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A Meta-Analysis of Antecedents and Correlates of Employee Turnover: Update, Moderator Tests, and Research Implications for the Next Millennium

Rodger W. Griffeth
Georgia State University
Peter W. Hom
Arizona State University
Stefan Gaertner
Georgia State University

This article reports the results of a comprehensive meta-analysis of turnover antecedents, extending an earlier one by Hom and Griffeth (1995). As such, this updated meta-analysis represents the most wide-ranging quantitative review to date of the predictive strength of numerous turnover antecedents. Importantly, the present investigation identifies various moderators of antecedent-turnover correlations. The implications of these findings for both theory and practice are discussed. © 2000 Elsevier Science Inc. All rights reserved.

As we enter the new millennium, a final review of turnover research conducted in the 20th century is warranted. Specifically, this review updates and refines our previous meta-analysis (Hom & Griffeth, 1995). Until that time, the 1995 meta-analysis represented a more thorough review than other turnover meta-analyses, which generally examined a few predictors. It also extended Cotton and Tuttle's (1986) first large-scale meta-analysis by estimating the size and variability of predictor-quit relationships rather than only their statistical reliability. The current meta-analysis summarizes the numerous studies published since Hom and Griffeth's (1995) review including all studies conducted during the past decade. Given 500 correlations from 42 studies in the 1990s, this updated meta-analysis may change Hom and Griffeth's meta-analytic estimates. Going beyond Hom and Griffeth's review (Hom & Griffeth, 1995), we further specify various moderators of antecedent-turnover relationships. This earlier meta-analysis only carried out omnibus moderator tests without pinpointing which moder-

Direct all correspondence to: Rodger W. Griffeth, Department of Management, Georgia State University, Atlanta, GA 30303; Phone: (404) 651-2864; Fax: (404) 651-1700.

ators underlie the pervasive variability in antecedent-turnover correlations (Hunter & Schmidt, 1990). All told, a more thorough meta-analysis of turnover findings may serve to guide research efforts in the next millennium, identifying fruitful avenues for investigation.

Method

Study Sources

To update Hom and Griffeth's meta-analysis (Hom & Griffeth, 1995), we first searched for all published articles reporting predictor-turnover relationships in the 1990s, using computerized sources (e.g., ABI Inform and Social Science Index). We also manually searched key journals in the organizational sciences: *Journal of Applied Psychology*, *Academy of Management Journal*, *Organizational Behavior and Human Decision Processes*, *Administrative Science Quarterly*, *Personnel Psychology*, *Journal of Management*, *Journal of Vocational Behavior*, *Journal of Organizational Behaviour*, *Journal of Occupational Psychology*, and *Human Relations*. We added published correlations to Hom and Griffeth's data base (Hom & Griffeth, 1995) if all of the following conditions were met:

1. actual turnover (rather than quit intentions) was assessed;
2. the study used a predictive design that collects predictor measures before turnover occurrence; and
3. turnover was measured at the individual level of analysis.

These standards for inclusion of correlations correspond to those that Hom and Griffeth (1995) used. Tables 1 to 11 report the total number of samples found for each predictor-turnover relationship.[1] Our analyses excluded relationships assessed in fewer than three independent samples.

Meta-Analytical Procedure

The meta-analysis was conducted with Hunter and Schmidt's formulas (Hunter & Schmidt, 1990). Building on suggestions from Huffcutt, Arthur, and Bennett (1993), we constructed a meta-analysis program based on a Lotus 1-2-3 for Windows spreadsheet and validated formulas using hypothetical data and results published by Huffcutt et al. (1993) and Hunter and Schmidt (1990: 175–198). Following Hunter and Schmidt (1990), we corrected correlations and their variances for sampling error and for measurement errors in predictors. Because predictor reliabilities were sporadically available, we calculated artifact distributions to correct for measurement error (Hunter & Schmidt, 1990: 174).

In addition, we corrected correlations for deviations from sub-optimal turnover base rates. When the proportion of leavers (or stayers) diverges from 50%, turnover variance and antecedent-turnover correlations are attenuated (Kemery, Dunlap, & Griffeth, 1988). Because some studies omitted the necessary data for this correction, we also used artifact distribution formulas (Hunter & Schmidt, 1990). Analogous to attenuation factors for unreliability and range restriction

Table 1. Meta-Analysis of Demographic Predictors (All Studies)

Predictor	ρ_1 *(Hom & Griffeth, 1995)*[a]	*K*	*N*	$\bar{r}$	ρ_1[b]	*% of variance*$_1$	*95% Credibility Interval*$_1$	*Q-statistic*$_1$	ρ_2[c]	*% of variance*$_2$	*95% Credibility Interval*$_2$	*Q-statistic*$_2$
Cognitive Ability	−.09	7	6,062	.01	.01	8%	−.26 to +.28	93.4*	.02	8%	−.28 to +.31	93.3*
Education	.07	35	11,708	.05	.05	44%	−.07 to +.17	78.98*	.06	44%	−.07 to +.19	78.37*
Training	−.08	6	3,815	−.07	−.07	20%	−.22 to +.09	30.05*	−.08	21%	−.26 to +.10	28.56*
Marital Status[d]	−.01	28	16,684	−.05	−.05	17%	−.22 to +.12	160.97*	−.05	18%	−.24 to +.14	159.09*
Kinship responsibilities[e]	−.10	11	8,220	−.08	−.08	20%	−.22 to +.07	55.88*	−.10	22%	−.28 to +.08	49.20*
Children	−.14	8	9,043	−.14	−.14	13%	−.29 to +.01	63.93*	−.16	14%	−.33 to +.01	55.93*
Weighted Application Blank	.33	6	1,329	.31	.31	4%	−.25 to +.87	137.36*	.31	4%	−.26 to +.88	135.48*
Race[f]	—	7	10,683	−.01	−.01	44%	−.07 to +.04	15.96*	−.02	44%	−.08 to +.05	15.93*
Sex[g]	−.07	22	17,301	−.03	−.03	8%	−.26 to +.20	259.55*	−.03	9%	−.30 to +.23	258.42*
Age	−.12	45	21,656	−.09	−.09	13%	−.32 to +.13	337.24*	−.11	14%	−.36 to +.15	313.93*
Tenure	−.17	53	29,313	−.20	−.20	11%	−.43 to +.02	472.77*	−.23	14%	−.49 to +.02	392.40*

Note: K = number of samples; N = number of observations; r = sample size weighted average correlations; ρ_1 = sample size weighted average correlation corrected for measurement error in the predictors; % of variance = percent of variance in the observed correlations accounted for by artifacts; 95% credibility interval = interval around the mean corrected correlations; Q-statistic = Chi-square test for moderators.

* $p < .05$

[a] = Sample size weighted average correlation corrected for measurement error in the predictors found by Hom and Griffeth (1995).

[b] = Entries in columns marked with the subscript "1" refer to results obtained from a meta-analysis that controls for measurement error in the predictors and sampliing error.

[c] = Entries in columns marked with the subscript "2" refer to results obtained from a meta-analysis that controls for measurement error in the predictors, sampling error, *and* variations in the turnover base-rate across studies.

[d] = Low score: Single; High score: Married

[e] = Low score: No employed spouse; High score: Employed spouse

[f] = Low score: White; High score: Non-white

[g] = Low score: Male; High score: Female

Table 2. Meta-Analysis of Job Satisfaction, Organization Factors, and Work Environment Factors (All Studies)

Predictor	ρ_1 *(Hom & Griffeth, 1995)*[a]	*K*	*N*	$\bar{r}$	ρ_1[b]	*% of variance*$_1$	*95% Credibility Interval*$_1$	*Q-statistic*$_1$	ρ_2[c]	*% of variance*$_2$	*95% Credibility Interval*$_2$	*Q-statistic*$_2$
Overall Job Satisfaction	−.19	67	24,566	−.17	−.19	25%	−.38 to .00	271.23*	−.22	29%	−.44 to −.01	231.27*
Met Expectations	−.13	8	1,486	−.13	−.15	43%	−.34 to +.04	18.69*	−.18	45%	−.40 to +.04	17.64*
Compensation												
Pay	−.06	19	14,191	−.09	−.09	6%	−.37 to +.20	325.65*	−.11	7%	−.45 to +.24	287.69*
Pay Satisfaction	−.04	18	4,425	−.06	−.07	45%	−.22 to +.09	40.16*	−.08	46%	−.27 to +.11	39.50*
Distributive Justice	−.07	11	4,871	−.08	−.09	50%	−.19 to +.01	21.87*	−.11	53%	−.23 to +.01	20.62*
Leadership												
Supervisory Satisfaction	−.10	16	3,333	−.10	−.10	84%	−.17 to −.04	19.08	−.13	87%	−.20 to −.06	18.38
Leader-member Exchange	−.23	3	161	−.21	−.23	57%	−.48 to +.02	5.29	−.25	58%	−.52 to +.02	5.17
Co-worker												
Work Group Cohesion	−.14	9	4,558	−.09	−.11	25%	−.28 to +.07	36.58*	−.13	27%	−.34 to +.08	33.92*
Co-worker Satisfaction	−.10	13	1,606	−.10	−.11	79%	−.20 to −.01	16.45	−.13	81%	−.24 to −.02	16.12
Stress												
Role Clarity	−.24	5	795	−.18	−.21	100%	−.21 to −.21	.82	−.24	100%	−.24 to −.24	.77
Role Overload	.11	5	3,419	.09	.10	100%	+.10 to +.10	2.04	.12	100%	+.12 to +.12	1.97
Role Conflict	.16	5	780	.17	.20	100%	+.20 to +.20	1.80	.22	100%	+.22 to +.22	1.78
Overall Stress	.19	8	1,716	.13	.14	100%	+.14 to +.14	7.18	.16	100%	+.16 to +.16	7.03

(continued on next page)

Table 2. Continued

Predictor	ρ_1 *(Hom & Griffeth, 1995)*[a]	*K*	*N*	$\bar{r}$	ρ_1[b]	*% of variance*$_1$	*95% Credibility Interval*$_1$	*Q-statistic*$_1$	ρ_2[c]	*% of variance*$_2$	*95% Credibility Interval*$_2$	*Q-statistic*$_2$
Others												
Promotional Chances	−.10	10	5,752	−.11	−.12	6%	−.48 to +.25	178.61*	−.16	6%	−.64 to +.33	157.07*
Participation	−.08	10	4,825	−.10	−.11	51%	−.20 to −.02	19.49*	−.13	54%	−.24 to −.02	18.47*
Instrumental Communication	−.11	8	5,185	−.11	−.11	29%	−.24 to +.01	27.22*	−.14	33%	−.28 to +.01	33.46*

Note: K = number of samples; N = number of observations; r = sample size weighted average correlations; ρ_1 = sample size weighted average correlation corrected for measurement error in the predictors; % of variance = percent of variance in the observed correlations accounted for by artifacts; 95% credibility interval = interval around the mean corrected correlations; Q-statistic = Chi-square test for moderators.

* $p < .05$

[a] = Sample size weighted average correlation corrected for measurement error in the predictors found by Hom and Griffeth (1995).

[b] = Entries in columns marked with the subscript "1" refer to results obtained from a meta-analysis that controls for measurement error in the predictors and sampling error.

[c] = Entries in columns marked with the subscript "2" refer to results obtained from a meta-analysis that controls for measurement error in the predictors, sampling error, *and* variations in the turnover base-rate across studies.

Table 3. Meta-Analysis of Job Content and External Environmental Factors (All Studies)

Predictor	ρ_1 *(Hom & Griffeth, 1995)*[a]	*K*	*N*	$\bar{r}$	ρ_1[b]	*% of variance*$_1$	*95% Credibility Interval*$_1$	*Q-statistic*$_1$	ρ_2[c]	*% of variance*$_2$	*95% Credibility Interval*$_2$	*Q-statistic*$_2$
Job Content												
Job scope	−.13	15	4,285	−.11	−.12	16%	−.43 to +.18	94.67*	−.14	16%	−.49 to +.21	92.08*
Routinization	.09	6	3,707	.08	.09	50%	0 to +.18	12.09*	.11	53%	+.01 to +.22	11.33
Work satisfaction	−.19	32	9,859	−.14	−.16	28%	−.36 to +.05	113.48*	−.19	31%	−.43 to +.05	104.46*
Job involvement	−.13	16	7,666	−.08	−.10	31%	−.25 to +.06	52.37*	−.12	33%	−.31 to +.07	48.49*
External environment												
Alternative job opportunities	.11	23	18,189	.11	.12	55%	+.05 to +.22	42.02*	.15	61%	+.07 to +.23	37.64*
Comparison of alternatives with present job	.26	6	826	.14	.15	73%	+.04 to +.25	8.26	.19	77%	+.06 to +.31	7.84

Note: K = number of samples; N = number of observations; r = sample size weighted average correlations; ρ_1 = sample size weighted average correlation corrected for measurement error in the predictors; % of variance = percent of variance in the observed correlations accounted for by artifacts; 95% credibility interval = interval around the mean corrected correlations; Q-statistic = Chi-square test for moderators.

* $p < .05$

[a] = Sample size weighted average correlation corrected for measurement error in the predictors found by Hom and Griffeth (1995).

[b] = Entries in columns marked with the subscript "1" refer to results obtained from a meta-analysis that controls for measurement error in the predictors and sampling error.

[c] = Entries in columns marked with the subscript "2" refer to results obtained from a meta-analysis that controls for measurement error in the predictors, sampling error, *and* variations in the turnover base-rate across studies.

Table 4. Meta-Analysis of Other Behavioral Predictors (All Studies)

Predictor	ρ_1 *(Hom & Griffeth, 1995)*[a]	*K*	*N*	$\bar{r}$	ρ_1[b]	*% of variance*$_1$	*95% Credibility Interval*$_1$	*Q-statistic*$_1$	ρ_2[c]	*% of variance*$_2$	*95% Credibility Interval*$_2$	*Q-statistic*$_2$
Lateness	.15	6	2,283	.06	.06	100%	+.06 to +.06	3.57	.06	100%	+.06 to +.06	3.57
Absenteeism	.33	28	5,364	.20	.20	44%	+.04 to +.35	63.54*	.21	46%	+.05 to +.38	61.40*
Performance	−.19	72	25,234	−.14	−.15	16%	−.41 to +.11	440.03*	−.17	18%	−.46 to +.12	406.82*

Note: K = number of samples; N = number of observations; r = sample size weighted average correlations; ρ_1 = sample size weighted average correlation corrected for measurement error in the predictors; % of variance = percent of variance in the observed correlations accounted for by artifacts; 95% credibility interval = interval around the mean corrected correlations; Q-statistic = Chi-square test for moderators.

* $p < .05$

[a] = Sample size weighted average correlation corrected for measurement error in the predictors found by Hom and Griffeth (1995).

[b] = Entries in columns marked with the subscript "1" refer to results obtained from a meta-analysis that controls for measurement error in the predictors and sampling error.

[c] = Entries in columns marked with the subscript "2" refer to results obtained from a meta-analysis that controls for measurement error in the predictors, sampling error, *and* variations in the turnover base-rate across studies.

Table 5. Meta-Analysis of Cognitions and Behaviors about the Withdrawal Process (All Studies)

Predictor	ρ_1 *(Hom & Griffeth, 1995)*[a]	*K*	*N*	$\bar{r}$	ρ_1[b]	*% of variance*$_1$	*95% Credibility Interval*$_1$	*Q-statistic*$_1$	ρ_2[c]	*% of variance*$_2$	*95% Credibility Interval*$_2$	*Q-statistic*$_2$
Organizational Commitment	−.18	67	27,540	−.22	−.23	27%	−.07 to −.39	244.09*	−.27	35%	−.09 to −.44	193.83*
Job Search												
Search intentions	.27	19	4,308	.26	.29	42%	+.13 to +.45	45.11*	.34	56%	+.18 to +.51	34.23*
General job search scales	—	9	1,811	.21	.23	64%	+.12 to +.34	14.06	.29	77%	+.18 to +.40	11.56
Job search behaviors	—	4	1,109	.26	.28	52%	+.16 to +.40	7.72	.31	61%	+.19 to +.42	6.54
Job search methods	—	2	573	.42	.47	100%	+.47 to +.47	0.08	.50	100%	+.50 to +.50	.08
Withdrawal Cognitions												
Intention to quit	.35	71	63,232	.35	.38	4%	.00 to +.77	1,771.93*	.45	8%	+.01 to +.89	861.45*
Thinking of quitting	.27	10	1,964	.22	.24	86%	+.19 to +.30	11.64	.29	100%	+.29 to +.29	9.16
Withdrawal cognitions	.30	7	1,209	.30	.32	99%	+.31 to +.33	7.04	.36	100%	+.36 to +.36	6.19
Expected utility of withdrawal	.25	7	1,303	.21	.22	93%	+.18 to +.26	7.50	.28	100%	+.28 to +.28	6.35

Note: K = number of samples; N = number of observations; r = sample size weighted average correlations; ρ_1 = sample size weighted average correlation corrected for measurement error in the predictors; % of variance = percent of variance in the observed correlations accounted for by artifacts; 95% credibility interval = interval around the mean corrected correlations; Q-statistic = Chi-square test for moderators.

* $p < .05$

[a] = Sample size weighted average correlation corrected for measurement error in the predictors found by Hom and Griffeth (1995).

[b] = Entries in columns marked with the subscript "1" refer to results obtained from a meta-analysis that controls for measurement error in the predictors and sampling error.

[c] = Entries in columns marked with the subscript "2" refer to results obtained from a meta-analysis that controls for measurement error in the predictors, sampling error, *and* variations in the turnover base-rate across studies.

Table 6. Correlations Involving Moderators that Refer to Demographics, Turnover Measurement, and Workplace Characteristics (1990s)

	Moderators									
Turnover Predictors	*Sample Size*	*Age*	*Base Rate deviation from 50%*	*Turnover Lag*	*Gender (Percent Male)*	*Tenure*	*Executives*	*Military*	*Nurses*	*Lack of Reward Contingency*
Age	.17[a]	.24	−.11	.38	.70**	.31	.64**	—	—	—
	(17)[b]	(15)	(17)	(15)	(10)	(12)	(16)			
Tenure	−.29	.49*	.03	−.24	−.05	.19	—	−.27	—	—
	(15)	(12)	(15)	(13)	(12)	(14)		(15)		
Job Satisfaction	.22	−.23	.16	.10	−.33	−.03	—	—	.26	—
	(23)	(19)	(22)	(23)	(20)	(19)			(23)	
Pay	−.36	.23	−.51*	.28	−.39	−.16	—	—	—	—
	(12)	(9)	(12)	(10)	(7)	(9)				
Performance	−.06	.32	−.06	.50*	−.39	.04	—	—	—	.75**
	(14)	(11)	(14)	(12)	(11)	(10)				(14)
Organizational Commitment	−.39*	.29	−.19	−.41*	−.09	−.29	—	−.28	.13	—
	(22)	(18)	(20)	(22)	(21)	(15)		(22)	(22)	
Intention to Quit	.62**	−.30	−.26	.58**	.36	.22	—	.65**	−.22	—
	(16)	(12)	(15)	(16)	(13)	(9)		(16)	(16)	

*$p < 0.10$

**$p < 0.05$

[a] = Correlation between the Moderator and the turnover-predictor relationship. A positive correlation means, for example, that a given predictor-turnover relationship is more positive (or less negative) as the mean level of the moderator increases.

[b] = The number of studies used to derive the correlation between the moderator and the turnover-predictor relationship is shown in parentheses.

Table 7. Correlations Involving Moderators that Refer to Predictor Measurement Properties (1990s)

Job Satisfaction

Overall Satisfaction Scales[a]	*More than 5 times*	*Minnesota Satisfaction Questionnaire (MSQ)*	*Faces Scales*	*Coefficient Alpha*
.09[b]	−.13	−.03	.22	.05
(23)[c]	(23)	(23)	(23)	(22)

Performance

Coefficient Alpha[a]
.44[b]
(7)[c]

Organizational Commitment

Organizational Commitment Questionnaire (OCQ)[a]	*Allen & Meyer (1990) scale*	*Multiple self developed scales*	*Coefficient Alpha*
−.45**[b]	−.003	.582**	−.45**
(22)[c]	(22)	(22)	(22)

Intention to Quit

Number of items[a]	*Quit-intentions vs. Stay intentions*	*Measurement through multiple withdrawal cognitions facets*	*Bluedorn (1982) scale*	*Coefficient Alpha*
−.34[b]	−.34	−.27	−.29	.53
(15)[c]	(15)	(15)	(23)	(8)

*$p < 0.10$
**$p < 0.05$
[a] = Moderators are shown on top of each column
[b] = Correlation between the moderator and the turnover-predictor relationship. A positive correlation means, for example, that a given predictor-turnover relationship is more positive (or less negative) as the mean level of the moderator increases.
[c] = The number of studies used to derive the correlation between the moderator and the turnover-predictor relationship is shown in parentheses.

(Hunter & Schmidt, 1990), we computed an attenuation factor "d" for base-rate deviations from 50%, using the equation by Kemery et al. (1988):

$$d = \frac{h}{.7978^* \sqrt{p^*q}} \tag{1}$$

where h is the ordinate of the unit normal distribution at the threshold dividing the dichotomous categories (stayers and leavers), p is the proportion of cases in a particular category, and q is equal to "$1 - p$".

Because we regard turnover as a true dichotomy (Hom & Griffeth, 1995; Williams, 1990), we corrected correlations only for deviations from a 50% base rate

Table 8. Subgroup Analyses: Meta-Analysis of Age-Turnover and Tenure-Turnover Relationships (1990s)

Predictor	*K*	*N*	$\bar{r}$ *unweighted*	*Variance of r unweighted*	$\bar{r}$ *weighted*	ρ	*% of variance*	*95% Credibility Interval*	*Q-statistic*	*Z*
Age (all studies)	16	10,403	−.10	.032	−.06	−.06	6%	−.36 to +.24	261.77*	
Executives (USA only)	5	3,516	.07	.009	.05	.05	16%	−.12 to +.22	31.57*	
Non-Executives (USA only)	10	6,667	−.17	.025	−.10	−.10	11%	−.31 to +.12	90.91*	3.64*
Mostly Male samples	7	1,990	−.01	.015	.01	.01	20%	−.22 to +.25	35.58*	
Mostly Female samples	3	573	−.26	.019	−.26	−.26	26%	−.48 to +.04	11.35*	2.71*
Tenure (all studies)	15	15,917	−.16	.020	−.22	−.22	6%	−.45 to .00	248.30*	
Samples with average age < 40	8	13,860	−.20	.012	−.25	−.25	8%	−.40 to −.09	105.39*	
Samples with average age > 40	4	1,153	−.07	.008	−.02	−.02	33%	−.19 to +.15	12.30*	2.18*

Note: K = number of samples; N = number of observations; r (unweighted) = mean correlation unweighted by sample size; Variance of r (unweighted) = Variance of the correlations unweighted by sample size; r (weighted) = sample size weighted mean correlations; ρ = sample size weighted mean correlation corrected for measurement error in the predictors; % of variance = percent of variance in the observed correlations accounted for by sampling error and measurement error in the predictors; 95% credibility interval = interval around the mean corrected correlations; Q-statistic = Chi-square test for moderators; Z = Z-statistic for the critical ratio that indicates whether moderator subgroups are significantly different (significance of Z-test is determined using two-tailed tests).

*$p < .05$

Table 9. Subgroup Analyses: Meta-Analysis of Pay-Turnover and Performance-Turnover Relationships (1990s)

Predictor	*K*	*N*	$\bar{r}$ *unweighted*	*Variance of r unweighted*	$\bar{r}$ *weighted*	ρ	*% of variance*	*95% Credibility Interval*	*Q-statistic*	*Z*
Pay (all studies)	12	10,272	−.07	.008	−.12	−.12	11%	−.31 to +.07	111.82*	
Base Rate ≤ 15%	6	3,142	−.09	.004	−.04	−.04	32%	−.16 to +.09	19.02*	
Base Rate > 15%	6	7,130	−.04	.011	−.16	−.16	4%	−.41 to +.10	135.85*	0.99
Performance (all studies)	14	8,288	−.12	.042	−.14	−.16	10%	−.44 to +.11	138.04*	
No reward contingency	4	1,204	.13	.019	.06	.07	17%	−.22 to +.35	23.41*	
Reward contingency and uncertain	10	7,084	−.21	.018	−.18	−.20	15%	−.40 to .00	68.39*	4.20*
Turnover lag < 12 months	5	785	−.26	.007	−.26	−.30	68%	−.42 to −.19	7.35	
Turnover lag ≥ 12 months	7	7,244	−.05	.030	−.14	−.16	6%	−.45 to +.14	124.25*	2.79*

Note: K = number of samples; N = number of observations; r (unweighted) = mean correlation unweighted by sample size; Variance of r (unweighted) = Variance of the correlations unweighted by sample size; r (weighted) = sample size weighted mean correlations; ρ = sample size weighted mean correlation corrected for measurement error in the predictors; % of variance = percent of variance in the observed correlations accounted for by sampling error and measurement error in the predictors; 95% credibility interval = interval around the mean corrected correlations; Q-statistic = Chi-square test for moderators; Z = Z-statistic for the critical ratio that indicates whether moderator subgroups are significantly different (significance of Z-test is determined using two-tailed tests).

*$p < .05$

Table 10. Subgroup Analyses: Meta-Analysis of Relationship between Organizational Commitment and Turnover (1990s)

Predictor	*K*	*N*	$\bar{r}$ *unweighted*	*Variance of r unweighted*	$\bar{r}$ *weighted*	ρ	*% of variance*	*95% Credibility Interval*	*Q-statistic*	*Z*
Organizational Commitment										
(all studies)	22	13,375	−.18	.005	−.23	−.24	20%	−.41 to −.08	110.74*	
Turnover lag ≤ 12	11	10,637	−.18	.003	−.24	−.26	11%	−.44 to −.07	97.76*	
Turnover lag > 12	11	2,738	−.19	.007	−.18	−.19	100%	−.19 to −.19	7.52	.32
Sample Size ≤ 250	11	1,721	−.17	.004	−.18	−.19	100%	−.19 to −.19	7.19	
Sample Size > 250	11	11,654	−.19	.006	−.24	−.25	12%	−.42 to −.08	90.06*	.65
Alpha ≤ .88	12	10,303	−.18	.006	−.23	−.25	12%	−.44 to −.06	96.60*	
Alpha > .88	10	3,072	−.19	.005	−.22	−.23	53%	−.34 to −.13	18.80*	.33
Scale used: OCQ	16	11,014	−.20	.004	−.25	−.27	27%	−.40 to −.14	59.36*	
Scale used: No OCQ	6	2,361	−.13	.004	−.11	−.12	49%	−.23 to −.01	12.35*	2.31*
Scale used: OCQ or Meyer & Allen (1990)	19	11,975	−.20	.004	−.25	−.27	29%	−.39 to −.14	65.32*	
Scale used: Diverse self-constructed	3	1,400	−.08	.000	−.06	−.07	100%	−.07 to −.07	.88	6.47*

Note: K = number of samples; N = number of observations; r (unweighted) = mean correlation unweighted by sample size; Variance of r (unweighted) = Variance of the correlations unweighted by sample size; r (weighted) = sample size weighted mean correlations; ρ = sample size weighted mean correlation corrected for measurement error in the predictors; % of variance = percent of variance in the observed correlations accounted for by sampling error and measurement error in the predictors; 95% credibility interval = interval around the mean corrected correlations; Q-statistic = Chi-square test for moderators; Z = Z-statistic for the critical ratio that indicates whether moderator subgroups are significantly different (significance of Z-test is determined using two-tailed tests).

*$p < .05$

Table 11. Subgroup Analyses: Meta-Analysis of Relationship between Quit Intentions and Turnover (1990s)

Predictor	*K*	*N*	$\bar{r}$ *unweighted*	*Variance of r unweighted*	$\bar{r}$ *weighted*	ρ	*% of variance*	*95% Credibility Interval*	*Q-statistic*	*Z*
Intention to Quit (all studies)	16	12,201	.34	.007	.41	.44	8%	+.21 to +.66	205.71*	
Sample Size < 215	8	1,247	.31	.006	.31	.32	89%	+.27 to +.37	8.95	
Sample Size > 215	8	10,954	.37	.008	.43	.45	5%	+.26 to +.65	145.83*	1.46
Turnover Lag ≤ 12	9	3,397	.32	.006	.33	.34	79%	+.29 to +.39	11.39	
Turnover Lag > 12	7	8,804	.36	.008	.45	.47	5%	+.26 to +.69	145.57*	.94
Military	3	8,072	.45	.002	.46	.46	17%	+.40 to +.53	17.25*	
Civilian	13	4,129	.31	.005	.32	.34	85%	+.29 to +.38	15.28	4.30*

Note: K = number of samples; N = number of observations; r (unweighted) = mean correlation unweighted by sample size; Variance of r (unweighted) = Variance of the correlations unweighted by sample size; r (weighted) = sample size weighted mean correlations; ρ = sample size weighted mean correlation corrected for measurement error in the predictors; % of variance = percent of variance in the observed correlations accounted for by sampling error and measurement error in the predictors; 95% credibility interval = interval around the mean corrected correlations; Q-statistic = Chi-square test for moderators; Z = Z-statistic for the critical ratio that indicates whether moderator subgroups are significantly different (significance of Z-test is determined using two-tailed tests).

*$p < .05$

but not for dichotomization. Williams' Monte Carlo simulation (Williams, 1990) concluded that Kemery et al.'s equation more accurately corrects point-biserial turnover correlation than do equations proposed by Hunter, Schmidt, and Jackson (1982) and Steel, Shane, and Griffeth (1990). This equation assumes a normal marginal distribution for the predictor (Bass & Ager, 1991).

Given the ongoing controversy as to whether such corrections should (Bass & Ager, 1991; Hom & Griffeth, 1995; Hunter & Schmidt, 1990) or should not (Williams, 1990) be done, we calculated two sets of estimates. One set of estimates did not adjust for sub-optimal base-rate deviations, while the other set made this correction. Contrasting both uncorrected and corrected estimates allows us to assess the "practical" importance of base-rate corrections. It might be, for example, that turnover base-rate variability does not underlie much of the variance in observed correlations across studies. In such an event, base-rate variation may not represent the major artifactual source as some scholars imagine (cf. Steel & Griffeth, 1989).

Tests for Unsuspected Moderators. Three procedures tested whether unknown moderators exist. First, we estimated the degree to which two prime statistical artifacts (sampling error and scale unreliability) can account for between-study variance in observed correlations. In accord with Hunter and Schmidt's rule (Hunter & Schmidt, 1990), we concluded that moderators exist if these artifacts explain less than 75% of the observed variance in correlations. Second, we computed the Q homogeneity statistic, which yields a significant chi-square when moderators exist (Hunter & Schmidt, 1990: 168). Third, we calculated the 95% credibility interval (Whitener, 1990). Meta-analysts typically infer moderators when the credibility interval is either large or includes zero. Yet a credibility interval may include zero if the actual effect size is nearly zero (i.e., when there is hardly any effect to moderate), while the precise meaning of a "large" credibility interval is unclear (Sagie & Koslowsky, 1993). Owing to the ambiguity of these interpretations, we interpreted the credibility interval only if the other two tests disagree about a moderator's presence. As such, we followed Sagie and Koslowsky's prescription (Sagie & Koslowsky, 1993) to emphasize the 75% rule and the Q-statistic when probing for moderators.

Tests for A Priori Specified Moderators. The three "unsuspected moderators" tests only ascertain whether moderators exist, but these tests do not reveal the identity of the moderators (Whitener, 1990). As a result, we supplemented these initial tests with additional tests of moderators specified a priori (Hunter & Schmidt, 1990). Because of the comprehensive scope of our meta-analysis (which goes beyond prior smaller-scale meta-analyses), we simplified our tests for moderators specified a priori in three ways.

First, we evaluated theoretically predicted moderators only on studies that were published in the 1990s. We focused on these studies because Hom and Griffeth (1995) did not perform a detailed coding of moderators in their meta-analysis. Aside from this pragmatic reason, examining recent studies may yield more valid meta-analytic results. Assuming that turnover research progresses over time in terms of improvements in predictor measurement and the research designs applied, contemporary findings are likely more valid than results obtained in

earlier decades. That said, we reemphasize that our decision to restrict a priori moderator tests to research done in the 1990s is foremost a simplification. Future comprehensive turnover meta-analyses might complement our investigation by extending tests of a priori specified moderators to earlier studies.

Second, our a priori moderator tests focused on a subset of all antecedent-turnover correlations. These tests were conducted on an antecedent-turnover relationship only if ten or more samples assessed that relationship in the 1990s (thereby reducing second-order sampling error) and if the prior moderator tests based on the 75% rule and Q-statistic indicated moderator existence.

Third, we examined those a priori moderators identified by earlier meta-analyses (e.g., Cohen, 1993; Hom, Caranikas-Walker, Prussia, & Griffeth, 1992; Steel & Ovalle, 1984; Tett & Meyer, 1993; Williams & Livingstone, 1994). Specifically, we considered the following sample characteristics: age, gender, tenure, and occupation (executives vs. non-executives, military vs. non-military, nurses vs. non-nurses). Another set of moderators represented measurement properties of turnover determinants, such as scale reliability, number of items making up the scale, and particular scale used. A third set of moderators included methodological features of the study—namely, sample size, turnover base rate, and turnover lag (time lag between predictor assessment and turnover occurrence). Finally, we considered reward-contingency as a potential moderator of the performance-turnover relationship, which Williams and Livingstone (1994) documented.

We investigated moderators specified a priori in two ways (Hunter & Schmidt, 1990). First, we correlated the moderators with the effect sizes. We regarded a significant correlation as indicative of a potential moderator of a given antecedent-turnover relationship. Second, we divided the data into two subsets based on moderator characteristics. Using the *Z* statistic (Hunter & Schmidt, 1990: 438), we determined whether effect sizes statistically differed between those subsets. A significant *Z* statistic suggests that the characteristic used to dichotomize the sample is a moderator. Both a priori moderator tests were computed with observed effect sizes unweighted by sample size and uncorrected for unreliability and sub-optimal base rates.[2]

Although applying both moderator-effect size correlations and subgroup analyses more rigorously establishes moderator presence, these tests may nonetheless conflict. Therefore, we adopted a conservative decision rule requiring positive conclusions from both tests to certify that a moderator exists. To implement this decision rule, we sequentially performed these tests. We first conducted the correlational analysis to screen for significant correlations between moderators and effect sizes. Then we ran subgroup analyses on those moderators that significantly correlate with effect sizes.

Results

We present the results into two sections. First, we report the findings of the updated meta-analysis, which combined Hom and Griffeth's meta-analysis (Hom & Griffeth, 1995) with research results obtained in the 1990s (Tables 1 through

5). Then, we show the results of moderator tests conducted on studies from the 1990s (Tables 6 through 11).

Updated Meta-Analyses

In this section, we highlight differences between the updated and earlier meta-analyses. The first column in Tables 1 to 5 reports the final effect sizes from Hom and Griffeth (1995), though a detailed description of their findings can be obtained from their book (Hom & Griffeth, 1995: 35–50).

Personal Characteristics. Table 1 shows that this new meta-analysis replicated the previous findings for most demographic predictors, affirming their modest predictive strength. Considering the divergent results, the new meta-analysis now reports virtually no correlation between cognitive ability and turnover ($\rho_1 = .01$), which contrasts with the past estimate that more intelligent employees are less prone to quit ($-.09$). Similarly, the updated meta-analysis revealed that women's quit rate is similar to that of men's ($\rho_1 = -.03$), compared with the previous estimate (1995: $\rho_1 = -.07$). This result conforms to a recent labor economic finding that educated women actually resemble men in turnover rate and pattern (leaving to assume another job rather than to abandon the labor force—a route generally taken by less educated female leavers; Royalty, 1998). Finally, seven studies published in the nineties examined the race-turnover linkage. We found no relationship between race and turnover ($\rho_1 = -.01$), despite widespread accounts that minority employees are more likely to quit (Cox & Blake, 1991; Hom & Griffeth, 1995). However, racial effects on turnover may depend on type of racial minority (minorities might vary in their quit propensity) and demographic composition of the work group (racial minorities are prone to exit when they are underrepresented in work groups; Williams & O'Reilly, 1998). Thus, our finding may not be conclusive.

Satisfaction with Overall Job and Job Facets. By and large, the updated meta-analysis in Tables 2 and 3 replicated the 1995 meta-analysis, yielding similar predictive validity for overall job satisfaction and facet satisfaction. Various job attitudes modestly predicted turnover, with overall job satisfaction being the best predictor ($\rho_1 = -.19$). Work satisfaction, once again, displayed the highest relationship to turnover among all kinds of satisfaction facets ($\rho_1 = -.16$). This meta-analysis also generated a slightly stronger effect size for met expectations ($\rho_1 = -.15$). We caution, however, that this finding may be overstated as most studies inappropriately operationalized met expectations with difference scores or retrospective measures (Irving & Meyer, 1994).

Other Dimensions of Work Experience. Again from Tables 2 and 3, the new effect sizes for leader-member exchange, participative management, promotional chances, work group cohesion, role stress, pay, pay satisfaction, distributive justice, and job scope remain largely unchanged. Interestingly, effect sizes for pay and pay related variables are modest in light of their significance to compensation theorists and practitioners (Milkovich & Newman, 1999). Continued exclusion of other compensation forms (e.g., fringe benefits) and restricted pay variance surely underestimated how financial inducements deter quits (Miller, Hom, & Gomez-Mejia, 1999). With few exceptions (Aquino, Griffeth, Allen, & Hom, 1997),

turnover studies also neglect fairness of organizational rules and procedures for reward allocation (Greenberg, 1990). Conceivably, just procedures have as much—if not more—to do with encouraging employees to stay as fair pay amounts. After all, fair treatment by employers connotes that they value employees and care about their well-being, as well as reinforcing employees' expectations that they will be fairly treated throughout their tenure (Moorman, Blakely, & Niehoff, 1998). To reciprocate such perceived organizational support, employees develop stronger company commitment (Shore & Wayne, 1993). In support, Folger and Konovsky (1989) reported that perceived fairness of a merit-pay distribution committed employees to their firm more than did satisfaction with the amount of the raise.

External Environment Factors. As Table 3 shows, our 1995 conclusion about predictive efficacy of perceived alternatives still holds: perceived alternatives modestly predict turnover ($\rho_1 = .12$). Despite a span of over ten years, this updated meta-analysis virtually replicated Steel and Griffeth's meta-analysis (Steel & Griffeth, 1989) ($\rho = .13$). Conceivably, the temporal stability of such weak predictive validity reflects ongoing shortcomings in how perceived alternatives are operationalized (Steel & Griffeth, 1989). Excepting Steel (1996), progress in refining measures of perceived alternatives or broadly sampling from multiple firms, industries, or occupations (to expand scale variance) continues to lag. More than this, a complex scale assessing respondents' subjective comparison of alternatives to their present position predicted turnover slightly better than did more simplistic perceived-alternative measures ($\rho_1 = .15$), though this effect size is lower than our past estimate (1995; $\rho_1 = .26$). Such superior predictive validity may reside in their higher reliability (since these scales typically comprise more items) and specification of concrete job alternatives (rather than vague impressions of the job market) (Steel & Griffeth, 1989).

Behavioral Predictors. Compared with 1995 estimates, the latest meta-analysis uncovered less predictive accuracy for lateness ($\rho_1 = .06$) and absences ($\rho_1 = .20$) (see Table 4). Still, the pattern of findings corroborates a progression-of-withdrawal responses (Hulin, 1991; Rosse & Miller 1984), in which disgruntled employees progressively enact more extreme manifestations of job withdrawal over time (see Rosse, 1988). In keeping with this progression, the relative magnitude of estimated effect sizes implies that lateness represents the mildest form of workplace withdrawal, while turnover represents the most extreme (and irrevocable) form (with absences representing intermediate withdrawal). The current estimate of the performance-turnover relationship ($\rho_1 = -.15$) is somewhat consistent with the 1995 effect size estimate. High performers are less likely to quit than low performers.

Cognitions and Behaviors about the Withdrawal Process. As Table 5 shows, organizational commitment ($\rho_1 = -.23$) predicts turnover better than does overall job satisfaction ($\rho_1 = -.19$). Given continued usage of the Organizational Commitment Questionnaire (OCQ; Mowday, Porter, & Steers, 1982), its inclusion of items assessing quit decisions may, however, underpin its predictive superiority (Hom & Hulin, 1981). Moreover, the latest meta-analysis shows that quit intentions remain the best predictor ($\rho_1 = .38$) (excepting job search methods;

discussed next), outpredicting withdrawal cognitions (though this broad construct outperforms search intentions and thoughts of quitting). Importantly, newer operationalizations of job search are yielding remarkable levels of predictive efficacy—ranging from .23 to .47. Early operationalizations assessed whether or not leavers carried out a job search or how much effort they spent searching (Hom, Griffeth, & Sellaro, 1984). Borrowing from the job search literature (cf. Schwab, Rynes, & Aldag, 1987), recent investigations have considered the methods that leavers use to find other jobs. To illustrate, Kopelman, Rovenpor, and Millsap's Job Search Behavior Index (JSBI) (Kopelman, Rovenpor, & Millsap, 1992) assesses the various ways job seekers locate alternatives (mailing resumes, contacting employment agencies), while Blau's scale (Blau, 1993, 1994) taps "preparatory" and "active" job search. Preparatory search represents the effort to gather job search information (e.g., obtain potential job leads from relatives or current colleagues, prepare a resume), while active search refers to various means of soliciting jobs (e.g., mailing out resumes, telephoning prospective employers). Owing to their impressive predictions (cf. Blau, 1993; Kopelman et al., 1992), our updated meta-analysis incorporates these more sophisticated measures of job pursuit. Though computed on two studies, the high effect size for search methods warrants continued attention to the specific sources that leavers use to find jobs (cf. Blau, 1994). Indeed, this behavioral construct may develop into a more important turnover predictor in the years ahead as two trends are facilitating the translation of job search into turnover for job seekers. That is, the currently low joblessness rate—the lowest in nearly 40 years—and the growing use of the Internet for job hunting will make it easier for prospective leavers to find other work (Gross, 1998; Useem, 1999).

Moderator Tests

Tables 1 to 5 also report findings from the tests for unsuspected moderators. On the whole, moderator findings tempered most generalizations, showing that many effect sizes changed across settings or populations. Specifically, most indices of the contribution of artifactual to observed variance fell below the 75% threshold value and many Q-statistics were significant. In combination, these tests reveal that statistical artifacts did not entirely underlie between-study variation in correlations. As explained above, we tested a priori specified moderators with those studies appearing in the 1990s and only for predictor-quit correlations derived from 10 or more samples. Eight predictors met this latter condition: age, organizational tenure, overall satisfaction, pay, perceived job alternatives, performance, commitment, and quit intentions. We excluded perceived alternatives from further moderator testing because the unsuspected moderator analyses concluded that statistical artifacts underpinned most of the variance in observed correlations.[3]

As outlined earlier, we conducted tests for moderators specified a priori in two steps. In the first step, we correlated moderators with antecedent effect sizes. Table 6 shows correlations between antecedent-turnover relationships and moderators that are not measurement attributes of antecedents (e.g., sample demographic traits), whereas Table 7 reports correlations involving moderators that are

scale properties (e.g., reliability). In the second step, we performed subgroup analyses on moderators deemed significant by correlational analyses in the first step. Tables 8 to 11 present the subgroup analyses.

According to the results presented in Table 6, gender composition ($r = .70$) and proportion of executives ($r = .64$) represented in the samples moderated age-turnover correlations. As subgroup correlations in Table 8 attest, higher concentrations of men and executives attenuated the negative age-turnover relationship. This finding may reflect the relatively greater financial ability of men and executives to retire early (or, alternatively, their greater vulnerability to corporate downsizing pressures, which encourage highly paid employees to leave; Munk, 1999). Employee age ($r = .49$) moderated the tenure-turnover correlation (Table 6), such that this inverse relationship is less negative in older populations (see Table 8). This moderating effect may exist because older samples have greater tenure and, thus, are more homogeneous with respect to tenure. Such homogeneity would diminish the tenure-turnover correlation.

Table 6 also shows that deviation of the turnover base rate from 50% moderated the pay-turnover relationship ($r = -.51$). That is, increasing quit rates (approaching 50%) decrease the (negative) pay-turnover correlation, though the *Z*-test (.99, $p > .10$) failed to verify that subgroup correlations significantly varied (Table 9). Besides this, turnover lag ($r = .50$) and performance-contingent rewards ($r = .75$) influenced the performance-quit relationship (see Table 6). As Table 9 reveals, a long time lag between when performance and turnover are measured weakened the inverse performance-quit relationship. Significantly, the performance-turnover correlation is negative ($\rho = -.20$) when reward contingencies exist, but positive when contingencies are absent ($\rho = .07$; Table 9). Thus, when high performers are not (or insufficiently) rewarded, they leave. Though based on fewer studies, this finding further supports Williams and Livingstone's conclusion: Reward contingency moderates the performance-quit relationship (Williams & Livingstone, 1994).

Next, sample size ($r = -.39$) and turnover lag ($r = -.41$) moderated the commitment-turnover relationship. The negative commitment-turnover correlation shrank with large samples and long time lags between survey assessment of commitment and turnover data collection, but *Z*-tests did not detect significant subgroup differences (see Table 10). Finally, Table 6 indicates that sample size ($r = .62$), turnover lag ($r = .58$), and military-nonmilitary distinctions ($r = .65$) were significantly related to quit intentions' effect size. All the same, Table 10 subgroup tests only substantiated that military-civilian occupational differences across studies moderated the intention-behavior relationship. As Hom et al. (1992) and Steel and Ovalle (1984) observed, military personnel ($\rho = .46$) can more readily translate their termination decisions into leaving than can civilians ($\rho = .34$).

The results exhibited in Table 7 show the correlations of measurement attributes with effect sizes. Organizational Commitment Questionnaire usage ($r = -.45$), self-developed scales ($r = .58$), and scale reliability (α; $r = -.45$) significantly predicted commitment-turnover relationships. The subgroup tests in Table 10 corroborated only the first two moderators. Therefore, assessing orga-

nizational commitment with the OCQ ($\rho = -.27$), rather than other commitment scales ($\rho = -.12$), best promotes its predictive strength. Beyond this, established commitment measures generate higher predictive validity ($\rho = -.27$) than do ad hoc measures ($\rho = -.07$).

Summary and Conclusion

This latest comprehensive meta-analysis confirmed well-established findings, as well as generated new findings. For the most part, our results reconfirmed the relative predictive strength of turnover determinants found in past meta-analyses and proposed by existing theoretical perspectives (e.g., Hom & Griffeth, 1995; Kim, Price, Mueller, & Watson, 1996; Mobley, Griffeth, Hand, & Meglino, 1979; Price & Mueller, 1986; Steers & Mowday, 1981). Once again, proximal precursors in the withdrawal process were shown to be among the best predictors of turnover. These predictors include job satisfaction, organizational commitment, job search, comparison of alternatives, withdrawal cognitions, and quit intentions. Our meta-analysis also demonstrated small to moderate effect sizes for predictors, which prevailing theories presume to be more distal in the termination process (e.g., Hom & Griffeth, 1995; Mobley, 1977; Price & Mueller, 1986). Such distal determinants include characteristics of the work environment, such as job content, stress, work group cohesion, autonomy, leadership, and—to a lesser extent—distributive justice and promotional chances. Distal causes also represent factors external to the firm, such as alternative job opportunities. Few demographic attributes meaningfully predicted turnover, the exceptions being company tenure and number of children. Nonetheless, weighted applicant blanks—special coding of applicant descriptions of their demographic (and other background) traits—can effectively predict resignations. Moreover, other behaviors (namely, lateness, absenteeism, and job performance) can foreshadow turnover.

Several results obtained here merit further discussion. First, our updated meta-analysis discovered that job search methods can predict quits as well as do quit intentions and withdrawal cognitions. Quite possibly, leavers engage in a series of withdrawal decisions and behaviors during the termination process. Following a hierarchical means-end structure, more general withdrawal cognitions drive specific withdrawal intentions and such corresponding acts as search decisions and choice of specific job offers (Sager, Griffeth, & Hom, 1998; Tubbs & Ekeberg, 1991). That is, a general decision to leave (the construct most typically measured) is initiated by job dissatisfaction. This decision, in turn, may lead to preparatory job search in which "the employee determines the availability of 'greener pastures'..." (Blau, 1993: 316). "In the second (active) cycle the employee determines the 'accessibility of those greener pastures'..." (Blau, 1993: 316). After finding superior alternatives, prospective leavers would decide to accept a particular job offer and resign on a specific date (these decisions are more concrete than the initial decision to leave). Consequently, measures of search methods are relatively accurate turnover predictors because they reflect this latter cycle, which is closer in time to actual exits. Unfortunately, with only two studies

of search methods, little can be concluded with certainty (though there is reason for optimism).

Second, the present moderator tests divulged an important role for time lag between predictor and turnover assessments, although subgroup analyses revealed that lag time moderated only the performance effect size. By comparison, the moderating effects of turnover base rate were negligible, though their effects are presumed to be pervasive (Steel & Griffeth, 1989). Indeed, apprehension over poor quit rates has often motivated researchers to collect turnover data many months after predictor measurement (commonly, a 12-month lag). To maximize the behavioral base rate (and thus turnover predictions), they adopt long measurement windows to allow for more leavers to be included in their analysis. Nonetheless, the beneficial effects of expanded termination rates on improved predictive accuracy may be overstated. According to our decision rule for documenting moderators (which requires that both correlational and subgroup analyses agree), the turnover rate did not influence any predictor-quit relationship. Consistent with this conclusion, a comparison of effect sizes with and without base-rate corrections (ρ_1 vs. ρ_2 in Tables 1 to 5) suggests that correcting for turnover rate barely raised most effect sizes.

Taken together, these findings imply that the routine practice of prolonging the measurement lag to boost quit rates may prove counterproductive. In other words, expanding the lag time—during which measured predictor values become less relevant as predictor values change—may more than offset the gain in predictive strength produced by higher turnover rates. Perhaps a more fruitful approach would be to specify the temporal duration of antecedents' effects and collect turnover data during this period when they have their maximal impact, while insuring that the quit rate achieves some minimum (e.g., 10% to 15% quit rates). We are not recommending that researchers ignore base rates since the variance of a criterion obviously affects its predictability. We are, however, suggesting that waiting too long to maximize the turnover rate can attenuate the predictive accuracy of measured determinants (as the present meta-analysis also established). Unfortunately, that minimum threshold base rate is unknown. Future research, possibly using Monte Carlo simulation, might pinpoint which combination of lag time and base rate yields optimal prediction given their opposing effects on predictive efficacy. Alternatively, logistic regression or survival analysis may prove superior techniques for handling extreme quit rates (besides being more appropriate for analyzing a dichotomous criterion) (Huselid & Day, 1991; Morita, Lee, & Mowday, 1993).

Third, the findings regarding women's quit rates help to dispel common stereotypes regarding their instability on the job (Royalty, 1998). The latest estimate of the gender-turnover correlation indicates that their turnover rate is similar to that of men. Other evidence showing that gender moderates the age-turnover relationship demonstrates that women are more likely to *remain* as they age than are men. Perhaps domestic duties for women—who traditionally assume primary responsibility for household chores and child care—decrease as they age. Although child-bearing or -rearing often prompts younger women to abandon paid employment (cf. Royalty, 1998), these responsibilities (and their

control over women's workforce participation) diminish as children grow up. Thus, we are suggesting a second moderator for future research to examine: family responsibilities and their role in the female and male age-retention relationships. Also, it would be interesting to see if these results are mirrored for men having primary family obligations.

Fourth, the role of contingent rewards helped to explain the performance-turnover relationship and to illustrate the importance of merit-based reward systems for retaining high performers. Those who argue for such compensation plans appear to be correct. Indeed, this finding might temper the widespread enthusiasm for collective and team incentives. Where collective reward programs replace individual incentives, their introduction may actually stimulate greater exits among high performers (Milkovich & Newman, 1999).

Fifth, the importance of scale quality was demonstrated in moderator tests of the commitment-turnover relationship. Despite the availability of validated commitment scales, some researchers continue to use ad hoc measures, in turn jeopardizing predictive effectiveness. We hope the present study discourages this practice.

Sixth, the moderator role of military-nonmilitary on the intention to quit–turnover relationship is intriguing. Civilian employers might adopt an employment contract akin to military reenlistment that obligates employees to remain for a certain period of employment (which also obligates employers to provide limited job security; Mobley et al., 1979). Like professional sports, schools and universities already require their teachers and professors to sign one-year (or multi-year) contracts to discourage resignations during a fixed period. Similarly, fast-food restaurants have combined such contractual obligations with a pay bonus if employees remain for a specified duration. Clearly, there are benefits of this approach in that it could make turnover more predictable (improving human resource planning) and provide for a more stable workforce.

Though among the most thorough in the turnover literature, our meta-analysis nonetheless omitted some determinants that have been examined in recent meta-analyses. For example, we did not consider the "Big Five Personality Factors" (e.g., Digman, 1990), several of which (e.g., conscientiousness, agreeableness, openness to experience) can predict turnover or tenure (Barrick & Mount, 1991) because of the very small number of studies using personality predictors. In a recent study, Barrick and Mount (1996) found that these personality dimensions can exhibit even higher predictive validity for long-haul truck drivers. Specifically, conscientious and emotionally stable truckers are less likely to leave. The uncorrected correlation between those two personality traits and turnover (measured six months after personality testing) was about $-.20$. These encouraging findings suggest that individuals with high turnover propensities can be identified prior to organizational entry.

Our investigation also excluded job interviews, because two recent meta-analyses examined interviews as predictors of turnover. Briefly, one meta-analysis (McDaniel, Whetzel, Schmidt, & Maurer, 1994) found that interviews modestly predict job tenure. The sample-size weighted average correlation corrected for measurement error was .13. Since this effect size was obtained from myriad

structured and unstructured interviews, even stronger effect sizes might be derived from a meta-analysis of only structured interviews. Indeed, Schmidt and Rader (1999) later documented that an empirically developed structured telephone interview can accurately forecast tenure. The sample-size weighted average correlation corrected for unreliability and range restriction was an impressive .39.

In conclusion, these meta-analytical findings carry significant theoretical and practical implications. First, the findings suggest which managerial interventions may most effectively deter quits. They provide a stronger empirical foundation for prescriptions than do anecdotal evidence or speculation, the prime basis for popular advice. These results also identify robust causal antecedents that any viable model of turnover should incorporate. All the same, our meta-analysis revealed the limits to generalizations for causes of turnover. Moderator tests indicate that the effect sizes of nearly all determinants, including the direction of their effects, can vary widely across situations and populations. Such pervasive variability implies that greater theoretical attention should be paid to moderators, besides offering universal turnover formulations.

Notes

1. A complete listing of all articles included in this meta-analysis can be obtained from the first author.
2. When testing sample size, reliability, and quit base rate as moderators, such correction or weighting of correlations would have undermined the moderator tests. That is, we would not be able to detect those moderators if we had controlled or corrected for them when calculating moderator test statistics.
3. Results from the meta-analysis of studies conducted in the 1990s can be obtained from the first author.

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