



Research and Development Division
Professional DynaMetric Programs, Inc.

DISPARATE IMPACT STUDY
of the Professional DynaMetric Programs[®] (PDP[®])
ProScan[®] Instrument

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Disparate Impact Study of the Professional DynaMetric Programs[®], Inc. (PDP[®]) ProScan[®] Instrument

Executive Summary

In the Fall of 1993, 92 students from the University of Colorado at Denver participated in a study to assess the potential disparate impact of Professional DynaMetric Programs[®] ProScan[®] behavioral assessment device used for employment selection. Disparate impact occurs when members of one applicant group have a greater opportunity for employment than members of another applicant group.

The sample included 55 White students and 37 Non-White students with 34 Males and 58 Females. Their responses were then analyzed to determine if there were significant differences in the way Whites versus Non-Whites and Males versus Females scored on the various dimensions of the ProScan[®] device. Results showed no overall pattern of disparate impact against women or minorities on either side of the PDP[®] ProScan[®] form. Females showed significantly lower dominance scores than Males, and Non-Whites showed significantly higher Extroversion scores in the way that they tend to view their environment than Whites. However these effects, in conjunction with the overall pattern of scores, would not be enough to result in disparate impact if the ProScan[®] instrument was used for selection.

Since the test has indicated no basic difference between genders and ethnic groups, there is no reason to believe that these instruments would discriminate between groups in a hiring situation.

Overview

One of the legal pressures that an organization faces when developing an employee selection system is to avoid “disparate impact.” The purpose of this study was to investigate the possibility of disparate impact of the ProScan[®] behavioral assessment device development by Professional DynaMetric Programs[®], Inc. Disparate impact occurs when members of one applicant group have a greater opportunity for employment than a member of another applicant group.

By law, organizations and test publishers are responsible for conducting studies on disparate impact against members of protected applicant groups including:

- Ethnic minorities
- People over 40 years of age
- Physically challenged people
- Religiously affiliated people

Specifically, PDP[®], Inc. wanted to know if people from a protected group generally scored differently on the ProScan[®] instrument than non-protected groups.

The Instrument: ProScan[®]

ProScan[®] is a behavioral assessment device developed by PDP[®], Inc. and marketed as an employment selection and management development tool to large and small, profit and non-profit organizations. Years of research indicate that people generally tend to fail on the job because of the environment into which they are placed, not due to a lack of skills or competence. ProScan[®] is a statistical word response stimuli instrument that is valid, accurate, objective and unbiased, and is used to “put the right person in the right job.” By doing so, organizations:

- Increase the probability of success of new-hires
- Reduce turnover
- Reduce absenteeism
- Reduce job dissatisfaction.

Center for Applied Psychology

In the fall of 1993, PDP[®], Inc. requested the Center for Applied Psychology at the University of Colorado at Denver to direct and conduct a disparate impact study of the PDP[®] testing system.

The Center for Applied Psychology (CAP) was established in 1985 by the Department of Psychology at the University of Colorado at Denver (UCD) as a vehicle to study, market, and

perform services in the areas of Clinical and Industrial/Organizational Psychology. The Center is currently engaged in a number of activities to promote the goals and assets of the psychology department at UCD as a valuable resource to area businesses.

Method

Sample

Subjects in the study were 92 students from the University of Colorado at Denver (UCD). Subjects were recruited from University classes and completed the ProScan[®] form.

A deliberate effort was made to build a representative sample of subjects, by locating as many of the protected groups as possible. Given the age and work experience of UCD students, this sample closely resembles the type of applicants who might be hired using PDP's ProScan[®]. The representativeness of the sample is shown in Table 1.

Table 1. Sample Demographics

Gender	
Male	37%
Female	63%
Race	
African-Americans	5%
Hispanics	21%
Asians	7%
Native Americans	5%
Whites	60%
Other	2%
Age	
Under 40	93%
Over 40	7%

Collection of Data

The ProScan[®] forms and the demographics information (See Appendix A for a sample of demographics form), were collected in one of two ways:

- Students in three Ethnic Studies classes and one advanced Psychology class were given the ProScan[®] and demographics forms during class
- Students in introductory Psychology classes were given the ProScan[®] and demographics form during an arranged experiment session

Procedure

Originally, two methods were outlined to answer the question set forth in this study. The method involved looking at participants' ProScan[®] scores and comparing them to scores for a particular job "profile." The PDP[®] system creates job profiles based on ProScan[®] data and sets "cutoff" scores for applicants. The job profile that the PDP[®] system creates is a window between high and low "cutoff" scores. A "cutoff" score is a tally on an instrument that is determined to be the highest or lowest acceptable limit for, in this case, job applicants. Candidates who score within this window have been shown to have a higher probability of performing well on the job than those who do not score within the window.

For this study, it was decided that this method would be both a time consuming and costly way to examine potential disparate impact in the ProScan[®] system. For this method to be effective, the same procedure would have to be performed on every job profile that PDP[®] has in their possession. In other words, it was concluded that since the potential for disparate impact inherent in the ProScan[®] instrument should not be situation or job specific, an analysis of the difference between the means, or averages, of protected and non-protected applicant groups' scores could provide the same information. Thus, the second method involved studying the basic response patterns of the groups. If no difference is found at this level, it is assumed that no difference will exist in the job profiles.

Results

Analyses

The statistic used in this analysis was the standard t-test using pooled variance techniques, which looks at the difference between the means of two groups. More sophisticated multi-variate techniques were initially considered, but due to the straight-forward nature of the results these analyses were considered unnecessary and potentially confusing.

For the t-test analysis, a “statistically” significant difference between two groups on a ProScan[®] dimension would indicate disparate impact within the ProScan[®] process. The results of this analysis are shown as follows, three comparisons were made: Female vs. Male, White vs. Non-white, and Basic vs. Priority Environments. Basic environment is what PDP[®] has found to be the most natural behavior of the individual. Priority environment measures the effort to adjust from the Basic style of behavior to an unnatural behavior.

Part 1 of the ProScan[®] Instrument (Tables 2 – 5)

The first set of analyses involved Part 1 of the ProScan[®] form, that is, the scores of Dominance, Extroversion, Pace, Conformity and Logic. Results for gender are shown in Table 2 (including Asians in the analysis) and Table 3 (excluding Asians) in Appendix B.

Means for Males and Females on the ProScan[®] were not significantly different from each other on four of the five assessed dimensions. The same result was obtained for analyses run with and without Asians in the sample. Females did score significantly lower on Dominance than did males ($t=2.01$, $p<.05$ for the full sample, $t=2.11$, $p<.05$ excluding Asians). Of the other four dimensions with Asians, Males scored higher on Extroversion, while Females scored higher on Pace, Conformity and Logic. Without Asians, Males scored higher on Extroversion and Conformity, while Females scored higher on Pace and Logic.

However, these latter differences were not large; this pattern indicates that there is not a trend towards one gender scoring systematically differently than the other on the ProScan[®]. Given this result, it is unlikely that Females would suffer disparate impact when being tested on the ProScan[®] in employment settings.

Results for race are shown in Tables 4 (including Asians) and 5 (excluding Asians) in Appendix B. Means for Whites and Non-Whites on the ProScan[®] were not significantly different from each other on any of the assessed dimensions. The same result was obtained for analyses run with and without Asians in the sample. On all five dimensions, the means for Non-Whites was actually higher than the means for Whites, though these differences were not large. Given these results, it is unlikely that Non-Whites would suffer disparate impact when being tested on the ProScan[®] in employment settings.

Part 2 of the ProScan[®] Instrument (Tables 6 – 9)

The second set of analyses involved the data collected on Part 2 of the ProScan[®] form. These scores are the Dominance, Extroversion, Pace, Conformity and Logic adjustments that an individual is making from their Basic style of behavior to that which is unnatural. Results are shown on Tables 6 through 9 in Appendix B.

No significant differences were detected when comparing on gender on any of the scales. However, comparisons between the White and Non-White sub-samples did reveal one significant mean difference. Non-Whites tended to score higher on the Extroversion scale than Whites ($t=2.72$, $p<.01$ with Asians, $t=3.37$, $p<.01$ without Asians) indicating that Non-Whites view their environment as demanding more Extroversion than they are likely to exhibit. Although a significant difference between Whites and Non-Whites does exist on this scale, no pattern of differences was detected indicating that it is unlikely that disparate impact would result from the usage of this instrument.

Discussion

The purpose of the current study was to investigate the potential presence of statistically significant differences between average responses to the ProScan[®] form by Non-White versus White and Male versus Female respondents. By utilizing the t-test statistic and comparing average scores for each dimension represented by the ProScan[®] instrument, there was no overall pattern of results favoring Males or Whites. Of all dimensions tested, only two significant differences were found: Females tended to score lower than their Male counterparts on the Part 1 Dominance dimension

while Non-Whites tended to score higher than their White counterparts on the Part 2 Extroversion dimension of the ProScan[®] instrument.

The first significant difference indicates that Females tend to see themselves as less Dominant. The second indicates that Non-Whites tend to view their environment as demanding more Extroversion than they are likely to exhibit.

Other than these two dimensions, there was no pattern of results favoring one particular subgroup. Based on these findings, no consistent pattern of disparate impact emerged in this study, indicating that the instrument is generally sound, and disparate impact in the employment setting is unlikely.

Next Steps

While the study results are encouraging, PDP[®] and other organizations using the ProScan[®] should continue to investigate the potential for disparate impact of the instrument. It is important to replicate these findings with additional and larger samples (at least 80 per applicant group). Further, the test should be investigated for a broader range of protected groups including specific minority groups such as African Americans, Hispanics, Native Americans, etc. In addition, PDP[®] could examine the potential disparate impact in a specific employment context. This would involve comparing actual applicant's scores for a particular job with the PDP[®] profile for that job, and determining whether significant differences exist.

Appendix A

Demographics Questionnaire 1.1

Geographic Locations:

Current State of Residence: _____

Home State of Residence: _____

Education Level: Please check the highest level of education that you have achieved.

Ph.D., MD., Ed.D., LL.D., etc. _____

M.A., M.S.W., etc. _____

BS., BA., etc. _____

Associates Degree _____

Some College _____

High School Diploma _____

G.E.D. _____

No High School Diploma _____

Gender: Please check one.

Male _____

Female _____

Age: _____ years

Ethnic Identification: Please check one.

African-American _____

Hispanic _____

Asian _____

Native American _____

Inter-Racial _____

White _____

Other: _____

Appendix B

Table 2. Part 1 Comparison of Gender with Asians: Males vs. Females

	Male (n=34)		Female (n=58)		t	Sig. (t)
	M	Std.	M	Std.		
Dominance	403.35	124.08	344.66	141.65	2.01	p < .05
Extroversion	383.94	146.64	366.57	162.83	0.51	n.s.
Pace	348.65	127.24	393.17	124.51	-1.64	n.s.
Conformity	349.32	127.57	351.71	115.82	-0.09	n.s.
Logic	264.53	99.67	275.31	118.33	-0.45	n.s.

Table 3. Part 1 Comparison of Gender without Asians: Males vs. Females

	Male (n=32)		Female (n=54)		t	Sig. (t)
	M	Std.	M	Std.		
Dominance	415.56	117.35	352.76	142.22	2.11	p < .05
Extroversion	388.03	147.68	372.52	166.15	0.44	n.s.
Pace	354.84	124.99	391.22	126.83	-1.29	n.s.
Conformity	353.22	126.69	347.41	117.36	0.21	n.s.
Logic	268.53	97.99	276.83	121.04	-0.33	n.s.

Table 4. Part 1 Comparison of Ethnic with Asians: Whites vs. Non-Whites

	Male (n=37)		Female (n=55)		t	Sig. (t)
	M	Std.	M	Std.		
Dominance	378.16	136.66	358.40	139.08	0.67	n.s.
Extroversion	396.46	144.45	357.20	163.42	1.18	n.s.
Pace	398.54	142.76	362.04	113.63	1.36	n.s.
Conformity	373.27	126.76	335.73	113.21	1.49	n.s.
Logic	280.92	110.61	264.87	112.41	0.68	n.s.

Table 5. Part 1 Comparison of Ethnic without Asians: Whites vs. Non-Whites

	Male (n=31)		Female (n=55)		t	Sig. (t)
	M	Std.	M	Std.		
Dominance	407.58	127.23	358.40	139.08	1.62	n.s.
Extroversion	415.71	145.37	357.20	163.42	1.66	n.s.
Pace	405.45	144.78	362.04	113.63	1.54	n.s.
Conformity	374.13	129.98	335.73	113.21	1.43	n.s.
Logic	289.48	112.71	264.87	112.41	0.97	n.s.

Table 6. Part 2 Comparison of Gender with Asians: Males vs. Females

	Male (n=34)		Female (n=58)		t	Sig. (t)
	M	Std.	M	Std.		
Dominance	390.71	133.22	341.79	134.30	1.69	n.s.
Extroversion	342.03	146.93	337.00	140.22	0.16	n.s.
Pace	347.88	151.48	402.02	113.24	-1.95	n.s.
Conformity	312.29	144.25	357.45	122.94	-1.59	n.s.
Logic	335.91	142.04	346.12	125.20	-0.36	n.s.

Table 7. Part 2 Comparison of Gender without Asians: Males vs. Females

	Male (n=32)		Female (n=54)		t	Sig. (t)
	M	Std.	M	Std.		
Dominance	402.91	126.60	347.70	136.12	1.86	n.s.
Extroversion	350.81	146.84	339.78	142.08	0.34	n.s.
Pace	351.94	152.29	405.28	111.32	-1.87	n.s.
Conformity	316.22	145.52	362.93	119.48	-1.61	n.s.
Logic	345.22	141.08	349.26	127.92	-0.14	n.s.

Table 8. Part 2 Comparison of Ethnic with Asians: Whites vs. Non-Whites

	Male (n=37)		Female (n=55)		t	Sig. (t)
	M	Std.	M	Std.		
Dominance	373.19	120.84	350.91	144.56	0.77	n.s.
Extroversion	386.24	127.06	306.98	143.60	2.72	p < .01
Pace	404.97	127.69	366.56	131.33	1.39	n.s.
Conformity	351.12	128.55	333.80	135.42	0.61	n.s.
Logic	358.62	123.08	331.40	136.07	0.98	n.s.

Table 9. h 2 Comparison of Ethnic without Asians: Whites vs. Non-Whites

	Male (n=31)		Female (n=55)		t	Sig. (t)
	M	Std.	M	Std.		
Dominance	399.00	110.44	350.91	144.56	1.61	n.s.
Extroversion	409.35	118.24	306.98	143.60	3.37	p < .01
Pace	418.90	122.11	366.56	131.33	1.82	n.s.
Conformity	366.39	121.87	333.80	135.42	1.11	n.s.
Logic	376.77	121.65	331.40	136.07	1.54	n.s.

Curriculum Vitae

Kurt Kraiger, Ph.D.

December, 1992

Education

Institution	Date	Degree	Major
University of Cincinnati	1975-1979	B.A.	Psychology
The Ohio State University	1979-1982	M.A.	Psychology
The Ohio State University	1982-1983	Ph.D.	Psychology

Professional Experience

1992 – Present	Director, Center for Applied Psychology, University of Colorado at Denver
1992 – Present	Senior Research Associate, International Learning Systems, Golden, CO
1991 – Present	Associate Professor of Psychology, University of Colorado at Denver
1983 – 1991	Assistant Professor of Psychology, University of Colorado at Denver
1989 – 1990	Visiting Assistant Professor of Organizational Behavior, University of California – Berkeley
1989 – 1990	Senior Consultant, Human Resources Solutions, Orinda CA
1981 – 1983	Teaching Assistant, Department of Psychology, The Ohio State University
1980 – 1983	Personnel Analyst, City of Columbus, OH

Professional Service

Editor, The Industrial-Organizational Psychologist (1992)

Editor, Training Research Journal (1992)

Associate Editor, The Industrial-Organizational Psychologist (1990 – 1992)

Associate Editor, Careers Division Newsletter, Academy of Management (1989 – 1990)

Reviewer (1985 – 1992):

Journal of Applied Psychology

Personnel Psychology

Organizational Behavior & Human Decision Processes

Motivation and Emotion

Basic and Applied Social Psychology

International Journal of Applied Psychology

Division 14 Program Committee, American Psychological Association (1988 – 1989)

Division 14 Program Committee, Society for I/O Psychology (1987 – 1991)

Division 14 Program Committee, Planning Sub-Committee, Society for I/O Psychology
(1988, 1991)

Division 14 Training and Education Committee, Society for I/O Psychology (1991 – 1992)

Professional Organizations

Academy of Management

American Psychological Society

Society for Industrial and Organizational Psychology