-year not-ARL participants, 1.42, and for four-year ARL participants, 1.45. Thus, community college participants have somewhat narrower zones of tolerance as regards service expectations.

4. There were some differences in service expectations across the role groups, as reported in Table 1. For example, for both undergraduate and graduate student groups, "convenient business hours" was among the top three concerns, but less of an issue for faculty. On the other hand, "giving individual attention" was among the lowest three concerns for both student groups, but not for faculty.

5. There were also differences in service expectations across university settings, as reported in Table 2. For example, "consistently courteous" was in the top three concerns for community college users, but not for participants in the other three settings. Conversely, "interdisciplinary needs" was among the lowest three concerns for community college participants, but not for participants in the other three settings.

In summary, many of the results reported here are to be expected, and confirm that the LibQUAL+™ protocol is performing in an expected manner.[15] Considerable confidence can be vested in these estimates, given the large (i.e., 63,285) number of people providing data. No other projects in the library arena yet bring together so many people representing such diverse settings!

The data do suggest that the survey must be used cautiously in community college settings. Service quality dynamics in these settings may be somewhat different than those in other locations. Of course, LibQUAL+™ was grounded in qualitative research conducted in non-community college settings,[6] so some such differences should be anticipated.

LibQUAL+™ is but one way to listen to potential users and represents only one of the 11 ways of listening.[8] But LibQUAL+™ is a powerful total market survey with considerable scalability that can be used affordably by large numbers of libraries serving very large numbers of users, all with the ultimate goal of improving library service quality.

Colleen Cook is Wright Professor of Library Science and Executive Associate Dean of the Sterling C. Evans Library at Texas A&M University; she may be contacted via e-mail at: ccook@tamu.edu.

Fred Heath is Dean of Library Services and holder of the Sterling C. Evans Chair at Texas A&M University; he may be contacted via e-mail at: fheath@tamu.edu.

Bruce Thompson is Professor of Educational Psychology and Distinguished Research Scholar, Texas A&M University, Adjunct Professor of Family and Community Medicine, Baylor College of Medicine (Houston), and Professor of Interdisciplinary Health Sciences, LSU Health Science Center; he may be contacted via Internet URL: <http://www.coe.tamu.edu/~bthompson>.

Notes

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