



Photographs by Jeff Tippett

MOVING COMFORT
Athena \$38.00



- PROS**
- Great Support
 - Kept vertical movement to a minimum

- CONS**
- Too many hooks and snaps
 - Absorbed sweat, remained wet, difficult to take off due to dampness

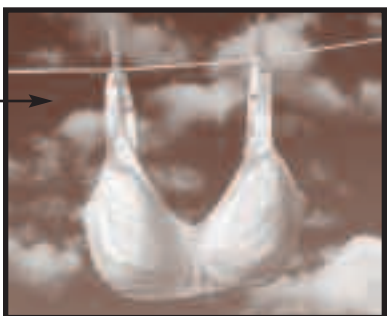
CHAMPION
Action Shape Sports Top \$36.00



- PROS**
- Excellent support
 - Really like velcro straps
 - Very comfortable

- CONS**
- Bra is too warm
 - Gets damp and stays damp
 - Difficult to take off when wet

CHAMPION
Sports Shape \$25.00



- PROS**
- Good support
 - Good comfort

- CONS**
- More like a regular bra than a sports bra

Active Support

ACE studies sports bras

DANSKIN
Support Contour \$30.00



- PROS**
- Fairly comfortable
 - Not bulky
 - Dries quickly

- CONS**
- Not enough support for exercising
 - Good only for non-impact activities

HANES SPORTS
Level 3 Racer Back \$11.00



- PROS**
- Fair comfort
 - Dries quickly

- CONS**
- Not enough support for exercising
 - Good only for non-impact activities

title IX may have given females equal opportunity to play sports in school, but it didn't completely level the playing field. A recent study confirmed that a large majority of women experience breast discomfort while exercising. And, to make matters worse, they don't know where to turn for advice, opting instead to either suffer in silence or avoid exercise altogether.

That's why we weren't surprised at the interest generated by our most recent study: an evaluation of popular sports bras for larger-breasted women.

A GROWING CONCERN

ACE commissioned Dr. John Porcari and his staff of researchers at the University of Wisconsin, La Crosse, to evaluate five of the most popular sports bras designed specifically for large-breasted women (size C-cup or larger). You might be surprised to learn that the average bra size has increased from 34B just 20 years ago to 36C (plastic surgery and the use of birth control pills have been implicated).

While many of us take our sports bras for granted — even the uncomfortable ones — there was a time when women had few options beyond an Ace bandage tightly bound around the chest. It wasn't until the late '70s that two inventive young women thought to sew two jockstraps together to help keep their breasts in place while they ran. And thus was born the Jogbra.

Since then, sports bras have become a \$300-million-a-year industry, accounting for roughly 10 percent of all bra sales.

Like the original jockstrap model, most sports bras still have more to do with function than anything else (although we have noticed a few recent additions to the market, such as the push-up sports bra, that have tried to change that perception). Women typically have two options: the compression bra, which works like the old Ace bandage by compressing the breasts against the chest (giving a woman what some call a "uni-boob"). This design works well for A- and B-cup women, and its tank or t-shape design allows many women to work out sans T-shirt without embarrassment. The other option is to encapsulate each breast in a harness-like device. Coverage is typically greater, and straps and clasps of all sorts help to keep the breasts in place. Because of their heavy-duty construction (and because larger-breasted women often feel more self-conscious about being on display), these bras typically are worn under workout clothes rather than alone.

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FINDING ONE THAT FITS

- Don't go by the size of the bra, go by the fit. Breast size changes with weight loss or gain, menstrual cycle or medication.
- Choose a bra that has good ventilation so sweat isn't trapped, which increases friction and chaffing. New fabrics such as CoolMax and Nike's DriFit help keep skin cool and dry.
- When trying on a bra, jump around and try to mimic as best you can the activity you'll be doing while wearing the bra. You may want a different type of bra for lower-impact sports than you would for aerobics or jogging.
- Make sure the clasps or straps don't dig into your skin. A good sports bra should fit comfortably from the very first wearing. Over time, however, elasticity is lost. Julia Alleyne, M.D., of Women's College Hospital in Toronto, recommends that sports bras be replaced every six months to a year.



Figure 1

Table 1 Subject characteristics

Subject #	Age (yr)	Height (in)	Weight (lbs)	Bra Size
1	25	65.5	137	34C
2	20	68	135	34D
3	45	66	198	38D
4	20	65	160	34D
5	21	65	135	36C
6	23	67	140	34D
7	27	70	125	36D
8	36	64	160	40C
9	21	66	145	36C
10	26	65	150	36C
	26.4 ± 8.11	66.5 ± 2.21	148.5 ± 20.68	

ACTIVE SUPPORT

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As most small- or medium-breasted women will tell you, finding a comfortable compression sports bra is not that difficult. There are countless styles and fabrics to choose from. Not so for the encapsulation model, which tends to come in fewer colors and cost more than other sports bras.

THE STUDY

When choosing the bras for our study, we looked for five that were widely available at varying costs (see page 7).

Ten subjects between the ages of 20 and 45 years were recruited for this study. All were recreationally active and participated in a variety of different exercise activities (e.g., volleyball, basketball, swimming, walking, running, yoga, cycling, hiking, rock climbing, tennis, aerobic dance, etc.). Demographics of the subjects are presented in Table 1, above.

Each subject completed a minimum of three 30-minute sessions of running, walking and aerobic dance while wearing each of the sports bras. The running and walking sessions were completed on an individual basis. For the aerobic dancing conditions, subjects had the option of attending prearranged aerobic dance classes, or watching and following along with an aerobics video. Once the subjects had completed

three exercise sessions in a particular bra, they completed a questionnaire assessing each of the following areas:

Comfort. Comfort was assessed using a previously validated questionnaire, that asked questions regarding materials used in the bra, overall design, breathability, bra parts (e.g., fasteners, straps, seams, etc.) and fit of the bra during activity (e.g., Did the straps move on the shoulders? Did the bra stay in place?). A total comfort score was determined, with 65 being a perfect score. Additionally, an overall comfort rating was determined on a scale of 1 to 5, with 1 being "very uncomfortable" and 5 being "very comfortable." Subjects also were asked whether or not they would purchase each bra based on comfort alone.

Support. Support was assessed by both questionnaire and biomechanical analysis. Subjects were questioned about the amount of support afforded by the bra during activity (e.g., support by the cups, straps, etc.) and the amount of breast movement allowed during exercise. A total support score was determined from the sum of eight questions, with 40 being a perfect score. Additionally, an overall support rating was determined on a scale of 1-5, with 1 being "very non-supportive" and 5 being "very supportive."

Support also was assessed by measuring the amount of vertical breast movement allowed during exercise. Each subject ran on a motor-

TABLE 2 RESULTS OF SUBJECTIVE RESPONSES

	Athena	Champion AS	Champion SS	Hanes	Danskin
COMFORT					
Comfort score*	58.0 ± 4.62	60.6 ± 3.52	60.9 ± 2.99	61.3 ± 2.34	61.2 ± 2.59
Comfort rating**	3.1 ± 1.11	4.0 ± .87	3.8 ± 1.02	4.0 ± .76	3.9 ± .63
* Out of a possible 65 points **On a scale of 1 to 5, with 5 being "very comfortable"					
SUPPORT					
Support score‡	28.3 ± 4.68	30.5 ± 2.64	29.5 ± 2.82	26.6 ± 3.99	26.1 ± 4.45
Support rating‡‡	3.8 ± 1.26	4.2 ± .76	3.9 ± .98	3.1 ± 1.34	2.9 ± 1.01
‡ Out of a possible 40 points ‡‡On a scale of 1 to 5, with 5 being "very supportive"					
PSYCHOLOGICAL FIT					
Silhouette rating	3.7 ± 1.31	4.0 ± .94	3.7 ± .97	3.8 ± .93	3.6 ± .88

ized treadmill at 6.0 mph while wearing each of the five sports bras, as well as their own, regular bra. Each running trial lasted approximately two minutes and conditions were presented in random order. Prior to each trial, reflective markers were placed on the sternum and the tips of each bra cup (Figure 1). The subjects were then filmed using a high-speed 3-D motional analysis system (Figure 2). The data for three consecutive strides were digitized and averaged and the amount of breast movement, relative to the movement of the sternum, was determined for each condition.

Psychological fit. The psychological fit of each bra was assessed using two questions:

- 1) How satisfied are you with the silhouette this bra gives you?
- 2) Would the amount of self-consciousness you feel when exercising in this bra keep you from buying this bra for use during exercise?

Results from the comfort, support and psychological questionnaires are presented in Table 2. There were no statistically significant differences in the responses between running, walking and aerobics, so the scores from these three activities were averaged. Here's what was found:

- The Champion AS, Champion SS, Hanes and Danskin bras all were significantly more comfortable than the Athena bra.
- The Champion AS, Athena and the Champion SS provided about the same amount of support. All three provided a good deal more support than the Hanes and Danskin bras.
- The biomechanical data (Table 3) confirmed the subjective ratings of support, in that the Champion AS, Athena and Champion SS all allowed significantly less vertical movement than did the Hanes and Danskin bras.
- The Hanes and Danskin bras did not provide any greater support than the subject's regular, everyday bras.

AND THE WINNER IS ...

Each subject was asked to give each bra an overall preference rating (5=highest preference, 1=lowest preference). Thus, the higher the

score, the higher the rating.

Champion Action Shape	42
Champion Sport Shape	35
Athena	29
Danskin	25
Hanes	19

In general, the highest-rated bra was the Champion Action Shape Sports Top. It provided the highest level of biomechanical and self-reported support, and also was rated high on the comfort scale. The Champion Sports Shape also rated fairly high on both the support and comfort scales. The Athena bra, while providing a good deal of support, was the lowest-rated bra on both the comfort scale and the overall comfort rating.

Based on the results of this study, neither the Hanes nor the Danskin bras are recommended for use as sports bras. They were very comfortable, but provided no more support than the subjects' regular bras, and because of the lack of support (and associated breast movement) more than half of the subjects felt too self-conscious exercising in those bras to purchase them. It should be noted that even after repeated washings (9 to 12 per bra), none of the bras showed excessive wear or loss of elasticity.

Study conducted by John Porcari and the research staff of the department of Exercise and Sport Science, University of Wisconsin, La Crosse.



FACT OR FICTION?

Is it true that not wearing a bra — or wearing an unsupportive one — while exercising will lead to sagging breasts? While there is no scientific evidence to suggest that breast tissue is more likely to be torn or damaged if left unsupported, a quick glance at *National Geographic* tells us that women in primitive cultures who never wear bras tend to develop long, pendulous breasts. Despite the bra-burning tendencies of some women in the '70s, pendulous breasts are not a common sight in America or other industrialized countries.

TABLE 3 RESULTS OF THE BIOMECHANICAL ANALYSIS

Regular	4.7 ± 1.20
Athena	3.2 ± 1.01
Champion AS	2.9 ± 1.31
Champion SS	3.3 ± 1.49
Hanes	4.2 ± 1.54
Danskin	4.4 ± 1.18

See text above for explanation of scores.

The following questions were posed to subjects to inquire whether or not they would purchase each of the bras based on comfort, support or psychological factors:

1. Based on comfort alone, would you purchase this bra for use as a sportsbra?
2. Based on support alone, would you purchase this bra for use as a sportsbra?
3. Would the amount of self-consciousness when exercising in this bra keep you from buying this bra for exercise?

	ATHENA		CHAMPION AS		CHAMPION SS		HANES		DANSKIN	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
Comfort	5	5	4	6	7	3	8	2	9	1
Support	6	4	9	1	8	2	4	6	4	6
Self-consciousness	2	8	1	9	1	9	6	4	6	4



Figure 2