Private Eyes, They See Your Every Move: Workplace Surveillance and Worker Well-Being

TECHNICAL APPENDIX FOR CONFIRMATORY FACTOR ANALYSIS

A confirmatory factor analysis (CFA) can be used to compare the fit of a set of alternative latent structures to observed data (Ullman 2006), thereby determining which hypothesized structure best fits the observed data. For each structure, model fit is determined using the RMSEA, CFI, and SRMR, with values of 0.95 or higher considered acceptable for the CFI, values of 0.06 or lower for the RMSEA, and values of 0.05 or less for the SRMR (Byrne 2012). The model chi-square can also be used to evaluate model fit, but tends to be significant in models with this large of a sample size (Bollen et al. 2014); however, the model chi-square can also be used to compare model fit in nested models, thereby testing whether models that add parameters have a significantly better fit than simpler models (Byrne 2012). Additionally, the Bayesian Criterion Index (BIC) is a non-parametric measure of model fit that can be used to compare whether the improvement in model fit is worth the increase in model complexity (Lin et al. 2017). We therefore report the BIC when comparing nested models to examine whether addition of parameters improves model fit over and above the increase in model complexity.

To compare different latent structures, we first estimate a "clean" CFA of the observations for surveillance, job autonomy, and job pressures. This is a clean CFA because items are used as reflectors only for their respective factors. Two additional models are estimated which allow cross-loadings. Cross-loadings are when responses on a question are used as indicators for two or more different factors at the same time. Specification of cross-loadings is facilitated by modification indices. Modification indices estimate the improvement in model fit that will be obtained by changing a model under consideration. In this case, modification indices are used to determine the likely improvement in model fit that will result if cross-loadings are added in subsequent models.

Tables S.1 shows the fit indices for each model, and Table S.2 shows the factor loadings and inter-factor covariances for each model. Again, Model 1 is a clean model, in which items are allowed to load only on their intended factors. Although the CFI and SRMR indicate acceptable fit for the clean model, the RMSEA indicates poor model fit. Moreover, inspection of the modification indices suggested that substantial improvement in model fit could be afforded by allowing a cross-loading between the latent autonomy factor and the surveillance item indicating monitoring. Model 2 shows the results of a model that adds this cross-loading. Comparison of the chi-square statistics for the two models shows that model fit is significantly improved from Model 1; moreover, the BIC is substantially lower in Model 2, indicating that the addition of this cross-loading improves model fit, even when taking the increase in model complexity into account. Although the model fit indices indicated acceptable fit in Model 2, the modification indices for the model indicated model fit could be further improved with a second cross-loading between the autonomy latent factor and an additional indicator for surveillance. Since one of the focal questions of our analyses involves the degree of overlap between surveillance responses and other measures of work conditions, and the modification indices suggested marked improvement in model fit, an additional cross-loading was added in Model 3.

All model fit indices show further improvement in model fit in Model 3 from Model 2, with an RMSEA of 0.30, a CFI of 0.992, and an SRMR of 0.018. The difference in the chi-square statistics between Models 2 and 3 is also significant, and the BIC is lower for Model 3,

indicating that the addition of the second cross-loading is worth the further increase in model complexity. Modification indices indicated no further cross-loadings with the surveillance items, and since Model 3 indicates excellent fit, no additional model modifications were made. The final model with two cross-loadings is therefore the CFA model presented in the first part of the results on the main paper, and used as the basis for the structural equation model in the second part of the results of the main paper.

The specifics of Model 3 are described in the main text, but it should be noted that Table S.2 shows that the correlation between latent autonomy and latent surveillance in the clean model (Model 1) is -0.354, but this correlation is reduced to -0.113 with both cross-loadings (Model 3). The reduction in the correlation between these two factors shows that the appearance of a higher correlation between surveillance and job autonomy is largely because people combine surveillance and job autonomy when responding to questions about surveillance. Taking the mixture of surveillance and job autonomy in these responses into account shows that surveillance and job autonomy are more distal constructs.

We present the unweighted distributions of the items used in the SEM (Table S.3). Table S.4. presents an expanded model with additional controls (pay perceptions, advancement opportunities, salaried work, and remote work). The results from this model are substantively similar to those presented in the model used in the main paper.

TABLE S.1
CFA Model Fit Indices

	χ^2	DF	Scaling Correction Factor	*p*	BIC	RMSEA	CFI	SRMR
Model 1	371.513	24	1.208	***	79706.042	0.064	0.959	0.042
Model 2	165.271	23	1.220	***	79466.953	0.042	0.983	0.028
Model 3	93.335	22	1.230	***	79388.224	0.030	0.992	0.018

*p≤ .05. **p ≤ .01. ***p ≤ .001.
N=3,508.
Difference in model fit between each model significant at *p*<.001.

TABLE S.2
CFA Factor Loadings and Inter-Factor Correlations

	Model 1				Model 2				Model 3			
	Metric	SE	*p*	Standardized	Metric Loading	SE	*p*	Standardized	Metric	SE	*p*	Standardized
Factor Loadings												
Surveillance												
Tracking	1.000	--	--	0.707	1.000	--	--	0.857	1.000	--	--	0.654
Evaluation	0.695	0.027	***	0.481	0.634	0.034	***	0.532	0.995	0.061	***	0.638
Monitoring	1.079	0.060	***	0.748	0.497	0.043	***	0.418	0.653	0.042	***	0.419
Autonomy												
Freedom	1.000	--	--	0.827	1.000	--	--	0.820	1.000	--	--	0.816
Decision	0.856	0.026	***	0.732	0.871	0.026	***	0.738	0.876	0.026	***	0.739
Lot of Say	0.856	0.025	***	0.693	0.866	0.025	***	0.694	0.874	0.025	***	0.697
Monitoring	--	--	--	--	-0.458	0.034		-0.365	-0.589	0.031		-0.467
Tracking	--	--	--	--	--	--	--	--	-0.345	0.031		-0.278
Presssures												
Overwhelmed	1.000	--	--	0.856	1.000	--	--	0.856	1.000	--	--	0.856
Tasks	0.997	0.019	***	0.841	0.997	0.019	***	0.840	0.997	0.019	***	0.841
Demands	1.029	0.019	***	0.835	1.029	0.019	***	0.835	1.029	0.019	***	0.835
Factor Covariances												
Surveillance, Autonomy	-0.354	0.015	***	-0.637	-0.312	0.018	***	-0.466	-0.113	0.020	***	-0.223

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TABLE S2. CONTINUED
CFA Factor Loadings and Inter-Factor Correlations

	Model 1				Model 2				Model 3			
	Metric	SE	*p*	Standardized	Metric Loading	SE	*p*	Standardized	Metric Loading	SE	*p*	Standardized
Surveillance, Pressures	0.143	0.018	***	0.203	0.157	0.020	***	0.184	0.127	0.017	***	0.196
Autonomy, Pressures	-0.075	0.019	***	-0.092	-0.078	0.018	***	-0.096	-0.074	0.018	***	-0.092

*p≤ .05. **p ≤ .01. ***p ≤ .001. N=3,508.

TABLE S3. Unweighted Percentage Distributions for Indicator Items of Latent Constructs

Psychological distress items	None of the time	A little of the time	Some of the time	Most of the time	All of the time
Anxious	12.64%	28.99%	33.67%	19.29%	5.42%
Nervous	20.37%	34.00%	30.83%	11.37%	3.43%
Restless	22.30%	30.14%	32.03%	12.56%	2.98%
Sad	21.06%	33.40%	31.06%	11.17%	3.31%
Hopeless	43.49%	26.17%	20.85%	7.09%	2.40%

Workplace surveillance items	Disagree	Somewhat Disagree	Somewhat Agree	Agree
Work activities are tracked	26.55%	32.70%	28.81%	11.94%
Performance is frequently evaluated	25.25%	27.61%	33.96%	13.17%
Rarely monitored at job	30.21%	35.42%	21.96%	12.41%

Job autonomy items	Disagree	Somewhat Disagree	Somewhat Agree	Agree
Freedom to decide actions on job	16.37%	24.35%	40.71%	18.57%
Responsibility to decide how job is done	9.16%	15.04%	40.39%	35.41%
Have a lot of say what happens on job	16.26%	24.53%	37.69%	21.51%

Job pressures items	Never	Rarely	Sometimes	Often	Very Often
Feeling overwhelmed by work	11.06%	24.46%	34.15%	16.19%	14.14%
Working on too many tasks at once	9.75%	22.52%	32.35%	19.44%	15.94%
Job demands exceed time available	13.40%	26.08%	28.91%	16.33%	15.28%

Note: The percentages listed in this appendix represent the unweighted distribution of responses for each item used as indicators. These percentages should not be interpreted as direct measures of distress or other constructs but are used to estimate latent constructs, which are continuous variables inferred from these observed indicators.

TABLE S4. Model with Additional Controls

	Surveillance				Job Autonomy				Job Pressures				Privacy Concerns				Psychological Distress				Job Satisfaction			
	Metric Coefficient	SE	*p*	Standardized Coefficient	Metric Coefficient	SE	*p*	Standardized Coefficient	Metric Coefficient	SE	*p*	Standardized Coefficient	Metric Coefficient	SE	*p*	Standardized Coefficient	Metric Coefficient	SE	*p*	Standardized Coefficient	Metric Coefficient	SE	*p*	Standardized Coefficient
Surveillance					-0.200	0.038	***	-0.165	0.237	0.038	***	0.150	0.494	0.042	***	0.299	-0.008	0.036		-0.005	0.141	0.038	***	0.090
Job autonomy																	-0.091	0.032	**	-0.075	0.432	0.035	***	0.335
Job pressures																	0.323	0.02	***	0.349	-0.276	0.021	***	-0.280
Privacy concerns																	0.056	0.018	**	0.063	-0.068	0.018	***	-0.072
Administration[a]	0.030	0.054		0.013	-0.025	0.053		-0.009	0.065	0.06		0.017	-0.118	0.063		-0.03	0.008	0.058		0.002	-0.084	0.06		-0.023
Clerical	0.012	0.046		0.006	-0.234	0.043	***	-0.104	-0.108	0.056		-0.037	-0.006	0.059		-0.002	0.067	0.053		0.025	-0.085	0.055		-0.029
Sales	0.121	0.057	*	0.052	0.019	0.058		0.007	-0.117	0.069		-0.032	-0.052	0.072		-0.013	-0.084	0.064		-0.024	-0.061	0.06		-0.017
Service	0.291	0.059	***	0.135	-0.141	0.06	*	-0.054	-0.032	0.071		-0.009	0.132	0.077		0.037	0.097	0.065		0.031	-0.113	0.069		-0.034
Labour	0.083	0.051		0.043	-0.127	0.05	*	-0.055	-0.207	0.064	***	-0.068	0.009	0.066		0.003	0.023	0.059		0.008	-0.06	0.058		-0.020
Other	0.041	0.049		0.021	-0.052	0.05		-0.023	-0.163	0.059	**	-0.054	-0.08	0.059		-0.025	0.126	0.051	*	0.045	-0.082	0.055		-0.027
BA Degree or More	-0.028	0.032		-0.021	0.029	0.032		0.019	0.208	0.039	***	0.102	0.058	0.041		0.027	-0.079	0.035	*	-0.042	0.005	0.036		0.003
Less than $25,000[b]	-0.055	0.077		-0.029	0.048	0.08		0.021	0.16	0.094		0.054	-0.001	0.096		0	0.147	0.091		0.053	-0.148	0.088		-0.050
$25,000 to $49,999	-0.042	0.073		-0.03	0.117	0.077		0.069	0.132	0.089		0.06	0.05	0.09		0.022	-0.025	0.086		-0.012	-0.095	0.084		-0.044
$50,000 to $74,999	-0.039	0.077		-0.025	0.203	0.081	*	0.107	0.158	0.094		0.064	-0.026	0.094		-0.01	-0.066	0.089		-0.029	-0.057	0.09		-0.023
$75,000 to $99,999	-0.122	0.083		-0.057	0.112	0.089		0.043	0.208	0.098	*	0.061	0.006	0.102		0.002	-0.155	0.096		-0.049	-0.069	0.097		-0.020
$100K to $149,999	-0.159	0.088		-0.063	0.129	0.093		0.043	0.198	0.109		0.05	0.007	0.109		0.002	-0.089	0.101		-0.024	-0.143	0.103		-0.036
$150K+	-0.100	0.082		-0.045	0.172	0.085	*	0.063	0.081	0.1		0.023	-0.032	0.104		-0.009	-0.02	0.098		-0.006	-0.127	0.095		-0.036
Missing Income	0.038	0.035		0.027	-0.241	0.035	***	-0.143	0.018	0.041		0.008	0.132	0.042	**	0.057	-0.005	0.037		-0.002	0.055	0.039		0.025
Men	0.055	0.030		0.042	0.087	0.029	**	0.056	-0.342	0.036	***	-0.167	-0.103	0.037	**	-0.049	-0.168	0.035	***	-0.089	-0.162	0.034	***	-0.081
30-39 Hours a Week[c]	0.161	0.047	***	0.118	-0.018	0.046		-0.011	0.157	0.054	**	0.073	-0.047	0.058		-0.021	-0.174	0.053	***	-0.087	0.053	0.053		0.025
40-49 Hours a Week	0.222	0.047	***	0.162	0.002	0.046		0.001	0.538	0.056	***	0.249	0.088	0.059		0.039	-0.259	0.054	***	-0.129	0.106	0.052	*	0.050
50+ Hours a Week	0.342	0.058	***	0.175	0.036	0.057		0.015	0.997	0.07	***	0.323	0.23	0.071	***	0.071	-0.342	0.067	***	-0.12	0.109	0.066		0.036
Age	-0.003	0.001	**	-0.07	0.006	0.001	***	0.107	-0.009	0.001	***	-0.12	0.001	0.001		0.008	-0.017	0.001	***	-0.259	0.003	0.001		0.036
Married	-0.089	0.034	**	-0.068	-0.009	0.033		-0.006	0.101	0.039	**	0.049	0.087	0.041	*	0.04	-0.079	0.037	*	-0.041	0.072	0.039		0.035
Children in the household	0.080	0.031	*	0.059	0.061	0.031		0.037	0.022	0.038		0.01	-0.046	0.04		-0.021	-0.081	0.035	*	-0.041	0.018	0.036		0.008
Visible Minority	-0.011	0.039		-0.006	-0.071	0.04		-0.034	0.029	0.046		0.011	0.12	0.048	*	0.042	-0.022	0.044		-0.009	-0.004	0.045		-0.002
Salaried	0.030	0.034		0.023	0.172	0.033	***	0.11	0.125	0.042	**	0.061	-0.293	0.042	***	-0.137	-0.033	0.038		-0.017	0.008	0.039		0.004
Work from home	-0.019	0.041		-0.01	0.064	0.038		0.028	-0.086	0.051		-0.029	-0.405	0.045	***	-0.131	0.015	0.046		0.005	-0.038	0.045		-0.013
Some chance of promotion[d]	0.017	0.031		0.012	0.261	0.03	***	0.161	-0.013	0.037		-0.006	-0.161	0.038	***	-0.073	0.003	0.035		0.002	0.039	0.035		0.019
High chance of promotion	-0.085	0.042	*	-0.054	0.543	0.037	***	0.287	-0.029	0.047		-0.012	-0.21	0.047	***	-0.081	0.039	0.045		0.017	-0.017	0.045		-0.007
Overpaid[e]	0.010	0.040		0.006	-0.039	0.041		-0.019	0.074	0.047		0.027	0.133	0.052	**	0.047	0.058	0.045		0.023	-0.038	0.047		-0.014
Underpaid	0.030	0.032		0.023	-0.168	0.031	***	-0.107	0.273	0.04	***	0.133	0.19	0.04	***	0.089	0.066	0.036		0.035	-0.287	0.037	***	-0.142
Coefficients of Determination																								
R^2	0.075				0.307				0.253					0.189			0.287				0.266			

* p<.05; ** p<.01; *** p<.001. N=3,508

a. Professional/Technical is reference

b. Less than $25,000 is reference

c. Fewer than 30 is reference

d. Low chance of promotion

e. Paid about right

REFERENCES

Bollen, Kenneth A., Jeffrey J. Harden, Surajit Ray, and Jane Zavisca. 2014. “BIC and Alternative Bayesian Information Criteria in the Selection of Structural Equation Models.” *Structural Equation Modeling: A Multidisciplinary Journal* 21(1):1–19.

Byrne, Barbara M. 2016. *Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming*. Routledge.

Lin, Li-Chung, Po-Hsien Huang, and Li-Jen Weng. 2017. “Selecting Path Models in SEM: A Comparison of Model Selection Criteria.” *Structural Equation Modeling: A Multidisciplinary Journal* 24(6):855–69.

Ullman, Jodie B. 2006. “Structural Equation Modeling: Reviewing the Basics and Moving Forward.” *Journal of Personality Assessment* 87(1):35–50.