

Zeschke, Venz, & Zacher: Relations Between Idle Time, Exhaustion, and Engagement at Work: The Role of Work Overload, Autonomy, and Recovery Experiences

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Explanation

This online appendix is part of the manuscript “Relations Between Idle Time, Exhaustion, and Engagement at Work: The Role of Work Overload, Autonomy, and Recovery Experiences” by Martin Zeschke, Laura Venz, and Hannes Zacher.

Variables

The scales are explained in the accompanying paper. The variable names are explained here:

- pslID = personal ID
- idleTimeFreq = Idle time frequency, based on Brodsky & Amabile, 2018
- fatigueEmo = Emotional exhaustion
- emotionalEngagement = Emotional engagement
- workDemands = Workload
- autonomyWorkScheduling = Work scheduling autonomy
- autonomyDecisionMaking = Decision making autonomy
- autonomyWorkMethods = Work methods autonomy
- recovery1detachment = Detachment during idle time
- recovery1relaxation = Relaxation during idle time
- _persMC = Person mean over all 5 measurements, centered (between-person level)
- _pmc = Person mean centered (within-person level)

Table S1: Attrition Analysis

Attrition:

- 0 = Complete participation
- 1 = Incomplete participation

```
##
## Call:
## glm(formula = attrition ~ T1_idleTimeFreq + T1_workDemands +
##      T1_autonomyWorkScheduling + T1_fatigueEmo + T1_emotionalEngagement,
##      family = "binomial", data = total15)
##
## Deviance Residuals:
##      Min        1Q    Median        3Q        Max
## -1.7607  -1.5084   0.7899   0.8315   0.9589
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)      0.677200   0.496790   1.363   0.173
## T1_idleTimeFreq  -0.003729   0.031891  -0.117   0.907
## T1_workDemands    0.023943   0.099468   0.241   0.810
## T1_autonomyWorkScheduling 0.104832   0.078901   1.329   0.184
## T1_fatigueEmo     0.080936   0.075548   1.071   0.284
## T1_emotionalEngagement -0.115014   0.082250  -1.398   0.162
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance: 1230.9  on 1033  degrees of freedom
## Residual deviance: 1226.3  on 1028  degrees of freedom
## (49 Beobachtungen als fehlend gelöscht)
## AIC: 1238.3
##
## Number of Fisher Scoring iterations: 4
```

```
##
## Call:
## lm(formula = attrition ~ T1_idleTimeFreq + T1_workDemands + T1_autonomyWorkScheduling +
##     T1_fatigueEmo + T1_emotionalEngagement, data = total15)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.7923 -0.6804  0.2690  0.2931  0.3625
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      0.6644297   0.1010612   6.575 7.75e-11 ***
## T1_idleTimeFreq    -0.0007104   0.0064510   -0.110   0.912
## T1_workDemands      0.0048520   0.0202502    0.240   0.811
## T1_autonomyWorkScheduling 0.0210970   0.0159927    1.319   0.187
## T1_fatigueEmo       0.0162035   0.0151854    1.067   0.286
## T1_emotionalEngagement -0.0229172   0.0164368   -1.394   0.164
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4505 on 1028 degrees of freedom
## (49 Beobachtungen als fehlend gelöscht)
## Multiple R-squared:  0.004446, Adjusted R-squared: -0.0003965
## F-statistic: 0.9181 on 5 and 1028 DF, p-value: 0.4683
```

Table S2: Data Transparency Appendix

Scales in the Dataset	Source	MS1	MS2
		(Status = Published)	(Status = Current)
Idle Time Proportion	Self-designed, based on Brodsky & Amabile (2018)	X	
	“Idle time is unplanned periods of downtime at work during which you were unable to continue working on your core work tasks for reasons beyond your personal control. For example: there were no customers, your supervisor did not give you any tasks, or you were waiting for a process to be completed. Breaks are not idle time. In the past three months, how much idle time did you experience compared to work and to work breaks in a typical workday over the past three months (with a total of 100% for all three options)?”		

Scales in the Dataset	Source	MS1 (Status = Published)	MS2 (Status = Current)
Idle Time Frequency	Self-designed, based on Brodsky & Amabile (2018) “Idle time is unplanned periods of downtime at work during which you were unable to continue working for reasons beyond your personal control. For example: There were no customers, your manager did not give you assignments, or you were waiting for a process to be completed. Breaks are not idle time. In the past three months, how often have you experienced periods of at least 15 minutes of idle time at their work in the past three months, with the options 1 (never), 2 (less than once a month), 3 (once a month), 4 (several times a month), 5 (once a week), 6 (several times a week), 7 (daily), and 8 (several times a day)?”		X
Workload	Rothmann et al., 2006		X
Autonomy	Stegmann et al., 2010; Morgeson & Humphrey, 2006		X
Boredom	T. W. Lee, 1986	X	
Job Satisfaction	Judge et al., 1998	X	
Exhaustion	Frone and Tidwell, 2015		X
Engagement	Rich et al., 2010		X
Turnover Intentions	Bothma & Roodt, 2013	X	
Prosocial Work Behavior	H. W. Lee et al., 2019	X	
Counterproductive Work Behavior	Aquino et al., 1999	X	
Recovery Experiences: Detachment & Relaxation	Sonnentag & Fritz, 2007		X
Working From Home	Self-Designed “In the past three months, how much have you worked from home in an average week (on a scale of 0-100%)?”	X	

Scales in the Dataset	Source	MS1 (Status = Published)	MS2 (Status = Current)
COVID-19 Impact on Work	Self-Designed “In the past three months, how much has the COVID-19 pandemic affected your work life?”	X	
Age	--	X	
Gender	--	X	
Job Tenure (in Years)	--	X	
Contractual Work Hours	--	X	
Big Five Personality	Rammstedt & John, 2005	X	
Positive and Negative Affect	Kessler & Staudinger, 2009	X	

Discriminant Validity and Measurement Invariance

Table S3a Measurement Model Test: One Factor

```

## lavaan 0.6.17 ended normally after 91 iterations
##
## Estimator ML
## Optimization method NLMINB
## Number of model parameters 90
##
## Used Total
## Number of observations 3299 5415
## Number of clusters [psID] 1036
##
## Model Test User Model:
##
## Test statistic 15046.172
## Degrees of freedom 270
## P-value (Chi-square) 0.000
##
## Model Test Baseline Model:
##
## Test statistic 24147.008
## Degrees of freedom 306
## P-value 0.000
##
## User Model versus Baseline Model:
##
## Comparative Fit Index (CFI) 0.380
## Tucker-Lewis Index (TLI) 0.298
##
## Loglikelihood and Information Criteria:
##
## Loglikelihood user model (H0) -75234.224
## Loglikelihood unrestricted model (H1) -67711.137
##
## Akaike (AIC) 150648.447
## Bayesian (BIC) 151197.571
## Sample-size adjusted Bayesian (SABIC) 150911.601
##
## Root Mean Square Error of Approximation:
##
## RMSEA 0.129
## 90 Percent confidence interval - lower 0.127
## 90 Percent confidence interval - upper 0.131
## P-value H_0: RMSEA <= 0.050 0.000
## P-value H_0: RMSEA >= 0.080 1.000
##
## Standardized Root Mean Square Residual (corr metric):
##
## SRMR (within covariance matrix) 0.160
## SRMR (between covariance matrix) 0.245
##
## Parameter Estimates:
##

```

```

## Standard errors                                Standard
## Information                                    Observed
## Observed information based on                    Hessian
##
##
## Level 1 [within]:
##
## Latent Variables:
##      Estimate  Std.Err  z-value  P(>|z|)
## all =~
## workDemands01    1.000
## workDemands02    1.393    0.055   25.455    0.000
## workDemands03    1.247    0.051   24.422    0.000
## workDemands04    1.283    0.053   24.081    0.000
## workDemands05    0.731    0.045   16.111    0.000
## workDemands06    0.829    0.046   18.184    0.000
## workDemands07    0.958    0.048   19.903    0.000
## workDemands08    1.132    0.051   22.375    0.000
## atnmyWrkSchd01   0.373    0.042    8.855    0.000
## atnmyWrkSchd02   0.384    0.044    8.809    0.000
## atnmyWrkSchd03   0.381    0.043    8.821    0.000
## fatigue07        0.063    0.041    1.551    0.121
## fatigue08        0.057    0.042    1.375    0.169
## fatigue09        0.141    0.042    3.380    0.001
## workEngagmnt04    0.201    0.040    4.992    0.000
## workEngagmnt05    0.220    0.041    5.402    0.000
## workEngagmnt06    0.209    0.040    5.282    0.000
## idleTimeFreq     -0.379    0.083   -4.579    0.000
##
## Variances:
##      Estimate  Std.Err  z-value  P(>|z|)
## .workDemands01    0.322    0.011   30.336    0.000
## .workDemands02    0.287    0.011   26.437    0.000
## .workDemands03    0.392    0.013   29.258    0.000
## .workDemands04    0.320    0.011   28.490    0.000
## .workDemands05    0.495    0.015   32.682    0.000
## .workDemands06    0.428    0.013   32.064    0.000
## .workDemands07    0.399    0.013   31.301    0.000
## .workDemands08    0.369    0.012   30.091    0.000
## .atnmyWrkSchd01   0.434    0.013   33.495    0.000
## .atnmyWrkSchd02   0.455    0.014   33.487    0.000
## .atnmyWrkSchd03   0.445    0.013   33.419    0.000
## .fatigue07        0.474    0.014   34.572    0.000
## .fatigue08        0.463    0.013   34.734    0.000
## .fatigue09        0.520    0.015   34.336    0.000
## .workEngagmnt04    0.446    0.013   33.887    0.000
## .workEngagmnt05    0.432    0.013   33.851    0.000
## .workEngagmnt06    0.401    0.012   33.784    0.000
## .idleTimeFreq     2.173    0.065   33.640    0.000
## all               0.249    0.019   13.357    0.000
##

```

```

##
## Level 2 [psID]:
##
## Latent Variables:
##      Estimate   Std.Err   z-value   P(>|z|)
## all =~
##      workDemands01      1.000
##      workDemands02      0.483      0.051      9.496      0.000
##      workDemands03      0.817      0.057     14.341      0.000
##      workDemands04      0.391      0.050      7.759      0.000
##      workDemands05      0.915      0.067     13.709      0.000
##      workDemands06      1.201      0.075     16.110      0.000
##      workDemands07      0.744      0.064     11.637      0.000
##      workDemands08      0.209      0.053      3.968      0.000
##      atnmyWrkSchd01     -0.540      0.066     -8.128      0.000
##      atnmyWrkSchd02     -0.501      0.067     -7.511      0.000
##      atnmyWrkSchd03     -0.533      0.067     -7.967      0.000
##      fatigue07          1.840      0.102     18.040      0.000
##      fatigue08          1.938      0.107     18.045      0.000
##      fatigue09          1.845      0.103     17.989      0.000
##      workEngagmnt04     -0.346      0.062     -5.606      0.000
##      workEngagmnt05     -0.703      0.070    -10.113      0.000
##      workEngagmnt06     -0.641      0.069     -9.226      0.000
##      idleTimeFreq       0.423      0.131      3.240      0.001
##
## Intercepts:
##      Estimate   Std.Err   z-value   P(>|z|)
##      .workDemands01      3.051      0.027    113.252      0.000
##      .workDemands02      3.754      0.023    166.040      0.000
##      .workDemands03      3.236      0.025    128.235      0.000
##      .workDemands04      3.810      0.022    170.472      0.000
##      .workDemands05      2.492      0.028     89.949      0.000
##      .workDemands06      2.673      0.029     90.921      0.000
##      .workDemands07      3.305      0.028    117.404      0.000
##      .workDemands08      3.833      0.023    166.106      0.000
##      .atnmyWrkSchd01      3.523      0.027    130.588      0.000
##      .atnmyWrkSchd02      3.564      0.028    129.072      0.000
##      .atnmyWrkSchd03      3.585      0.027    130.847      0.000
##      .fatigue07          2.265      0.029     78.804      0.000
##      .fatigue08          2.216      0.030     73.594      0.000
##      .fatigue09          2.332      0.030     78.590      0.000
##      .workEngagmnt04      3.007      0.027    112.761      0.000
##      .workEngagmnt05      3.211      0.027    117.662      0.000
##      .workEngagmnt06      3.238      0.028    115.930      0.000
##      .idleTimeFreq       3.439      0.058     59.215      0.000
##
## Variances:
##      Estimate   Std.Err   z-value   P(>|z|)
##      .workDemands01      0.323      0.022     14.444      0.000
##      .workDemands02      0.210      0.020     10.710      0.000
##      .workDemands03      0.239      0.020     11.791      0.000

```

##	.workDemands04	0.228	0.020	11.692	0.000
##	.workDemands05	0.377	0.026	14.586	0.000
##	.workDemands06	0.356	0.024	14.513	0.000
##	.workDemands07	0.466	0.029	16.178	0.000
##	.workDemands08	0.296	0.022	13.510	0.000
##	.atnmyWrkSchd01	0.507	0.030	16.936	0.000
##	.atnmyWrkSchd02	0.543	0.032	17.188	0.000
##	.atnmyWrkSchd03	0.528	0.031	17.047	0.000
##	.fatigue07	-0.046	0.006	-7.323	0.000
##	.fatigue08	-0.043	0.006	-6.774	0.000
##	.fatigue09	-0.014	0.008	-1.648	0.099
##	.workEngagmnt04	0.531	0.031	17.260	0.000
##	.workEngagmnt05	0.489	0.029	16.846	0.000
##	.workEngagmnt06	0.554	0.031	17.612	0.000
##	.idleTimeFreq	2.586	0.153	16.892	0.000
##	all	0.220	0.026	8.583	0.000

Table S3b Measurement Model Test: Two Factors

```

## lavaan 0.6.17 ended normally after 93 iterations
##
## Estimator ML
## Optimization method NLMINB
## Number of model parameters 90
##
## Used Total
## Number of observations 3299 5415
## Number of clusters [psID] 1036
##
## Model Test User Model:
##
## Test statistic 15046.172
## Degrees of freedom 270
## P-value (Chi-square) 0.000
##
## Model Test Baseline Model:
##
## Test statistic 24147.008
## Degrees of freedom 306
## P-value 0.000
##
## User Model versus Baseline Model:
##
## Comparative Fit Index (CFI) 0.380
## Tucker-Lewis Index (TLI) 0.298
##
## Loglikelihood and Information Criteria:
##
## Loglikelihood user model (H0) -75234.224
## Loglikelihood unrestricted model (H1) -67711.137
##
## Akaike (AIC) 150648.447
## Bayesian (BIC) 151197.571
## Sample-size adjusted Bayesian (SABIC) 150911.601
##
## Root Mean Square Error of Approximation:
##
## RMSEA 0.129
## 90 Percent confidence interval - lower 0.127
## 90 Percent confidence interval - upper 0.131
## P-value H_0: RMSEA <= 0.050 0.000
## P-value H_0: RMSEA >= 0.080 1.000
##
## Standardized Root Mean Square Residual (corr metric):
##
## SRMR (within covariance matrix) 0.160
## SRMR (between covariance matrix) 0.245
##
## Parameter Estimates:
##

```

```

## Standard errors Standard
## Information Observed
## Observed information based on Hessian
##
##
## Level 1 [within]:
##
## Latent Variables:
## Estimate Std.Err z-value P(>|z|)
## idleTime =~
## idleTimeFreq 1.000
## jdr =~
## workDemands01 1.000
## workDemands02 1.393 0.055 25.456 0.000
## workDemands03 1.247 0.051 24.423 0.000
## workDemands04 1.283 0.053 24.082 0.000
## workDemands05 0.731 0.045 16.111 0.000
## workDemands06 0.829 0.046 18.184 0.000
## workDemands07 0.958 0.048 19.904 0.000
## workDemands08 1.132 0.051 22.375 0.000
## atnmyWrkSchd01 0.373 0.042 8.855 0.000
## atnmyWrkSchd02 0.384 0.044 8.809 0.000
## atnmyWrkSchd03 0.381 0.043 8.821 0.000
## fatigue07 0.063 0.041 1.552 0.121
## fatigue08 0.057 0.042 1.375 0.169
## fatigue09 0.141 0.042 3.380 0.001
## workEngagmnt04 0.201 0.040 4.992 0.000
## workEngagmnt05 0.220 0.041 5.402 0.000
## workEngagmnt06 0.209 0.040 5.282 0.000
##
## Covariances:
## Estimate Std.Err z-value P(>|z|)
## idleTime ~~
## jdr -0.094 0.021 -4.510 0.000
##
## Variances:
## Estimate Std.Err z-value P(>|z|)
## .idleTimeFreq 0.000
## .workDemands01 0.322 0.011 30.336 0.000
## .workDemands02 0.287 0.011 26.437 0.000
## .workDemands03 0.392 0.013 29.258 0.000
## .workDemands04 0.320 0.011 28.490 0.000
## .workDemands05 0.495 0.015 32.683 0.000
## .workDemands06 0.428 0.013 32.064 0.000
## .workDemands07 0.399 0.013 31.301 0.000
## .workDemands08 0.369 0.012 30.091 0.000
## .atnmyWrkSchd01 0.434 0.013 33.495 0.000
## .atnmyWrkSchd02 0.455 0.014 33.487 0.000
## .atnmyWrkSchd03 0.445 0.013 33.419 0.000
## .fatigue07 0.474 0.014 34.572 0.000
## .fatigue08 0.463 0.013 34.734 0.000

```

```

##      .fatigue09      0.520    0.015   34.336    0.000
##      .workEngagmnt04 0.446    0.013   33.887    0.000
##      .workEngagmnt05 0.432    0.013   33.851    0.000
##      .workEngagmnt06 0.401    0.012   33.784    0.000
##      idleTime      2.208    0.066   33.245    0.000
##      jdr           0.249    0.019   13.358    0.000
##
##
## Level 2 [psID]:
##
## Latent Variables:
##      Estimate Std.Err z-value P(>|z|)
##      idleTime =~
##      idleTimeFreq      1.000
##      jdr =~
##      workDemands01      1.000
##      workDemands02      0.483    0.051    9.494    0.000
##      workDemands03      0.817    0.057   14.342    0.000
##      workDemands04      0.391    0.050    7.758    0.000
##      workDemands05      0.915    0.067   13.709    0.000
##      workDemands06      1.201    0.075   16.110    0.000
##      workDemands07      0.744    0.064   11.637    0.000
##      workDemands08      0.209    0.053    3.967    0.000
##      atnmyWrkSchd01     -0.540    0.066   -8.128    0.000
##      atnmyWrkSchd02     -0.501    0.067   -7.511    0.000
##      atnmyWrkSchd03     -0.533    0.067   -7.967    0.000
##      fatigue07          1.840    0.102   18.041    0.000
##      fatigue08          1.938    0.107   18.045    0.000
##      fatigue09          1.845    0.103   17.990    0.000
##      workEngagmnt04     -0.346    0.062   -5.605    0.000
##      workEngagmnt05     -0.703    0.070  -10.113    0.000
##      workEngagmnt06     -0.641    0.069   -9.226    0.000
##
## Covariances:
##      Estimate Std.Err z-value P(>|z|)
##      idleTime ~~
##      jdr           0.093    0.028    3.271    0.001
##
## Intercepts:
##      Estimate Std.Err z-value P(>|z|)
##      .idleTimeFreq      3.439    0.058   59.217    0.000
##      .workDemands01      3.051    0.027  113.252    0.000
##      .workDemands02      3.754    0.023  166.042    0.000
##      .workDemands03      3.236    0.025  128.236    0.000
##      .workDemands04      3.810    0.022  170.475    0.000
##      .workDemands05      2.492    0.028   89.949    0.000
##      .workDemands06      2.673    0.029   90.921    0.000
##      .workDemands07      3.305    0.028  117.405    0.000
##      .workDemands08      3.833    0.023  166.107    0.000
##      .atnmyWrkSchd01     3.523    0.027  130.588    0.000
##      .atnmyWrkSchd02     3.564    0.028  129.072    0.000

```

```

##      .atnmyWrkSchd03      3.585      0.027    130.847      0.000
##      .fatigue07          2.265      0.029     78.805      0.000
##      .fatigue08          2.216      0.030     73.594      0.000
##      .fatigue09          2.332      0.030     78.590      0.000
##      .workEngagmnt04      3.007      0.027    112.762      0.000
##      .workEngagmnt05      3.211      0.027    117.663      0.000
##      .workEngagmnt06      3.238      0.028    115.930      0.000
##
## Variances:
##              Estimate Std.Err  z-value  P(>|z|)
##      .idleTimeFreq      0.000
##      .workDemands01      0.323      0.022    14.444      0.000
##      .workDemands02      0.210      0.020    10.710      0.000
##      .workDemands03      0.239      0.020    11.791      0.000
##      .workDemands04      0.228      0.020    11.692      0.000
##      .workDemands05      0.377      0.026    14.586      0.000
##      .workDemands06      0.356      0.024    14.513      0.000
##      .workDemands07      0.466      0.029    16.178      0.000
##      .workDemands08      0.296      0.022    13.510      0.000
##      .atnmyWrkSchd01      0.507      0.030    16.936      0.000
##      .atnmyWrkSchd02      0.543      0.032    17.188      0.000
##      .atnmyWrkSchd03      0.528      0.031    17.047      0.000
##      .fatigue07          -0.046      0.006    -7.323      0.000
##      .fatigue08          -0.043      0.006    -6.774      0.000
##      .fatigue09          -0.014      0.008    -1.648      0.099
##      .workEngagmnt04      0.531      0.031    17.260      0.000
##      .workEngagmnt05      0.489      0.029    16.846      0.000
##      .workEngagmnt06      0.554      0.031    17.612      0.000
##      idleTime            2.626      0.155    16.979      0.000
##      jdr                  0.220      0.026     8.583      0.000

```

Table S3c Measurement Model Test: Three Factors

```

## lavaan 0.6.17 ended normally after 163 iterations
##
## Estimator ML
## Optimization method NLMINB
## Number of model parameters 94
##
## Used Total
## Number of observations 3299 5415
## Number of clusters [psID] 1036
##
## Model Test User Model:
##
## Test statistic 9209.477
## Degrees of freedom 266
## P-value (Chi-square) 0.000
##
## Model Test Baseline Model:
##
## Test statistic 24147.008
## Degrees of freedom 306
## P-value 0.000
##
## User Model versus Baseline Model:
##
## Comparative Fit Index (CFI) 0.625
## Tucker-Lewis Index (TLI) 0.568
##
## Loglikelihood and Information Criteria:
##
## Loglikelihood user model (H0) -72315.876
## Loglikelihood unrestricted model (H1) -67711.137
##
## Akaike (AIC) 144819.752
## Bayesian (BIC) 145393.281
## Sample-size adjusted Bayesian (SABIC) 145094.601
##
## Root Mean Square Error of Approximation:
##
## RMSEA 0.101
## 90 Percent confidence interval - lower 0.099
## 90 Percent confidence interval - upper 0.103
## P-value H_0: RMSEA <= 0.050 0.000
## P-value H_0: RMSEA >= 0.080 1.000
##
## Standardized Root Mean Square Residual (corr metric):
##
## SRMR (within covariance matrix) 0.177
## SRMR (between covariance matrix) 0.292
##
## Parameter Estimates:
##

```

```

## Standard errors Standard
## Information Observed
## Observed information based on Hessian
##
##
## Level 1 [within]:
##
## Latent Variables:
## Estimate Std.Err z-value P(>|z|)
## idleTime =~
## idleTimeFreq 1.000
## jdr =~
## workDemands01 1.000
## workDemands02 1.234 0.046 26.947 0.000
## workDemands03 1.200 0.045 26.902 0.000
## workDemands04 1.134 0.045 25.384 0.000
## workDemands05 0.785 0.042 18.737 0.000
## workDemands06 0.881 0.043 20.618 0.000
## workDemands07 0.928 0.043 21.620 0.000
## workDemands08 0.959 0.042 22.952 0.000
## atnmyWrkSchd01 0.426 0.042 10.252 0.000
## atnmyWrkSchd02 0.436 0.044 9.963 0.000
## atnmyWrkSchd03 0.453 0.045 10.169 0.000
## outcomes =~
## fatigue07 1.000
## fatigue08 1.020 0.017 59.906 0.000
## fatigue09 0.969 0.018 54.909 0.000
## workEngagmnt04 0.121 0.021 5.869 0.000
## workEngagmnt05 0.003 0.021 0.144 0.886
## workEngagmnt06 0.045 0.021 2.157 0.031
##
## Covariances:
## Estimate Std.Err z-value P(>|z|)
## idleTime ~~
## jdr -0.075 0.025 -2.987 0.003
## outcomes 0.035 0.038 0.927 0.354
## jdr ~~
## outcomes 0.214 0.015 14.580 0.000
##
## Variances:
## Estimate Std.Err z-value P(>|z|)
## .idleTimeFreq 0.000
## .workDemands01 0.318 0.011 29.973 0.000
## .workDemands02 0.295 0.011 27.258 0.000
## .workDemands03 0.391 0.013 29.021 0.000
## .workDemands04 0.327 0.011 29.058 0.000
## .workDemands05 0.491 0.015 32.342 0.000
## .workDemands06 0.422 0.013 31.587 0.000
## .workDemands07 0.395 0.013 31.156 0.000
## .workDemands08 0.377 0.012 30.699 0.000
## .atnmyWrkSchd01 0.425 0.012 34.076 0.000

```

```
##      .atnmyWrkSchd02      0.438      0.013      34.418      0.000
##      .atnmyWrkSchd03      0.429      0.012      34.524      0.000
##      .fatigue07          0.201      0.009      22.584      0.000
##      .fatigue08          0.159      0.008      19.048      0.000
##      .fatigue09          0.244      0.010      25.337      0.000
##      .workEngagmnt04      0.448      0.013      34.407      0.000
##      .workEngagmnt05      0.427      0.012      34.869      0.000
##      .workEngagmnt06      0.397      0.011      34.751      0.000
##      idleTime            2.201      0.066      33.374      0.000
##      jdr                  0.336      0.023      14.828      0.000
##      outcomes            0.829      0.030      27.807      0.000
```

```
##
```

```
##
```

```
## Level 2 [psID]:
```

```
##
```

```
## Latent Variables:
```

```
##      Estimate Std.Err z-value P(>|z|)
##      idleTime =~
##      idleTimeFreq      1.000
##      jdr =~
##      workDemands01      1.000
##      workDemands02      0.306      0.074      4.143      0.000
##      workDemands03      0.584      0.072      8.124      0.000
##      workDemands04      0.088      0.078      1.137      0.256
##      workDemands05      0.369      0.080      4.612      0.000
##      workDemands06      0.843      0.089      9.487      0.000
##      workDemands07      0.547      0.084      6.508      0.000
##      workDemands08      0.308      0.075      4.135      0.000
##      atnmyWrkSchd01     -2.258      0.196     -11.522      0.000
##      atnmyWrkSchd02     -2.400      0.205     -11.681      0.000
##      atnmyWrkSchd03     -2.427      0.208     -11.695      0.000
##      outcomes =~
##      fatigue07          1.000
##      fatigue08          1.123      0.046      24.392      0.000
##      fatigue09          1.079      0.051      21.171      0.000
##      workEngagmnt04     -2.221      0.178     -12.511      0.000
##      workEngagmnt05     -2.543      0.188     -13.510      0.000
##      workEngagmnt06     -2.578      0.194     -13.278      0.000
```

```
##
```

```
## Covariances:
```

```
##      Estimate Std.Err z-value P(>|z|)
##      idleTime ~~
##      jdr              -0.007      0.020     -0.324      0.746
##      outcomes          0.071      0.020      3.493      0.000
##      jdr ~~
##      outcomes          0.045      0.007      6.698      0.000
```

```
##
```

```
## Intercepts:
```

```
##      Estimate Std.Err z-value P(>|z|)
##      .idleTimeFreq      3.436      0.058     59.052      0.000
##      .workDemands01      3.036      0.025    123.059      0.000
```

```

##      .workDemands02      3.743      0.022    167.024      0.000
##      .workDemands03      3.221      0.023    139.117      0.000
##      .workDemands04      3.800      0.022    170.274      0.000
##      .workDemands05      2.479      0.026     95.922      0.000
##      .workDemands06      2.657      0.027     98.934      0.000
##      .workDemands07      3.293      0.027    122.692      0.000
##      .workDemands08      3.825      0.024    160.665      0.000
##      .atnmyWrkSchd01      3.526      0.027    130.657      0.000
##      .atnmyWrkSchd02      3.559      0.028    128.625      0.000
##      .atnmyWrkSchd03      3.587      0.027    131.404      0.000
##      .fatigue07           2.234      0.021    106.909      0.000
##      .fatigue08           2.177      0.022     98.940      0.000
##      .fatigue09           2.303      0.022    102.930      0.000
##      .workEngagmnt04      2.996      0.026    113.465      0.000
##      .workEngagmnt05      3.226      0.027    117.952      0.000
##      .workEngagmnt06      3.238      0.028    115.623      0.000
##
## Variances:
##      Estimate Std.Err z-value P(>|z|)
##      .idleTimeFreq      0.000
##      .workDemands01      0.286      0.022     13.288      0.000
##      .workDemands02      0.232      0.020     11.688      0.000
##      .workDemands03      0.216      0.020     10.878      0.000
##      .workDemands04      0.251      0.020     12.674      0.000
##      .workDemands05      0.421      0.029     14.721      0.000
##      .workDemands06      0.418      0.029     14.617      0.000
##      .workDemands07      0.463      0.029     15.953      0.000
##      .workDemands08      0.331      0.023     14.396      0.000
##      .atnmyWrkSchd01      0.012      0.008      1.555      0.120
##      .atnmyWrkSchd02     -0.025      0.006     -3.899      0.000
##      .atnmyWrkSchd03     -0.057      0.006    -10.051      0.000
##      .fatigue07           0.020      0.007      3.016      0.003
##      .fatigue08           0.042      0.007      5.968      0.000
##      .fatigue09           0.066      0.009      7.331      0.000
##      .workEngagmnt04      0.057      0.011      5.275      0.000
##      .workEngagmnt05     -0.031      0.008     -3.843      0.000
##      .workEngagmnt06     -0.005      0.009     -0.595      0.552
##      idleTime            2.639      0.155     16.996      0.000
##      jdr                 0.113      0.019      6.007      0.000
##      outcomes            0.102      0.015      6.577      0.000

```

Table S3d Measurement Model Test: Four Factors

```

## lavaan 0.6.17 ended normally after 144 iterations
##
## Estimator ML
## Optimization method NLMINB
## Number of model parameters 100
##
## Used Total
## Number of observations 3299 5415
## Number of clusters [psID] 1036
##
## Model Test User Model:
##
## Test statistic 5934.727
## Degrees of freedom 260
## P-value (Chi-square) 0.000
##
## Model Test Baseline Model:
##
## Test statistic 24147.008
## Degrees of freedom 306
## P-value 0.000
##
## User Model versus Baseline Model:
##
## Comparative Fit Index (CFI) 0.762
## Tucker-Lewis Index (TLI) 0.720
##
## Loglikelihood and Information Criteria:
##
## Loglikelihood user model (H0) -70678.501
## Loglikelihood unrestricted model (H1) -67711.137
##
## Akaike (AIC) 141557.002
## Bayesian (BIC) 142167.140
## Sample-size adjusted Bayesian (SABIC) 141849.395
##
## Root Mean Square Error of Approximation:
##
## RMSEA 0.081
## 90 Percent confidence interval - lower 0.080
## 90 Percent confidence interval - upper 0.083
## P-value H_0: RMSEA <= 0.050 0.000
## P-value H_0: RMSEA >= 0.080 0.891
##
## Standardized Root Mean Square Residual (corr metric):
##
## SRMR (within covariance matrix) 0.127
## SRMR (between covariance matrix) 0.222
##
## Parameter Estimates:
##

```

```

## Standard errors                                Standard
## Information                                    Observed
## Observed information based on                    Hessian
##
##
## Level 1 [within]:
##
## Latent Variables:
##      Estimate Std.Err z-value P(>|z|)
##      idleTime =~
##      idleTimeFreq      1.000
##      demand =~
##      workDemands01      1.000
##      workDemands02      0.936      0.050      18.735      0.000
##      workDemands03      1.194      0.057      21.120      0.000
##      workDemands04      0.865      0.051      17.090      0.000
##      workDemands05      0.995      0.059      16.830      0.000
##      workDemands06      1.066      0.060      17.900      0.000
##      workDemands07      0.963      0.055      17.515      0.000
##      workDemands08      0.784      0.050      15.594      0.000
##      autonom =~
##      atnmyWrkSchd01      1.000
##      atnmyWrkSchd02      1.268      0.047      26.749      0.000
##      atnmyWrkSchd03      1.249      0.047      26.787      0.000
##      outcomes =~
##      fatigue07           1.000
##      fatigue08           1.019      0.017      60.276      0.000
##      fatigue09           0.962      0.017      55.956      0.000
##      workEngagmnt04       0.085      0.021       4.096      0.000
##      workEngagmnt05      -0.047      0.021      -2.199      0.028
##      workEngagmnt06      -0.003      0.021      -0.165      0.869
##
## Covariances:
##      Estimate Std.Err z-value P(>|z|)
##      idleTime ~~
##      demand             -0.025      0.018      -1.422      0.155
##      autonom             0.025      0.015       1.643      0.100
##      outcomes            0.044      0.039       1.137      0.255
##      demand ~~
##      autonom             0.013      0.006       2.232      0.026
##      outcomes            0.229      0.017      13.329      0.000
##      autonom ~~
##      outcomes            -0.016      0.013      -1.242      0.214
##
## Variances:
##      Estimate Std.Err z-value P(>|z|)
##      .idleTimeFreq       0.000
##      .workDemands01       0.312      0.011      29.295      0.000
##      .workDemands02       0.337      0.012      28.513      0.000
##      .workDemands03       0.389      0.014      28.085      0.000
##      .workDemands04       0.359      0.012      29.753      0.000

```

```
##      .workDemands05      0.467      0.015      30.941      0.000
##      .workDemands06      0.396      0.013      29.689      0.000
##      .workDemands07      0.386      0.013      30.315      0.000
##      .workDemands08      0.397      0.013      30.798      0.000
##      .atnmyWrkSchd01      0.265      0.010      27.861      0.000
##      .atnmyWrkSchd02      0.179      0.010      17.520      0.000
##      .atnmyWrkSchd03      0.180      0.010      18.014      0.000
##      .fatigue07           0.202      0.009      22.778      0.000
##      .fatigue08           0.159      0.008      19.181      0.000
##      .fatigue09           0.245      0.010      25.566      0.000
##      .workEngagmnt04      0.446      0.013      34.488      0.000
##      .workEngagmnt05      0.425      0.012      34.912      0.000
##      .workEngagmnt06      0.394      0.011      34.816      0.000
##      idleTime             2.185      0.065      33.634      0.000
##      demand               0.186      0.016      11.351      0.000
##      autonom               0.185      0.012      15.383      0.000
##      outcomes              0.866      0.031      28.375      0.000
```

```
##
##
```

```
## Level 2 [psID]:
```

```
##
```

```
## Latent Variables:
```

```
##      Estimate Std.Err z-value P(>|z|)
##      idleTime =~
##      idleTimeFreq      1.000
##      demand =~
##      workDemands01      1.000
##      workDemands02      1.398      0.068      20.417      0.000
##      workDemands03      0.997      0.054      18.624      0.000
##      workDemands04      1.253      0.065      19.198      0.000
##      workDemands05      0.418      0.053       7.949      0.000
##      workDemands06      0.626      0.056      11.166      0.000
##      workDemands07      0.834      0.060      13.906      0.000
##      workDemands08      1.038      0.061      17.028      0.000
##      autonom =~
##      atnmyWrkSchd01      1.000
##      atnmyWrkSchd02      1.031      0.024      43.194      0.000
##      atnmyWrkSchd03      1.051      0.023      46.552      0.000
##      outcomes =~
##      fatigue07           1.000
##      fatigue08           1.150      0.058      19.943      0.000
##      fatigue09           1.111      0.065      17.070      0.000
##      workEngagmnt04      -2.833      0.289      -9.803      0.000
##      workEngagmnt05      -3.189      0.307     -10.397      0.000
##      workEngagmnt06      -3.247      0.317     -10.255      0.000
```

```
##
```

```
## Covariances:
```

```
##      Estimate Std.Err z-value P(>|z|)
##      idleTime ~~
##      demand              -0.123      0.037      -3.300      0.001
##      autonom              -0.034      0.048      -0.708      0.479
```

```

##      outcomes      0.055    0.017    3.296    0.001
## demand ~~
##      autonom      0.031    0.016    1.933    0.053
##      outcomes      0.004    0.005    0.796    0.426
##      autonom ~~
##      outcomes     -0.083    0.011   -7.401    0.000
##
## Intercepts:
##              Estimate Std.Err  z-value  P(>|z|)
## .idleTimeFreq      3.432    0.058   58.737    0.000
## .workDemands01      3.046    0.028  108.126    0.000
## .workDemands02      3.753    0.029  130.614    0.000
## .workDemands03      3.232    0.027  118.060    0.000
## .workDemands04      3.814    0.028  136.743    0.000
## .workDemands05      2.484    0.026   95.131    0.000
## .workDemands06      2.664    0.028   96.048    0.000
## .workDemands07      3.301    0.029  111.984    0.000
## .workDemands08      3.837    0.028  138.849    0.000
## .atnmyWrkSchd01      3.532    0.027  129.580    0.000
## .atnmyWrkSchd02      3.569    0.028  128.567    0.000
## .atnmyWrkSchd03      3.593    0.027  131.111    0.000
## .fatigue07          2.232    0.020  110.869    0.000
## .fatigue08          2.176    0.021  102.591    0.000
## .fatigue09          2.302    0.022  105.796    0.000
## .workEngagmnt04      2.998    0.027  112.828    0.000
## .workEngagmnt05      3.229    0.027  118.157    0.000
## .workEngagmnt06      3.241    0.028  115.561    0.000
##
## Variances:
##              Estimate Std.Err  z-value  P(>|z|)
## .idleTimeFreq      0.000
## .workDemands01      0.315    0.022   14.532    0.000
## .workDemands02      0.050    0.014    3.500    0.000
## .workDemands03      0.221    0.019   11.726    0.000
## .workDemands04      0.123    0.015    8.149    0.000
## .workDemands05      0.406    0.028   14.310    0.000
## .workDemands06      0.442    0.030   14.888    0.000
## .workDemands07      0.465    0.028   16.415    0.000
## .workDemands08      0.256    0.020   12.681    0.000
## .atnmyWrkSchd01      0.053    0.008    6.382    0.000
## .atnmyWrkSchd02      0.038    0.007    5.573    0.000
## .atnmyWrkSchd03     -0.001    0.006   -0.211    0.833
## .fatigue07          0.015    0.007    2.264    0.024
## .fatigue08          0.039    0.007    5.649    0.000
## .fatigue09          0.069    0.009    7.623    0.000
## .workEngagmnt04      0.053    0.011    5.003    0.000
## .workEngagmnt05     -0.030    0.008   -3.828    0.000
## .workEngagmnt06     -0.006    0.009   -0.697    0.486
## idleTime           2.673    0.157   17.061    0.000
## demand             0.315    0.032    9.930    0.000
## autonom             0.544    0.033   16.270    0.000

```

##	outcomes	0.065	0.013	5.039	0.000
----	----------	-------	-------	-------	-------

Table S3e Measurement Model Test: Five Factors

```

## lavaan 0.6.17 ended normally after 119 iterations
##
## Estimator ML
## Optimization method NLMINB
## Number of model parameters 108
##
## Used Total
## Number of observations 3299 5415
## Number of clusters [psID] 1036
##
## Model Test User Model:
##
## Test statistic 2488.230
## Degrees of freedom 252
## P-value (Chi-square) 0.000
##
## Model Test Baseline Model:
##
## Test statistic 24147.008
## Degrees of freedom 306
## P-value 0.000
##
## User Model versus Baseline Model:
##
## Comparative Fit Index (CFI) 0.906
## Tucker-Lewis Index (TLI) 0.886
##
## Loglikelihood and Information Criteria:
##
## Loglikelihood user model (H0) -68955.252
## Loglikelihood unrestricted model (H1) -67711.137
##
## Akaike (AIC) 138126.504
## Bayesian (BIC) 138785.453
## Sample-size adjusted Bayesian (SABIC) 138442.289
##
## Root Mean Square Error of Approximation:
##
## RMSEA 0.052
## 90 Percent confidence interval - lower 0.050
## 90 Percent confidence interval - upper 0.054
## P-value H_0: RMSEA <= 0.050 0.048
## P-value H_0: RMSEA >= 0.080 0.000
##
## Standardized Root Mean Square Residual (corr metric):
##
## SRMR (within covariance matrix) 0.036
## SRMR (between covariance matrix) 0.101
##
## Parameter Estimates:
##

```

```

## Standard errors                                Standard
## Information                                    Observed
## Observed information based on                    Hessian
##
##
## Level 1 [within]:
##
## Latent Variables:
##      Estimate Std.Err z-value P(>|z|)
## idleTime =~
##   idleTimeFreq      1.000
## demand =~
##   workDemands01      1.000
##   workDemands02      1.465    0.078   18.763   0.000
##   workDemands03      1.322    0.073   18.143   0.000
##   workDemands04      1.354    0.077   17.590   0.000
##   workDemands05      0.579    0.070    8.269   0.000
##   workDemands06      0.636    0.069    9.237   0.000
##   workDemands07      0.897    0.069   13.057   0.000
##   workDemands08      1.163    0.072   16.219   0.000
## autonom =~
##   atnmyWrkSchd01      1.000
##   atnmyWrkSchd02      1.258    0.047   27.017   0.000
##   atnmyWrkSchd03      1.235    0.046   26.975   0.000
## fatig =~
##   fatigue07           1.000
##   fatigue08           1.058    0.033   32.075   0.000
##   fatigue09           1.004    0.032   31.164   0.000
## engag =~
##   workEngagmnt04      1.000
##   workEngagmnt05      1.217    0.047   26.113   0.000
##   workEngagmnt06      1.053    0.039   26.794   0.000
##
## Covariances:
##      Estimate Std.Err z-value P(>|z|)
## idleTime ~~
##   demand             -0.041    0.013   -3.258   0.001
##   autonom              0.023    0.015    1.554   0.120
##   fatig                0.001    0.018    0.072   0.943
##   engag               -0.033    0.015   -2.130   0.033
## demand ~~
##   autonom             0.024    0.004    5.771   0.000
##   fatig                0.024    0.005    4.805   0.000
##   engag                0.005    0.004    1.313   0.189
## autonom ~~
##   fatig                0.001    0.006    0.208   0.835
##   engag                0.042    0.005    7.914   0.000
## fatig ~~
##   engag               -0.027    0.006   -4.382   0.000
##
## Variances:

```

##		Estimate	Std.Err	z-value	P(> z)
##	.idleTimeFreq	0.000			
##	.workDemands01	0.319	0.011	29.991	0.000
##	.workDemands02	0.280	0.011	24.736	0.000
##	.workDemands03	0.385	0.014	28.089	0.000
##	.workDemands04	0.315	0.011	27.372	0.000
##	.workDemands05	0.506	0.016	32.472	0.000
##	.workDemands06	0.439	0.014	32.063	0.000
##	.workDemands07	0.407	0.013	31.097	0.000
##	.workDemands08	0.373	0.013	29.704	0.000
##	.atnmyWrkSchd01	0.263	0.009	27.799	0.000
##	.atnmyWrkSchd02	0.179	0.010	18.040	0.000
##	.atnmyWrkSchd03	0.181	0.010	18.677	0.000
##	.fatigue07	0.208	0.009	22.589	0.000
##	.fatigue08	0.163	0.009	17.748	0.000
##	.fatigue09	0.247	0.010	24.171	0.000
##	.workEngagmnt04	0.257	0.010	26.874	0.000
##	.workEngagmnt05	0.150	0.010	15.094	0.000
##	.workEngagmnt06	0.189	0.009	21.914	0.000
##	idleTime	2.187	0.065	33.649	0.000
##	demand	0.107	0.011	10.000	0.000
##	autonom	0.189	0.012	15.482	0.000
##	fatig	0.282	0.015	19.030	0.000
##	engag	0.195	0.012	15.579	0.000

##

##

Level 2 [psID]:

##

Latent Variables:

##		Estimate	Std.Err	z-value	P(> z)
##	idleTime =~				
##	idleTimeFreq	1.000			
##	demand =~				
##	workDemands01	1.000			
##	workDemands02	0.912	0.041	21.977	0.000
##	workDemands03	0.941	0.040	23.738	0.000
##	workDemands04	0.792	0.041	19.276	0.000
##	workDemands05	0.832	0.057	14.509	0.000
##	workDemands06	1.048	0.062	16.898	0.000
##	workDemands07	0.908	0.054	16.846	0.000
##	workDemands08	0.676	0.041	16.534	0.000
##	autonom =~				
##	atnmyWrkSchd01	1.000			
##	atnmyWrkSchd02	1.032	0.024	42.646	0.000
##	atnmyWrkSchd03	1.055	0.023	45.867	0.000
##	fatig =~				
##	fatigue07	1.000			
##	fatigue08	1.045	0.018	58.922	0.000
##	fatigue09	0.988	0.020	49.163	0.000
##	engag =~				
##	workEngagmnt04	1.000			

```

##      workEngagmnt05      1.123      0.032      34.968      0.000
##      workEngagmnt06      1.178      0.034      35.050      0.000
##
## Covariances:
##              Estimate Std.Err  z-value  P(>|z|)
##  idleTime ~~
##      demand          -0.060      0.048     -1.259      0.208
##      autonom          -0.024      0.047     -0.504      0.614
##      fatig             0.174      0.053      3.251      0.001
##      engag            -0.132      0.044     -3.011      0.003
##  demand ~~
##      autonom          -0.053      0.020     -2.624      0.009
##      fatig             0.322      0.027     11.910      0.000
##      engag            -0.043      0.018     -2.327      0.020
##  autonom ~~
##      fatig            -0.165      0.024     -6.967      0.000
##      engag             0.212      0.021     10.164      0.000
##  fatig ~~
##      engag            -0.182      0.022     -8.247      0.000
##
## Intercepts:
##              Estimate Std.Err  z-value  P(>|z|)
##      .idleTimeFreq      3.435      0.058     58.900      0.000
##      .workDemands01      3.059      0.030    101.824      0.000
##      .workDemands02      3.765      0.028    134.646      0.000
##      .workDemands03      3.244      0.029    112.428      0.000
##      .workDemands04      3.820      0.027    142.246      0.000
##      .workDemands05      2.497      0.029     84.905      0.000
##      .workDemands06      2.678      0.032     84.351      0.000
##      .workDemands07      3.313      0.031    106.483      0.000
##      .workDemands08      3.843      0.027    144.057      0.000
##      .atnmyWrkSchd01      3.530      0.027    130.052      0.000
##      .atnmyWrkSchd02      3.566      0.028    129.029      0.000
##      .atnmyWrkSchd03      3.590      0.027    131.498      0.000
##      .fatigue07           2.264      0.029     78.130      0.000
##      .fatigue08           2.210      0.030     73.134      0.000
##      .fatigue09           2.333      0.030     78.236      0.000
##      .workEngagmnt04      3.005      0.027    112.547      0.000
##      .workEngagmnt05      3.221      0.027    117.575      0.000
##      .workEngagmnt06      3.241      0.028    115.382      0.000
##
## Variances:
##              Estimate Std.Err  z-value  P(>|z|)
##      .idleTimeFreq      0.000
##      .workDemands01      0.266      0.022     12.201      0.000
##      .workDemands02      0.199      0.019     10.589      0.000
##      .workDemands03      0.202      0.020     10.370      0.000
##      .workDemands04      0.238      0.019     12.369      0.000
##      .workDemands05      0.340      0.032     10.586      0.000
##      .workDemands06      0.305      0.035      8.646      0.000
##      .workDemands07      0.396      0.029     13.684      0.000

```

##	.workDemands08	0.310	0.022	14.145	0.000
##	.atnmyWrkSchd01	0.054	0.008	6.507	0.000
##	.atnmyWrkSchd02	0.038	0.007	5.590	0.000
##	.atnmyWrkSchd03	-0.002	0.006	-0.309	0.758
##	.fatigue07	0.010	0.006	1.636	0.102
##	.fatigue08	0.025	0.007	3.699	0.000
##	.fatigue09	0.061	0.009	6.981	0.000
##	.workEngagmnt04	0.118	0.011	10.790	0.000
##	.workEngagmnt05	0.045	0.009	4.904	0.000
##	.workEngagmnt06	0.038	0.010	3.936	0.000
##	idleTime	2.661	0.156	17.050	0.000
##	demand	0.500	0.041	12.105	0.000
##	autonom	0.536	0.033	16.167	0.000
##	fatig	0.673	0.038	17.507	0.000
##	engag	0.446	0.031	14.244	0.000

Table S4a: Workload Measurement Invariance

```
## ##### Nested Model Comparison #####
##
## Chi-Squared Difference Test
##
##           Df   AIC   BIC  Chisq Chisq diff    RMSEA Df diff Pr(>Chisq)
## fit.config1 100 72837 73573 2350.7
## fit.metric1 128 72804 73368 2372.9      22.236 0.000000      28      0.7703
## fit.scalar1 156 72767 73159 2392.1      19.169 0.000000      28      0.8928
## fit.strict1 188 72741 72938 2430.6      38.530 0.017346      32      0.1980
##
## ##### Model Fit Indices #####
##           chisq df pvalue rmsea   cfi   tli   srmr       aic       bic
## fit.config1 2350.666† 100   .000 .182 .805 .727 .081† 72837.460 73572.926
## fit.metric1 2372.901 128   .000 .161 .806 .787 .083 72803.696 73367.553
## fit.scalar1 2392.070 156   .000 .145 .806† .826 .083 72766.865 73159.113
## fit.strict1 2430.600 188   .000 .133† .806 .855† .084 72741.395† 72937.519†
##
## ##### Differences in Fit Indices #####
##           df rmsea   cfi   tli   srmr       aic       bic
## fit.metric1 - fit.config1 28 -0.021 0.000 0.060 0.002 -33.764 -205.373
## fit.scalar1 - fit.metric1 28 -0.015 0.001 0.039 0.000 -36.831 -208.439
## fit.strict1 - fit.scalar1 32 -0.013 -0.001 0.029 0.000 -25.470 -221.594
```

Table S4b: Work Scheduling Autonomy Measurement Invariance

```
## ##### Nested Model Comparison #####
##
## Chi-Squared Difference Test
##
##           Df    AIC    BIC   Chisq Chisq diff   RMSEA Df diff Pr(>Chisq)
## fit.config2  0 22568 22844  0.0000
## fit.metric2  8 22559 22786  7.1466      7.147 0.000000      8      0.5209
## fit.scalar2 16 22553 22730 16.6941      9.547 0.016888      8      0.2982
## fit.strict2 28 22597 22701 84.7887     68.095 0.083022     12 7.265e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## ##### Model Fit Indices #####
##           chisq df pvalue rmsea   cfi    tli  srmr      aic      bic
## fit.config2  .000†      NA .000† 1.000  1.000  .000† 22567.983 22843.782
## fit.metric2  7.147   8   .521 .000† 1.000† 1.000† .013 22559.129 22785.898
## fit.scalar2 16.694  16   .406 .008  1.000  1.000  .016 22552.677† 22730.414
## fit.strict2 84.789  28   .000 .055   .992  0.996  .018 22596.771 22700.962†
##
## ##### Differences in Fit Indices #####
##           df rmsea   cfi    tli  srmr      aic      bic
## fit.metric2 - fit.config2  8 0.000  0.000  0.000 0.013 -8.853 -57.884
## fit.scalar2 - fit.metric2  8 0.008  0.000  0.000 0.003 -6.453 -55.484
## fit.strict2 - fit.scalar2 12 0.047 -0.008 -0.004 0.003 44.095 -29.452
```

Table S4c: Exhaustion Measurement Invariance

```
## ##### Nested Model Comparison #####
##
## Chi-Squared Difference Test
##
##           Df    AIC    BIC   Chisq Chisq diff   RMSEA Df diff Pr(>Chisq)
## fit.config3  0 22699 22974  0.0000
## fit.metric3  8 22690 22916  7.1494      7.149 0.000000      8      0.5206
## fit.scalar3 16 22681 22859 14.6244      7.475 0.000000      8      0.4863
## fit.strict3 28 22706 22810 63.2733     48.649 0.067616     12 2.409e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## ##### Model Fit Indices #####
##           chisq df pvalue rmsea   cfi    tli  srmr      aic      bic
## fit.config3  .000†      NA .000† 1.000  1.000  .000† 22698.730  22973.847
## fit.metric3  7.149   8   .521 .000† 1.000† 1.000† .012  22689.879  22916.087
## fit.scalar3 14.624  16   .552 .000† 1.000† 1.000  .014  22681.354† 22858.652
## fit.strict3 63.273  28   .000 .043  0.995  0.998  .014  22706.003  22809.936†
##
## ##### Differences in Fit Indices #####
##           df rmsea   cfi    tli  srmr      aic      bic
## fit.metric3 - fit.config3  8 0.000  0.000  0.000 0.012 -8.851 -57.760
## fit.scalar3 - fit.metric3  8 0.000  0.000  0.000 0.002 -8.525 -57.435
## fit.strict3 - fit.scalar3 12 0.043 -0.005 -0.003 0.000 24.649 -48.716
```

Table S4d: Work Engagement Measurement Invariance

```
## ##### Nested Model Comparison #####
##
## Chi-Squared Difference Test
##
##           Df    AIC    BIC   Chisq Chisq diff   RMSEA Df diff Pr(>Chisq)
## fit.config4  0 22657 22931  0.0000
## fit.metric4  8 22643 22869  2.5629    2.5629 0.000000      8    0.95873
## fit.scalar4 16 22643 22820 18.6130    16.0501 0.038952      8    0.04167 *
## fit.strict4 28 22644 22748 43.3909    24.7779 0.040070     12    0.01591 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## ##### Model Fit Indices #####
##           chisq df pvalue rmsea   cfi   tli  srmr       aic       bic
## fit.config4  .000†      NA .000† 1.000  1.000 .000† 22656.490 22931.283
## fit.metric4  2.563    8   .959 .000† 1.000† 1.002† .009 22643.053† 22868.994
## fit.scalar4 18.613   16   .289 .016  1.000  1.000 .015 22643.103 22820.192
## fit.strict4 43.391   28   .032 .029  0.998  0.999 .016 22643.881 22747.691†
##
## ##### Differences in Fit Indices #####
##           df rmsea   cfi   tli  srmr       aic       bic
## fit.metric4 - fit.config4  8 0.000  0.000  0.002 0.009 -13.437 -62.289
## fit.scalar4 - fit.metric4  8 0.016  0.000 -0.002 0.006  0.050 -48.802
## fit.strict4 - fit.scalar4 12 0.013 -0.002 -0.001 0.001  0.778 -72.500
```

Table S5: Three-Way-Interaction: Idle Time, Autonomy, and Workload

<i>Predictors</i>	fatigue Emo			emotional Engagement		
	<i>Estimates</i>	<i>CI</i>	<i>p</i>	<i>Estimates</i>	<i>CI</i>	<i>p</i>
(Intercept)	2.277	2.229 – 2.326	<0.001	3.157	3.111 – 3.203	<0.001
idleTimeFreq pmc	0.005	-0.011 – 0.022	0.527	-0.016	-0.031 – -0.001	0.041
idleTimeFreq persMC	0.056	0.030 – 0.082	<0.001	-0.036	-0.060 – -0.011	0.004
workDemands pmc	0.249	0.187 – 0.311	<0.001	0.007	-0.048 – 0.062	0.803
workDemands persMC	0.541	0.471 – 0.611	<0.001	-0.004	-0.070 – 0.061	0.900
autonomyWorkScheduling pmc	-0.015	-0.059 – 0.029	0.503	0.158	0.118 – 0.197	<0.001
autonomyWorkScheduling persMC	-0.237	-0.296 – -0.178	<0.001	0.352	0.297 – 0.408	<0.001

idleTimeFreq pmc × workDemands pmc	0.033	-0.019 – 0.085	0.213	-0.017	-0.064 – 0.030	0.468
idleTimeFreq persMC × workDemands persMC	-0.005	-0.039 – 0.029	0.777	0.083	0.051 – 0.115	<0.001
idleTimeFreq pmc × autonomyWorkScheduling pmc	-0.045	-0.081 – -0.009	0.013	-0.056	-0.088 – -0.023	0.001
idleTimeFreq persMC × autonomyWorkScheduling persMC	-0.001	-0.030 – 0.029	0.965	-0.026	-0.054 – 0.002	0.068
workDemands pmc × autonomyWorkScheduling pmc	-0.082	-0.187 – 0.023	0.127	-0.001	-0.096 – 0.094	0.983
workDemands persMC × autonomyWorkScheduling persMC	-0.027	-0.096 – 0.043	0.451	0.034	-0.031 – 0.100	0.308
(idleTimeFreq pmc × workDemands pmc) × autonomyWorkScheduling pmc	0.001	-0.060 – 0.061	0.987	-0.087	-0.141 – -0.033	0.002
(idleTimeFreq persMC × workDemands persMC) × autonomyWorkScheduling persMC	-0.004	-0.035 – 0.027	0.810	0.036	0.007 – 0.065	0.016
Random Effects						
σ^2	0.35			0.29		
τ_{00}	0.49 _{psID}			0.45 _{psID}		
ICC	0.58			0.61		
N	1036 _{psID}			1036 _{psID}		
Observations	3299			3299		
Marginal R ² / Conditional R ²	0.198 / 0.665			0.150 / 0.670		

Figure S1: Johnson-Neyman Plot Idle Time × Autonomy at the Within-Person Level) → Exhaustion

```
## JOHNSON-NEYMAN INTERVAL
##
## When autonomyWorkScheduling_pmc is OUTSIDE the interval [-0.36, 1.25], the slope of idleTimeFreq_pmc is p < .05.
##
## Note: The range of observed values of autonomyWorkScheduling_pmc is [-3.13, 3.00]
```

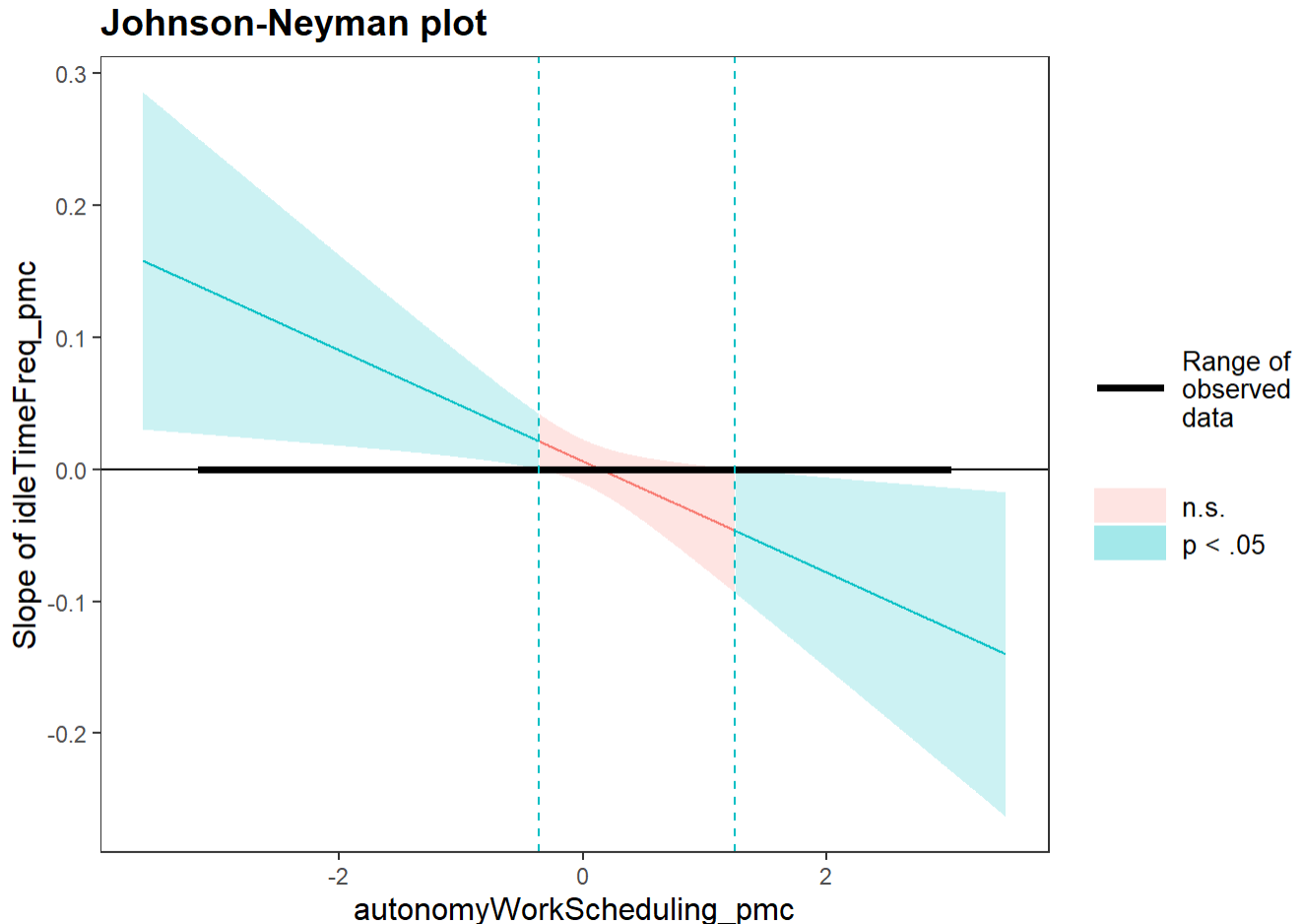


Figure S2: Johnson-Neyman Plot Idle Time × Autonomy at the Within-Person Level) → Engagement

```
## JOHNSON-NEYMAN INTERVAL
##
## When autonomyWorkScheduling_pmc is OUTSIDE the interval [-1.31, -0.06], the slope of idleTimeFreq_pmc is p < .05.
##
## Note: The range of observed values of autonomyWorkScheduling_pmc is [-3.13, 3.00]
```

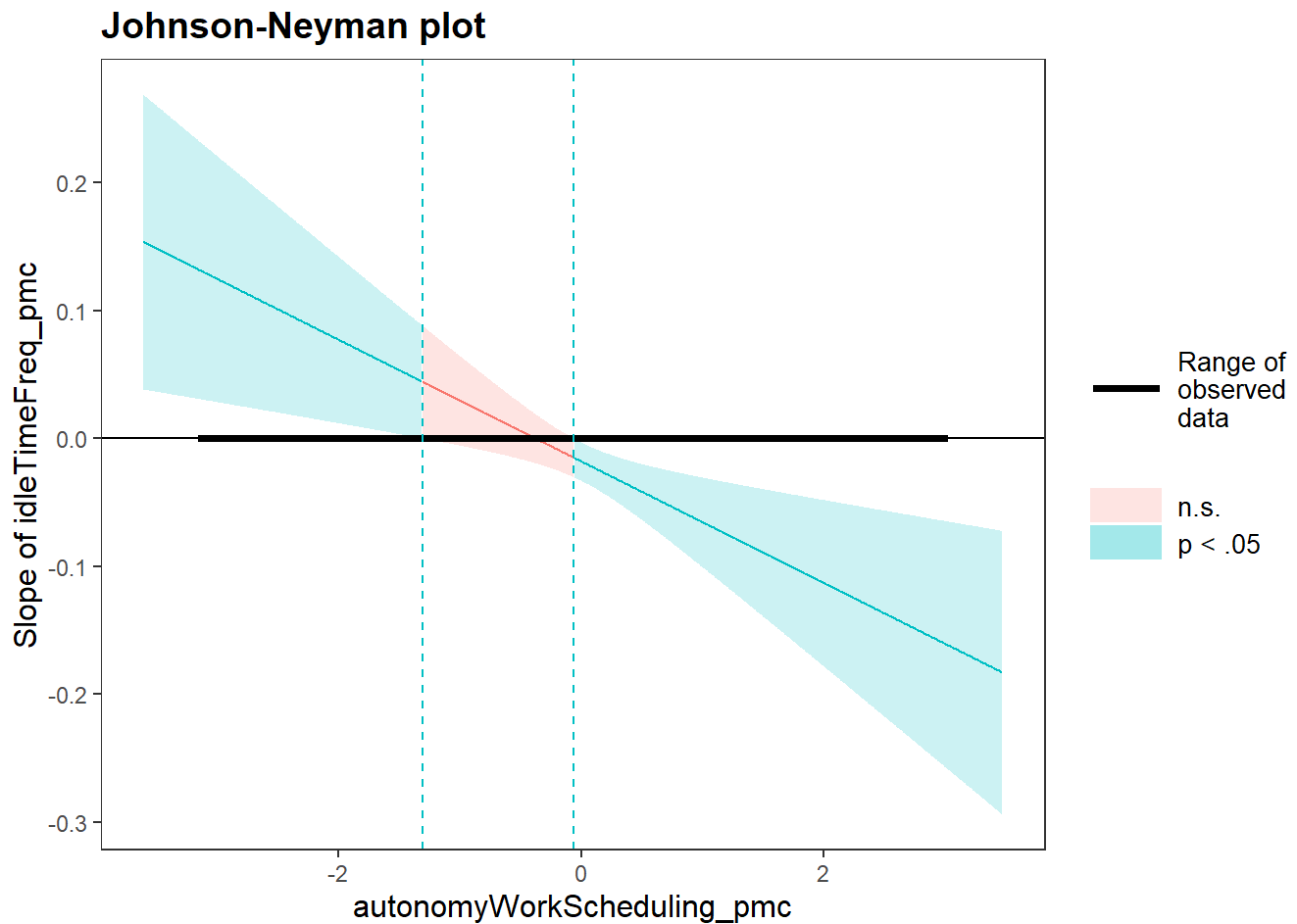


Figure S3: Johnson-Neyman Plot Idle Time × Autonomy at the Between-Person Level) → Engagement

```
## JOHNSON-NEYMAN INTERVAL
##
## When autonomyWorkScheduling_persMC is OUTSIDE the interval [-5.30, -0.26], the slope of id
leTimeFreq_persMC is p < .05.
##
## Note: The range of observed values of autonomyWorkScheduling_persMC is [-2.56, 1.44]
```

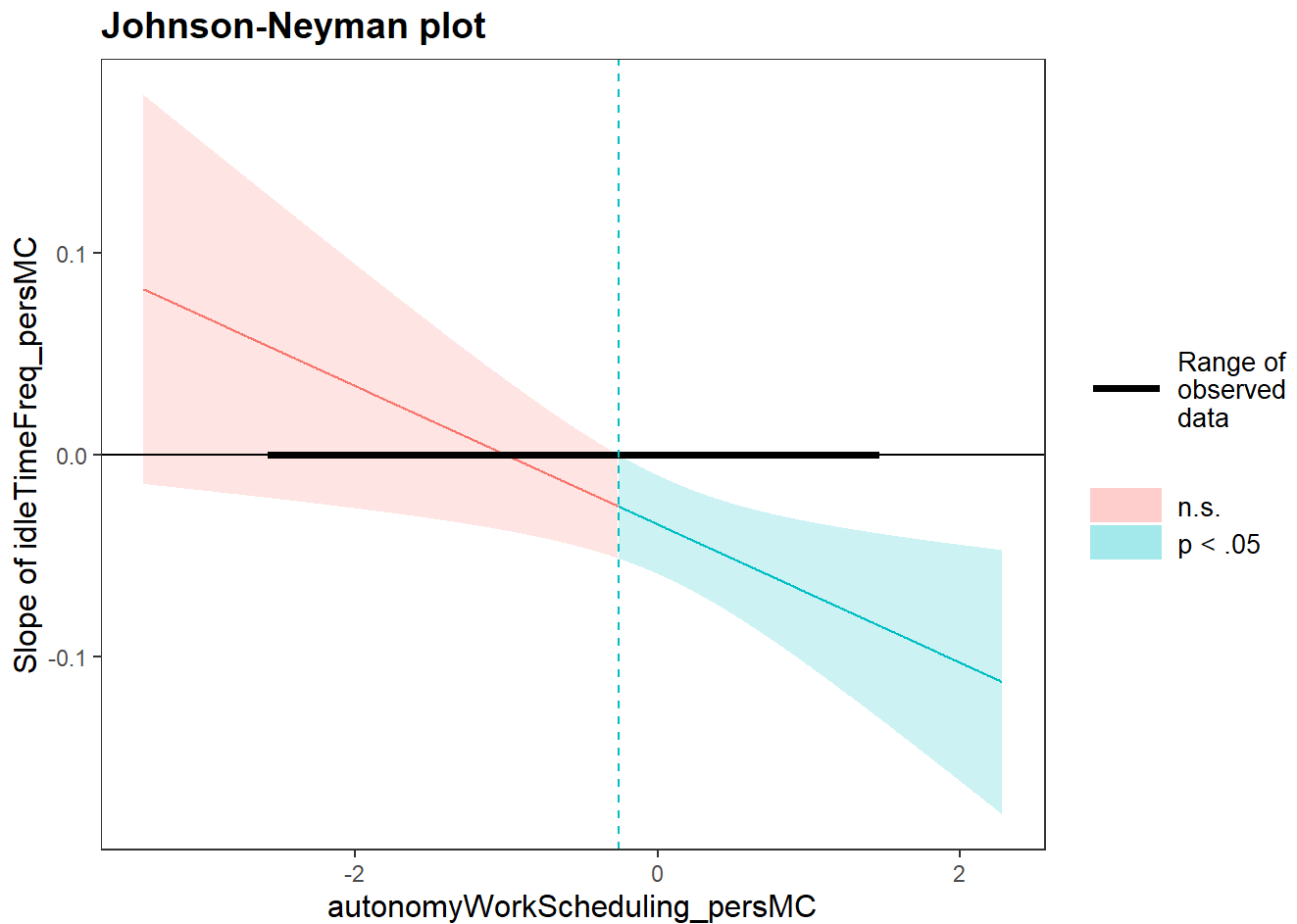


Figure S4: Johnson-Neyman Plot Idle Time × Workload at the Between-Person Level) → Engagement

```
## JOHNSON-NEYMAN INTERVAL
##
## When workDemands_persMC is OUTSIDE the interval [0.12, 0.92], the slope of idleTimeFreq_persMC is p < .05.
##
## Note: The range of observed values of workDemands_persMC is [-2.29, 1.71]
```

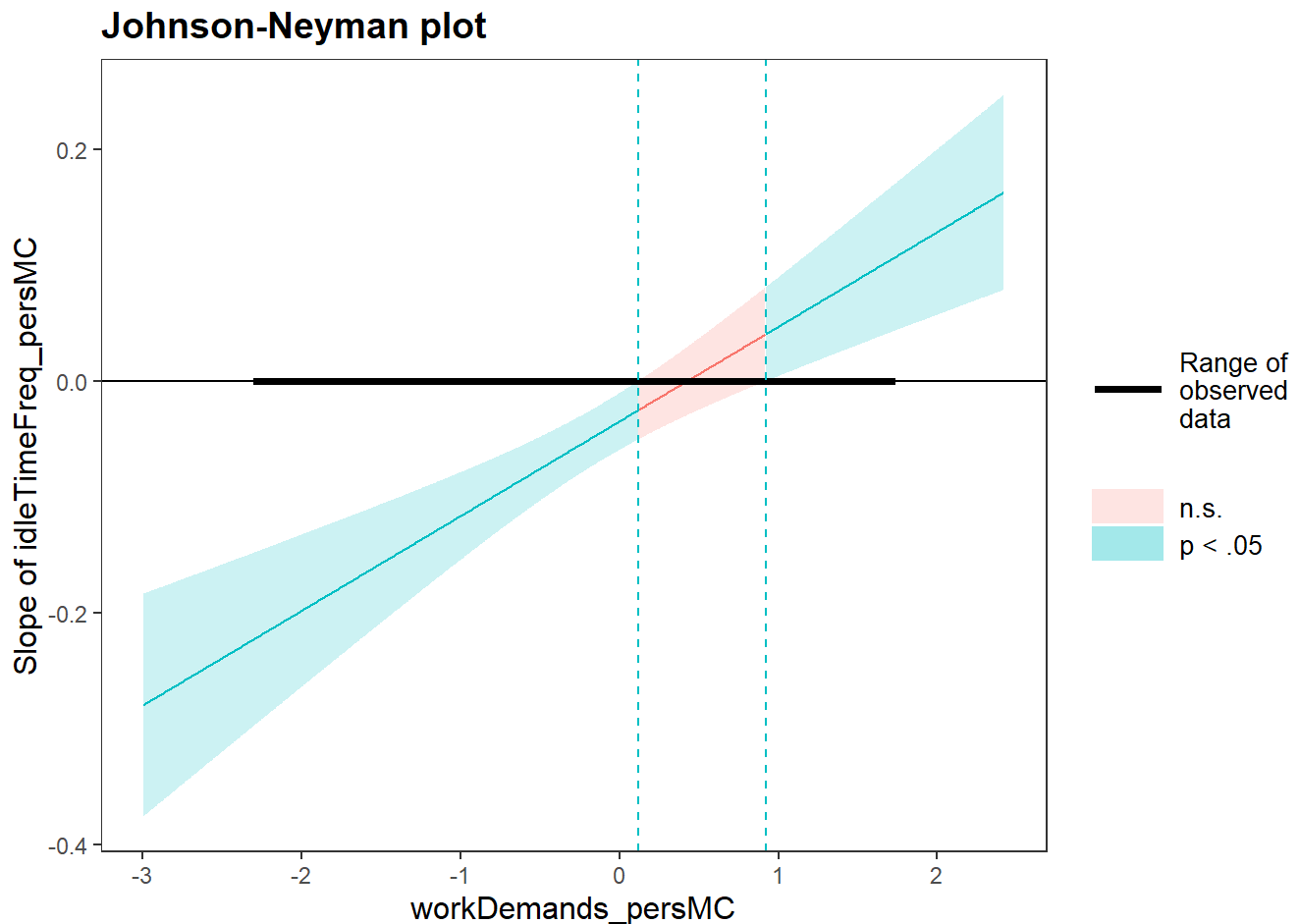


Figure S5: Interaction Plot for the Three-Way Interaction between Idle Time, Workload, and Autonomy at the Within-Person Level → Engagement

```
## Scale for y is already present.  
## Adding another scale for y, which will replace the existing scale.
```

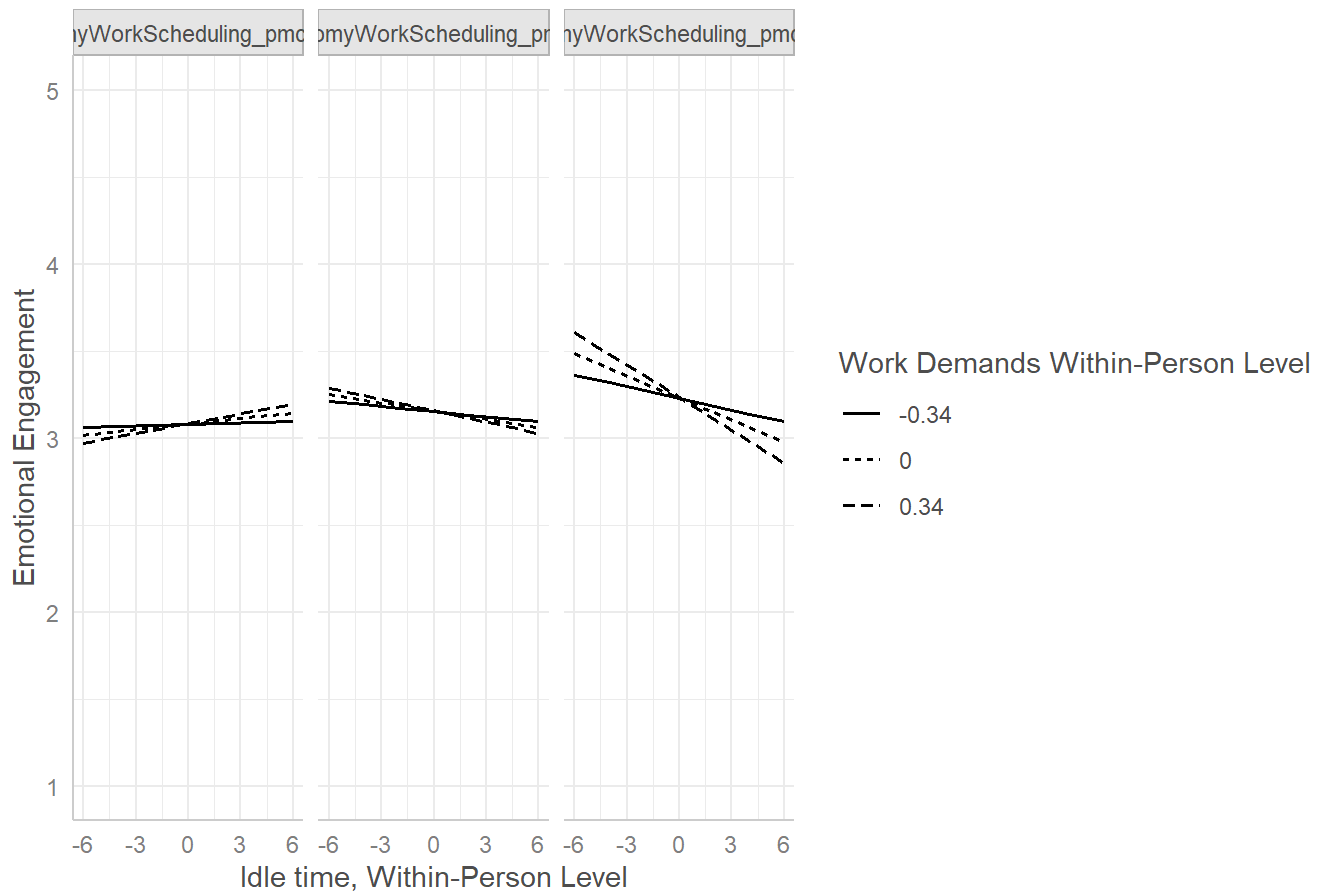


Figure S6: Interaction Plot for the Three-Way Interaction between Idle Time, Workload, and Autonomy at the Between-Person Level → Engagement

```
## Scale for y is already present.
## Adding another scale for y, which will replace the existing scale.
```

