

On the Use of College Students in Social Science Research: Insights from a Second-Order Meta-analysis

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A second-order meta-analysis was conducted to assess the implications of using college student subjects in social science research. Four meta-analyses investigating response homogeneity (cumulative $N > 650,000$) and 30 meta-analyses reporting effect sizes for 65 behavioral or psychological relationships (cumulative $N > 350,000$) provided comparative data for college student subjects and nonstudent (adult) subjects for the present research. In general, responses of college student subjects were found to be slightly more homogeneous than those of nonstudent subjects. Moreover, effect sizes derived from college student subjects frequently differed from those derived from nonstudent subjects both directionally and in magnitude. Because there was no systematic pattern to the differences observed, caution must be exercised when attempting to extend any relationship found using college student subjects to a nonstudent (adult) population. The results augur in favor of, and emphasize the importance of, replicating research based on college student subjects with nonstudent subjects before attempting any generalizations.

A subtle indicator of the importance of an issue in the social sciences is the extent to which it is raised by successive generations of researchers. One such issue is whether (undergraduate) college students are representative of “people in general,” “adults,” or, more precisely, are appropriate research surrogates for individuals other than college students. This issue has been formally recognized, empirically examined, and heatedly debated in a variety of disciplines for more than five decades (cf. McNemar 1946, p. 333).

Empirical examinations of the issue can be found in disciplines that include accounting (e.g., Ashton and Kramer 1980), human resources (e.g., Covin and Brush 1993), management (e.g., Remus 1986), management information systems (e.g., Walstrom 1996–97), and organizational psychology (e.g., Barr and Hitt 1986). Examples of spirited dialogues can be found in the management (e.g., Dobbins, Lane, and Steiner 1988a, 1988b; Gordon, Slade, and Schmitt 1986, 1987; Greenberg 1987; Slade and Gordon 1988) and communications (e.g., Abelman 1996; Basil 1996; Courtright 1996; Potter, Cooper, and Dupagne 1995; Sparks 1995a, 1995b) literatures. Indeed, to paraphrase Courtright (1996), there seem to be few insights into the college-student-as-research-subject issue that have not been previously pre-

sented, replied to, subjected to rejoinder, and subsequently forgotten.

Opinions on the issue diverge dramatically. For example, representative and widely cited opinions against the use of college students as research subjects include those of Schultz (1969) and Dill (1964), whereas representative and widely cited opinions in favor of using college students as research subjects include those of Oakes (1972) and Weick (1967). However, despite the importance of the college-students-as-research-subjects issue, there is a paucity of generalizable research on it. Rather, the various positions appear to be based on conjecture and anecdotal evidence. The present research attempts to fill this lacuna by documenting differences and similarities between college student subjects and nonstudent subjects through a second-order meta-analysis.¹

COLLEGE STUDENTS AS SURROGATES FOR CONSUMERS

The propriety of using college students as subjects in social science research generally, and consumer research in particular, has been debated philosophically and addressed

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¹Throughout this article the term “nonstudents” will be used as complementary to the term “college students” for expository ease. The term “nonstudents” is defined as non-college students and includes adults, consumers, the general public, and people in general older than, say, 22 or 23 years of age. Elementary, middle, or high school students are not included in this definition and were excluded from the nonstudent subjects studied.

empirically numerous times. Calder, Phillips, and Tybout (1981) argued eloquently for the use of college students as subjects in consumer research when the objective of the research was theoretical in nature. They made a distinction between what they termed “effects application research,” or research whose purpose is to produce parameter estimates for some larger population, and “theory application research,” or research in which theory generalization, not the research results themselves, is the focus. In many regards, their arguments reiterated the distinctions made by Farber (1952) between “descriptive-level” and “conceptual-level” research and by Kruglanski (1975) between “particularistic research” and “universalistic research.”

Calder et al.’s arguments were countered by Lynch (1982), who stressed the need for external and construct validity when conducting research on consumer behavior. The ensuing dialogue (Calder, Phillips, and Tybout 1982, 1983; Calder and Tybout 1999; Lynch 1983, 1999), which was subsequently joined by McGrath and Brinberg (1983), Wells (1993), Kardes (1996), Petty and Cacioppo (1996), and Winer (1999), has been both elucidating and lively.

Interestingly enough, only a relatively few investigations have focused on direct, empirical comparisons of college students and nonstudents as subjects in consumer research. Of those investigations that have undertaken direct comparisons, 10 are reported (in chronological order) in table 1. Several of these investigations have been broadly referenced, either in support of, or in opposition to, the use of college students as subjects in consumer research. Note that while none of these investigations has been published within the past decade, this does not suggest the issue is no longer considered important, as the more recent articles of Wells (1993), Kardes (1996), Petty and Cacioppo (1996), and Winer (1999) attest.

Although the investigations reported in table 1 would seem to support a conclusion that college students should not be used as subjects when the focus of the research is on effects application, the evidence is not so clear regarding theory application research. Moreover, given the nature and characteristics of the investigations—frequently atheoretic, employing convenience samples of relatively small size (especially with regard to the large number of variables often analyzed) with a focus on very specific and narrow (and often less-than-interesting and perhaps trivial or mundane) psychological constructs, behaviors, and products and services, and confounded data collection modes—the findings are not unexpected and not very generalizable. Only one investigation (Wilson and Peterson 1990) was located that made an attempt to compare the responses of large, nationally representative samples of college students and consumers on theoretically relevant measures.

Perhaps in part because of the inconclusiveness of results such as those reported in table 1, and in part because of their accessibility, college students are increasingly the subjects in social science research. For example, in the context of consumer research employing human subjects, of those articles published in the *Journal of Consumer Research*

(*JCR*) over the past quarter century, the percentage using college students has steadily increased, from 23% in the first volume to 89% in the most recent volume. This percentage is similar to the 86% reported by Sherman et al. (1999) for subject-based articles appearing in the *Personality and Social Psychology Bulletin* but larger than the 63% they reported for the *Journal of Personality and Social Psychology*. Moreover, as a further point of comparison, 86% of the empirically based articles appearing in the *Journal of Consumer Psychology* since its inception in 1992 have employed college students as subjects. If the *JCR* subject-usage trend continues, virtually all subject-based consumer research published in it will utilize college students within the next decade.

DIFFERENCES BETWEEN COLLEGE STUDENTS AND NONSTUDENTS

There are theoretical reasons to expect that college students should respond differently from nonstudents in certain social science research studies. Perhaps the most succinct reason is that, according to Carlson (1971, p. 212), “students are ‘unfinished’ personalities” in a relatively early adult life stage. As such, they may systematically differ from nonstudents—especially individuals who are older and possess more life experiences—on a number of specific psychological and/or behavioral dimensions. For example, Frieze, Sales, and Smith (1991) suggested that the use of college students (in laboratory studies) might distort conclusions about female-male relationships “since we are studying women and men in a context that minimized achievement differences and maximized relational differences” (p. 389).

More specifically, following an extensive review of the psychology literature, Sears (1986, p. 515) noted that, compared with nonstudents (older adults), “college students are likely to have less-crystallized attitudes, less-formulated senses of self, stronger cognitive skills, stronger tendencies to comply with authority, and more unstable peer group relationships.” Because of such possible differences, Sears concluded that by relying heavily on what he termed a narrow database of college students as research subjects, psychological research might have produced systematic biases in its “portrait of human nature” (p. 515). He cited three potential problems that might arise from the use of college students as research subjects, with the most important being the possibility that “the nature of a relationship might be wrongly described” (p. 520), either with respect to its shape or strength. However, as Sears readily acknowledged, many of his arguments were inferential in nature and, indeed, speculative because they were not founded on direct, empirical comparisons between college students and nonstudents.

Finally, researchers (e.g., Calder, Phillips, and Tybout 1981; Greenberg 1987; Kraus 1995) have occasionally claimed that college students differ from nonstudents in that they are more homogeneous. Although the domain to which claims of homogeneity apply is not always clear (i.e., whether the claim relates to such obvious demographic char-

TABLE 1

DIRECT CONSUMER RESEARCH COMPARISONS OF STUDENTS AND NONSTUDENTS

Study	Focus	Source of data		Conclusion
		Students	Nonstudents	
Sheth (1970)	(Simulated) choice and dissonance reduction	49 Columbia University male graduate students	43 suburban New Jersey housewives	There exists a "remarkable" degree of similarity between students and housewives in their post-decision dissonance reduction" (p. 245)
Enis, Cox, and Stafford (1972)	Perceptions of advertisements	210 University of Houston undergraduate students	282 housewives from a Houston, TX, religious group	"Our results may support those researchers who contend that accumulating empirical evidence will show that sometimes students are good predictors of housewives' behavior and sometimes they are not" (p. 74)
Cunningham, Anderson, and Murphy (1974)	Sociopsychological attributes, product information sources, choice influences, and store image perceptions	220 University of Texas undergraduate marketing students	388 adults in Austin, TX	"Student response patterns do not accurately reflect those of other consumers" (p. 409)
Shuptrine (1975)	Product ratings	50 University of South Carolina female graduate students	66 Columbia, SC, housewives	Results "tend to be inconclusive" (p. 389), but "using students as models in consumer experiments should be discouraged unless there are compelling reasons for assuming validity" (p. 390)
Roering, Schooler, and Morgan (1976)	Ratings of marketing practices	46 University of Missouri marketing undergraduates	46 Columbia, MO, adult females	"Students do not evaluate marketing practices in the same way that housewives do" (p. 141)
Hawkins, Albaum, and Best (1977)	Department store attitudes, preferences, and beliefs	107 University of Oregon marketing undergraduates	114 Eugene, OR, housewives in various church groups	"Researchers should not use measures of students' attitudes as a direct substitute for housewives' attitudes toward retail outlets" (p. 220), although attitudes predicted reported behavior equally for the samples
Park and Lessig (1977)	Susceptibility to reference groups	88 University of Kansas marketing undergraduates	100 Topeka, KS, housewives	"The findings raise a serious question concerning the external validity of studies which use students as subjects yet make generalizations to a broader population base" (p. 102)

TABLE 1 (Continued)

Study	Focus	Source of data		Conclusion
		Students	Nonstudents	
Beltramini (1983)	Entertainment and media habits; attitudes toward events facility	321 Arizona State University undergraduates	288 Tempe, AZ, adults	"Students may well serve as surrogates for adult groups in consumer research at the attitudinal level, but appear far less appropriate as surrogates in consumer research at the behavioral level" (p. 443)
Burnett and Dunne (1986)	Numerous topics	299 Texas Tech University undergraduate students	245 parents of the students; 188 members of a Lubbock, TX, consumer panel; and 104 individuals similar in age to the college students but not enrolled in college	"Both in terms of theory development and answer comparisons, students are different from the other three groups and lessen external validity of the research" (p. 329)
Wilson and Peterson (1990)	Information processing	916 students from eight different universities	1,004 members of a nationwide consumer panel	While "patterns of intervariable relationships were similar across the two groups . . . the magnitude of the experimentally produced effects differed in certain circumstances" (p. 106)

acteristics as age or education, whether it relates to questionnaire responses, or whether it relates to the variance in the psychological constructs and behaviors investigated), a subsequent, and very important (but often implicit), assumption is typically made. This assumption is that the alleged homogeneity of college students translates into stronger hypothesis tests than if nonstudents were the research subjects since there is less noise or extraneous variation associated with college students than with nonstudents (e.g., Brown and Stayman 1992). Indeed, this assumption is frequently provided as the rationale enabling the use of college students as research subjects.

Despite the enduring and oftentimes vitriolic nature of the debate over the use of college students as research subjects, relatively little empirical evidence exists to inform or buttress the various positions proffered. As the investigations in table 1 illustrate, the empirical evidence that does exist is typically ad hoc and inconsistent, does not lend itself to meaningful generalization, and is inconclusive at best.

Given this state of affairs, the objective of the present research was to provide quantitative insights into differences and similarities in variable relationships that might exist when college students are used as subjects and when nonstudents are used as subjects in social science research. More

specifically, the objective was to compare the effect sizes or magnitudes of a variety of relationships that have been investigated in meta-analyses incorporating samples of college students and nonstudents. Through such a comparison it should be possible to provide insights into whether college student subjects are more homogeneous in their responses to questionnaires than nonstudent subjects and whether effect sizes or relationship magnitudes observed in studies using college students generalize to, or are at least comparable to, effect sizes or relationship magnitudes observed in similar studies employing nonstudents.

To accomplish this objective, published meta-analyses were examined to identify those reporting effect sizes for both college students and nonstudents such that direct comparisons between the two groups were possible. The use of meta-analyses overcomes many of the limitations associated with prior comparisons of college students and nonstudents, notably the use of small convenience samples and narrowly defined independent and dependent variables. As a consequence, inferences from the present research should be more reliable and generalizable than those previously reported in individual investigations. The remainder of this article describes the methodology employed in identifying the meta-analyses included in the present research and reports the re-

sults from investigating these meta-analyses as well as their implications for social science research.

COMPILATION OF META-ANALYSES

The standard meta-analytic data collection approaches were employed when identifying meta-analyses that might be candidates for inclusion in the present research. Social science computer databases, including ABI/INFORM, Psych Abstracts, Sociological Abstracts, and ERIC were searched; tables of contents of journals not included in the databases were manually scanned; and references and citations found in various publications were perused for meta-analyses using key terms such as "meta-analysis," "quantitative review," and "integrative review." Only meta-analyses reported in peer-reviewed journal articles were considered in an attempt to ensure at least a modicum of quality control over the underlying data.

Several hundred journal articles containing meta-analyses of behavioral and/or psychological phenomena were initially identified as potentially providing useful information. Each of these articles was examined in depth by the author to determine whether it did in fact contain comparative information on investigated relationships for college students and nonstudents.

For a meta-analysis to be included in the present research, it had to meet several criteria. Most obviously, it had to report or permit calculation of effect sizes for well-defined groups of both (undergraduate) college students and nonstudents. Meta-analyses reporting effect sizes for only college students or nonstudents, but not both, were summarily excluded from further consideration. Moreover, meta-analyses reporting effect sizes for college-age individuals without explicitly labeling the individuals as college students were excluded. Similarly, meta-analyses only reporting effect sizes for special or unique populations (e.g., particular occupational groups, physically or mentally disabled or addicted adults, senior citizens) were excluded.

Additionally, to be included in the present research, a meta-analysis had to report effect sizes for both college student and nonstudent samples that were based on at least two observations or samples. Even though two might seem to be a small number of observations or samples, these observations or samples may, in turn, consist of hundreds or thousands of individuals, such that reliability per se was not deemed to be an issue. Further, to the extent possible, meta-analyses incorporating non-U.S. subjects were excluded in an attempt to reduce possible cultural biases.

It is important to note that the meta-analyses included in the present research varied considerably on a number of dimensions and reflected a variety of analytic decisions. Some incorporated only effect sizes from experiments, whereas others incorporated experimentally based as well as nonexperimentally based effect sizes. The effect size metrics employed ranged from β to r to d to g to ω^2 . Some meta-analyses focused on behavioral variables, whereas others included self-report data and/or third-party reports. Some meta-analyses included outlier effect sizes, whereas others

excluded them; some only incorporated statistically significant effect sizes, whereas others incorporated all effect sizes, whether statistically significant or not. Some meta-analyses were based on weighted or corrected effect sizes, whereas others were based on unweighted or uncorrected effect sizes.

Such differences were, however, of little consequence in the present research. Because effect size comparisons were always conducted within a particular meta-analysis, the dimensions and analytic decisions were effectively held constant. Thus, the "fruit salad argument" against combining disparate measures is not applicable here. Similarly, because the purpose of the present research was to compare effect sizes for college students and nonstudents within a particular meta-analysis, and many of the meta-analyses included unpublished studies and/or addressed the issue of unpublished studies analytically, potential file-drawer problems were not deemed to be a concern. Consequently, as long as consistent rules were followed for any particular meta-analysis, comparison of the effect sizes found for college students with those found for nonstudents in that meta-analysis was considered meaningful.

RESULTS

Table 2 presents the characteristics and results of four meta-analyses offering insights into the homogeneity of responses or response variability of college students relative to nonstudents. Three different measures of response variability are represented in the table—reliability coefficients (the larger the coefficient, the more homogeneous are the responses), rating scale standard deviations (the smaller the standard deviation, the more homogeneous are the responses), and the percentage of variance accounted for in factor analyses (the smaller the percentage, the more homogeneous are the responses). As might be expected given the prevalence of college student samples in social science research, there were more effect sizes for college students ($K = 3,965$) than for nonstudents ($K = 3,402$). Although only four meta-analyses are presented in table 2, the cumulative number of subjects represented by the meta-analyses was estimated to be in excess of 650,000.

The measures shown in table 2 are consistent. The responses of college students were slightly more homogeneous across the measures investigated than were those of nonstudents. Thus, college students displayed less variation within a scale (smaller standard deviations) and more consistency across scales (higher correlations) than did nonstudents.

Table 3 presents effect sizes for 63 comparisons reported in 28 meta-analyses. Because some of the meta-analyses investigated similar constructs or phenomena, there may have been some overlap in terms of the studies included in them, leading to redundancy in results. After examining the meta-analyses, however, the possible effect of such overlap was deemed minimal, with the exception of the Kite and Whitley (1996) and Whitley and Kite (1995) meta-analyses. Thus, as indicated in a footnote to table 3, only the former analysis was included in the present research.

TABLE 2
META-ANALYTIC INDICATIONS OF COLLEGE STUDENT AND NONSTUDENT RESPONSE HOMOGENEITY

Study	Dependent variable	Measure	College students		Nonstudents	
			<i>K</i>	<i>M</i>	<i>K</i>	<i>M</i>
DeNeve and Cooper (1998)	Reliability estimates: • Subjective well-being • Personality trait	α_c^a	30	.82	19	.83
			35	.79	31	.57
			1,741	.77	879	.74
Peterson (1994)	Coefficient alpha	α_c	1,741	.77	879	.74
Peterson (1997)	Rating scale variability	SD_s^b	1,847	-.03	1,966	.01
Peterson (2000)	Variance accounted for in factor analysis	%	299	53.4	502	58.5

NOTE.—*K* = number of measures included in meta-analysis; *M* = average measure value.

^aCoefficient alpha.

^bStandardized rating scale standard deviation. The smaller the measure, the more homogeneous the ratings.

Two additional meta-analyses that permit comparisons of college students and nonstudents but do not fit into the format of the present research are those of Gemunden (1985) and Steele and Southwick (1985). Gemunden (1985) undertook a meta-analysis to determine whether a positive relationship existed between perceived risk and information search behavior. He concluded that the probability of finding a positive relationship between risk perception and information search was less when college students were studied ($K = 14$) than when nonstudents were studied ($K = 32$). Steele and Southwick (1985) conducted a meta-analysis of the relationship between alcohol consumption and selected social behaviors. Even though specific effect sizes were not contained in the meta-analysis, the authors reported a statistically significant correlation of .22 ($K = 121$) between alcohol-behavior effect sizes and whether subjects were college students or nonstudents. Effect sizes were smaller for college students than for nonstudents. The Gemunden and Steele and Southwick findings are incorporated in the present research as appropriate.

Although it was not possible to precisely determine the cumulative sample size underlying the effect sizes due to the absence of information in certain meta-analyses, a conservative estimate is that more than 350,000 subjects constituted the effect size database. Analogous to the meta-analyses in table 2, there were more effect sizes for college students ($K = 2,576$) than for nonstudents ($K = 1,995$). Forty-nine of the 63 comparisons reported in table 2 had more effect sizes for college students than for nonstudents.

Three general observations about the effect sizes analyzed merit mention. First, many of the effect sizes in table 3 are relatively small. Indeed, according to Cohen's (1992) criteria, less than 5% of the observed effect sizes would be considered large. Even so, the magnitudes of the various effect sizes must be considered in the context from which they were derived (Fern and Monroe 1996; Prentice and Miller 1992). More important, differences in comparable effect sizes between college student subjects and nonstudent

subjects are the focal point of the present research, not the absolute effect sizes themselves.

Second, there was a tendency for studies employing college students to produce larger effect sizes than studies employing nonstudents. Of 64 relationships investigated (the 63 reported in table 3 plus those reported in Steele and Southwick [1985]), effect sizes were larger for college students than for nonstudents in 35 instances (55% of the relationships) and larger for nonstudents in 27 instances (42% of the relationships). In two instances the respective effect sizes were identical.

Third, there appears to be a relationship between effect sizes respectively computed for college student subjects and nonstudent subjects. Specifically, across the 63 effect size comparisons reported in table 3, the pairwise correlation is a statistically significant .75. Even so, its magnitude suggests there is less than a one-to-one correspondence between the respective effect sizes.

Inspection of individual effect sizes revealed that the directionality of the relationships investigated differed between college students and nonstudents 19% of the time. Thus, in nearly one-of-five relationships studied, a conclusion based on college student subjects may have differed directionally from one based on nonstudent subjects. Such a possibility is thought provoking, even though any conclusion (notwithstanding the first general observation regarding absolute effect sizes) must be tempered by knowledge that in certain instances (e.g., Donahue 1985; Jorgensen et al. 1996) at least one effect size was close to zero, and in the extreme instance (Karau and Williams 1993), the authors offered a cautionary note about the directionality difference they observed. Furthermore, in an additional 29% of the relationships investigated, the larger effect size in a pair exceeded the smaller one by a factor of more than two. Thus, although the same directionality was observed, different conclusions, especially about the strength of a relationship, may have resulted as a function of whether college students or nonstudents served as research subjects.

TABLE 3
CHARACTERISTICS AND RESULTS OF COMPILED META-ANALYSES

Study	Relationship	Effect size index	College students		Nonstudents	
			<i>K</i>	<i>ES</i>	<i>K</i>	<i>ES</i>
Brown and Stayman (1992)	Ad attitude:	<i>r</i>				
	• Ad cognitions		9	.58	3	.47
	• Brand cognitions		14	.34	3	.31
	• Brand attitudes		26	.68	7	.65
Byrnes, Miller, and Schafer (1999)	• Purchase intentions		12	.46	2	.36
	Gender—risk taking:	<i>d</i>				
	• Choice dilemma		36	.07	3	.38
	• Problem framing		25	.06	2	.00
Cohn (1991)	• Drink/driving behavior		6	.17	3	-.15
	• Sexual behavior		22	.18	16	-.11
	Gender—personality development	<i>g^u</i>	25	.21	17	.14
Donahue (1985)	Intrinsic—extrinsic religiousness	<i>r</i>	6	-.03	12	.01
Eagly, Makhijani, and Klonsky (1992)	Evaluation—leader gender	<i>d</i>	63	-.01	17	.21
Eisenberg and Miller (1987) ^a	Empathy—prosocial behavior	<i>r</i>	17	.30	5	.09
Faith, Wong, and Carpenter (1995) ^a	Group sensitivity training:	<i>d</i>				
	• Behavior change		9	1.80	9	.92
Farley, Lehmann, and Ryan (1981)	• Self-report change		24	.49	4	.56
	Behavioral intentions:	β				
Feingold (1994)	• Attitude		26	.48	11	.39
	• Subjective norm		26	.29	11	.34
Gender—personality: ^{a, b}	Gender—personality: ^{a, b}	<i>d</i>				
	• Anxiety		8	-.26	7	-.23
	• Gregariousness		9	.22	5	-.42
	• Assertiveness		11	.33	5	.79
	• Activity		6	.12	3	.07
	• Impulsiveness		7	.25	2	-.07
	• Openness		6	.08	3	-.18
	• Trust		4	-.26	2	-.22
	• Tendermindedness		7	-.59	4	-.93
	• Order		3	-.02	2	-.18
	Gender—personality: ^{a, c}					
	• Self-esteem		6	.14	2	.26
	• Assertiveness		5	.07	3	.09
	Franke, Crown, and Spake (1997)	Gender—perceptions	<i>d</i>	33	.26	24
Georgeson and Harris (1998)	Power—evaluations of others	<i>r</i>	9	.30	5	.27
Hyde (1981) ^a	Gender—field articulation	ω^2	8	.05	5	.07
Jaffee and Hyde (2000)	Gender:	<i>d</i>				
	• Care orientation		36	-.18	38	-.36
Jorgensen et al. (1996) ^a	• Justice orientation		32	.04	26	.43
	Blood-pressure personality:	<i>d</i>				
Karau and Williams (1993)	• Affect expression		11	-.01	70	.03
	• Negative affect		13	.10	64	.09
Kite and Whitley (1996) ^d	Effort—work context	<i>d</i>	141	.47	6	-.19
Gender—attitude: ^e	Gender—attitude: ^e	<i>d</i>				
	• Person		100	.48	8	.10
• Behavior		13	.31	13	-.01	

TABLE 3 (Continued)

Study	Relationship	Effect size index	College students		Nonstudents	
			K	ES	K	ES
Konrad et al. (2000) ^a	Gender—job attribute preferences: ^f	<i>d</i>				
	• Task enjoyment		8	-.19	11	-.00
	• Creativity		5	.01	7	.04
	• Variety		11	-.16	10	-.12
Kraus (1995)	Attitude—behavior	<i>r</i>	65	.34	23	.48
Mabe and West (1982) ^a	Self-evaluation—rated performance	<i>r</i>	15	.24	84	.23
Notani (1998)	Perceived behavioral control:	<i>r</i>				
	• Behavior intention		40	.47	23	.06
	• Behavior		33	.22	12	.25
	• Attitude		22	.30	22	.03
	• Subjective norms		22	.13	21	-.06
Paik and Comstock (1994)	Television violence—aggressive behavior	<i>r</i>	267	.37	57	.18
Peterson and Jolibert (1995)	Country of origin:	ω^2				
	• Perceived quality		139	.28	704	.30
	• Purchase intent		218	.05	129	.28
Postmes and Spears (1998)	Deindividuation—antinormative behavior	<i>r</i>	50	.09	4	-.09
Richman et al. (1999) ^a	Social desirability distortion—mode of data collection:	<i>d</i>				
	• Computer—paper and pen		234	.07	220	-.02
	• Computer—personal interviews		16	-.08	17	-.05
Suls and Wan (1989)	Type A behavior—chronic dysphoria:	<i>g</i>				
	• Jenkins survey		14	.12	19	.32
	• Framingham scale		4	.53	15	.59
Sweeney, Anderson, and Bailey (1986)	Attribution styles—positive outcomes:	<i>r</i>				
	• Internality		31	-.17	13	-.21
	• Stability		26	-.09	9	-.23
	• Globality		18	-.07	9	-.09
	Attribution styles—negative outcomes:					
	• Internality		52	.22	24	.18
	• Stability		47	.21	16	.15
• Globality		36	.20	15	.20	
Symons and Johnson (1997)	Self-referencing—memory: ^a	<i>d</i>				
	• Other reference		52	.29	17	.51
	• Semantic encoding		54	.69	3	.44
Wilson and Sherrell (1993)	Message source—persuasion	ω^2	283	.10	89	.05

NOTE.—K = number of effects included in meta-analysis; ES = average effect size.

^aAverage effect size calculated from data reported in article.

^bBased on standardized personality test norms.

^cBased on independent studies.

^dEffect sizes reported in this article supersede those reported in Whitley and Kite (1995).

^eAttitude toward homosexual persons and homosexual behavior, respectively.

^fOnly nongender-type attributes included.

CONCLUSIONS

The intent of the present research was to quantitatively assess the implications of using college students as subjects in social science research. By investigating effect sizes derived from meta-analyses addressing a diversity of relationships in a variety of contexts, it was possible to evaluate the potential generalizability of research results using college student subjects to a nonstudent (adult) population. Although it was anticipated that broad insights would be obtained into the college-students-as-research-subjects issue, the insights that did result were relatively equivocal.

The responses of college student subjects were slightly but consistently more homogeneous (less variable) than those of nonstudent subjects, both within and across scales. Thus the present research supports prior (but heretofore empirically unsubstantiated) conclusions regarding the response homogeneity of college students. Even so, greater homogeneity does not appear to uniformly translate into more powerful hypothesis tests or larger effect sizes than would be observed for samples of nonstudents. Although greater homogeneity implies less noise or extraneous variability in data, it may also reduce the magnitude of differences or minimize relationships that do exist among variables.

Consider the results of a meta-analysis conducted by Peterson, Albaum, and Beltramini (1985). These authors undertook a meta-analysis of effect sizes (ω^2) obtained in consumer behavior experiments. The average ω^2 observed for college students was .09 ($K = 330$), whereas the corresponding figure for nonstudents was .13 ($K = 231$), with the difference being statistically significant at $p < .01$. Thus, less variance was explained in consumer behavior experiments when the subjects were college students than when they were nonstudents. In the present investigation, about one-fourth of the effect size comparisons were derived from experiments.² Contrary to the Peterson et al. (1985) results, college student subjects displayed larger effect sizes than nonstudent subjects in slightly more than two-thirds of these within-experiment comparisons. Thus, whether response homogeneity will inflate or deflate effect sizes in any particular situation remains an open question, and caution must be exercised when making inferences about the impact that the homogeneity of college student subjects will have on research results.

Sears (1986) speculated about the influence of college students' characteristics on construct and construct-behavior relationships studied. The present results empirically corroborate Sears's speculation that the nature of relationships—both their magnitude and, to a lesser extent, their

directionality—does vary as a function of the construct studied and whether the research subjects are college students or nonstudents. Nearly half, 48%, of the effect sizes respectively observed for college student and nonstudent subjects differed substantially, either in direction or magnitude. Unfortunately, there was no systematic or unambiguous pattern to the differences. Thus, what remains is to determine those factors accounting for the differences or, for that matter, the similarities of the respective effect sizes observed for college student subjects and nonstudent subjects.

The primary implication of the present research is that social science researchers should be cautious when using college student subjects and be cognizant of the implications of doing so if the purpose of the investigation is to produce universal principles. More specifically, the present research suggests that, by relying on college student subjects, researchers may be constrained regarding what might be learned about consumer behavior and in certain instances may even be misinformed.

Even when the research focus is on theory application, or the emphasis is on internal validity, the use of college students as research subjects should be carefully scrutinized in view of the effect size differences and similarities documented in the present research. Given the magnitudes and pattern of effect size differences documented in the present research, statements in the literature that it is appropriate to use college students in certain situations or contexts (e.g., Kardes 1996) must be carefully examined. Because college student subjects appear to produce different effect sizes from nonstudent subjects in instances that may not be theoretically predictable or expected, additional research is required to explain and predict these effect size differences. One potential line of research might investigate whether age, life span, or developmental stages (e.g., Craig 1999; Feldman 1997) influence the effect size differences and similarities observed for college student subjects and nonstudent subjects.

Consequently, whether conclusions in social science research based on college student subjects are qualitatively and quantitatively generalizable to nonstudent (e.g., adult) populations remains an empirical question. Hubbard and Vetter (1996) presented data (partially corroborated by the present research) that only about 27% of business-related research results are supported in replications or extensions. At a minimum, research results based on college students need to be replicated with nonstudent subjects prior to the generation of universal principles. (As an aside, the emergence of the Re-Inquiries section in this journal emphasizes the importance of replicating research findings generally.) Incorporating samples of college students and nonstudents in a particular investigation—along the lines of Belk, Bahn, and Mayer (1982), McQuarrie and Mick (1992), or Netemeyer, Burton, and Lichtenstein (1995)—as a check on the reproducibility of research results would seem to be an appropriate and productive methodological strategy. Moreover, as a reviewer aptly opined, researchers should be encouraged to report more fully on the characteristics of their samples

²Because many of the meta-analyses incorporated in the present research did not explicitly distinguish between experimentally and nonexperimentally induced effect sizes, these estimates must be treated as tentative. Indeed, given differences in terminology and convention across social science disciplines and researchers, it was not possible to reliably distinguish between laboratory and nonlaboratory (e.g., field studies, surveys, correlational investigations) designs or experimental versus nonexperimental designs, hence precluding possible moderator variable analyses.

so that independent, informed judgments can be made as to the possible influence of these characteristics on research results. Indeed, sample characteristics should be routinely incorporated in consumer behavior studies as covariates to analytically assess their potential effects.

In closing, it is important to emphatically point out that the present findings are not a per se indictment of research employing college student subjects. Rather, they simply demonstrate that research results produced using college student subjects may differ from research results produced using non-student subjects, just as research results based on seven-year-old subjects may differ from research results based on 70-year-old subjects. Consequently, research is required to determine when college student samples are appropriate in consumer behavior studies and when they are not. Finally, the present findings provide a cautionary reminder not to draw unwarranted inferences or generalities from any particular research investigation and to emphasize the importance of replications in the generation of knowledge.

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