

Typological measurement of complex, multidimensional constructs: The example of employment quality

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Motivation

The labor market has changed over recent decades

- Including general shift from secure toward more flexible employment

This trend not been adequately examined from a population health perspective

- Labor market experiences are socially distributed

How to operationalize employment relationship in epi analyses?

- The character of employment relationships is complex, multifaceted

Need rigorous, theoretically-meaningful measurement approaches



Outline

1/ Introduction

- What to measure? → Employment Quality (EQ)
- How to operationalize? → Typological measurement approach

2/ Two case studies examining patterns of EQ, health, and worker demographics

- Identifying patterns of EQ using latent class analysis
- Identifying trajectories of EQ using sequence analysis

3/ Discussion

- Strengths/Limitations



'De-standardization' of employment

Standard Employment Relationship (SER) as useful benchmark

- Permanent, ongoing contract
- Regularly scheduled, full-time hours
- Direct employment
- Adequate wages/benefits
- Social & economic protections
- Collective representation

Key insights for measurement of employment relationships:

1. Multiple dimensions are important
2. Modern arrangements can deviate from SER in numerous ways
3. Workers' experience employment arrangements as a package



Employment quality (EQ) construct

The contractual and relational aspects of the worker-employer relationship as determined by:

1. Employment stability
2. Material rewards
3. Workers' rights and social protection
4. Working time arrangements
5. Training and employability opportunities
6. Empowerment [or collective organization]
7. Interpersonal power relations



Worker health & well-being

- Self-reported health
- Mental health
- Occupational injury
- Job satisfaction

Dimensional measurement approaches

- Orders individuals along a continuum (e.g., wage level, precarious employment score)
- Assumes homogeneity with respect to variable-outcome relationship

Typological measurement approaches

- Prototypically class or cluster-based approaches
- Inherently multidimensional
- Assumes there is meaningful population heterogeneity with respect to the studied phenomena
- Emphasis on structure and distribution of simultaneously occurring conditions (i.e., “patterns”)
 - Identification of both typical and atypical patterns



Study 1: Identifying patterns of EQ in cross-sectional data

Peckham T, Fujishiro K, Hajat A, Flaherty BP, & Seixas N. 2019. Evaluating Employment Quality as a Determinant of Health in a Changing Labor Market. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 5(4), pp.258-281.



Data

General Social Survey

- Nationally representative, repeated cross-sectional survey
- Includes **Quality of Work Life module**
- Four waves of collection
 - 2002, 2006, 2010, 2014
- N = 5,125 currently-employed wage-earners

THE GENERAL SOCIAL SURVEY



Operationalization of EQ in GSS

| EQ Dimensions | Available Indicators |
|---|---|
| [1] Employment stability | [1] Employment contract/arrangement |
| [2] Material Rewards | [2] Income level |
| [3] Workers' rights & social protection | [3] Mandatory extra days of work* |
| [4] Working time arrangements | [4] Long working hours |
| | [5] Working times regularity |
| [5] Employability opportunities | [6] Opportunity to develop abilities |
| [6] Collective organization | [7] Have adequate training, equipment, information* |
| | [8] Union representation |
| [7] Interpersonal power relations | [9] Employee involvement |
| | [10] Control over schedule* |
| | [11] Subjected to harassment/abuse |

* EQ indicator is combination of two items

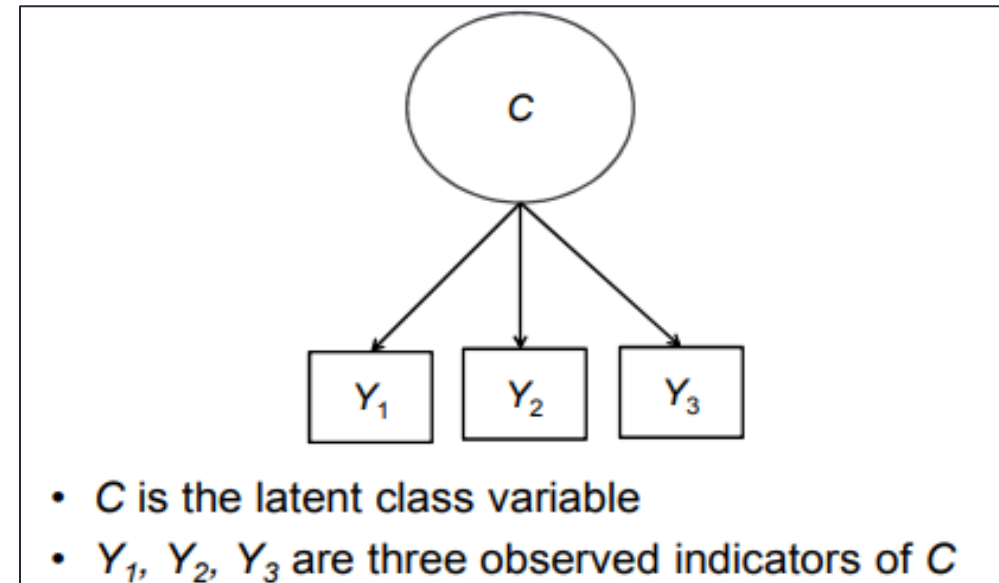


Latent class analysis approach

LCA identifies mutually exclusive and exhaustive latent subgroups

→ 'employment types' based on patterns of responses to 11 EQ indicators

- Model selection:
 - (1) fit statistics
 - (2) theoretical interpretation
- Assigns membership probabilities for each individual
 - Allows for specific estimation of classification error



Employment types among wage earners

| EQ Type Label | % of Wage Earners | Characteristics of EQ Types | | Health Status | | |
|--|-------------------|---|---|----------------------|--------------------------|---------------------|
| | | "High" Quality EQ Attributes | "Poor" Quality EQ Attributes | Self-reported health | Frequent mental distress | Occupational injury |
| Standard Employment Relationship (SER)-like | 26 | Permanent, full-time, adequate wages, regular working time arrangements, with opportunity to develop and good relations | | (ref) | (ref) | (ref) |
| Portfolio | 14 | Very high stability, pay, schedule control, opportunity, and strong power relations | Long hours | Better | ns | ns |
| Inflexible skilled | 14 | High pay and employee involvement | Long and excessive work hours and little control over schedule | ns | Worse | Worse |
| Dead-end | 17 | Stable, standard, full-time working arrangements with adequate wages | Very low opportunity and poor individual and collective power relations | Worse | Worse | Worse |
| Optimistic precarious | 12 | High opportunity to develop and strong interpersonal power relations | Non-standard arrangements with low wages | ns | ns | ns |
| Precarious | 18 | | Non-standard working arrangements, low wages, lack of opportunity, and poor individual and collective power relations | Worse | Worse | Worse |

Employment types among wage earners + health

| EQ Type Label | % of Wage Earners | Characteristics of EQ Types | | Health Status | | |
|--|-------------------|---|---|----------------------|--------------------------|---------------------|
| | | "High" Quality EQ Attributes | "Poor" Quality EQ Attributes | Self-reported health | Frequent mental distress | Occupational injury |
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| Portfolio | 14 | Very high stability, pay, schedule control, opportunity, and strong power relations | Long hours | Better | ns | ns |
| Inflexible skilled | 14 | High pay and employee involvement | Long and excessive work hours and little control over schedule | ns | Worse | Worse |
| Dead-end | 17 | Stable, standard, full-time working arrangements with adequate wages | Very low opportunity and poor individual and collective power relations | Worse | Worse | Worse |
| Optimistic precarious | 12 | High opportunity to develop and strong interpersonal power relations | Non-standard arrangements with low wages | ns | ns | ns |
| Precarious | 18 | | Non-standard working arrangements, low wages, lack of opportunity, and poor individual and collective power relations | Worse | Worse | Worse |

Robust Poisson regression, controlling for age, sex, race/ethnicity, nativity, education, survey year. ns = non-significant

Employment types among wage earners + demographics

| EQ Type Label | % of Wage Earners | Social and job-related correlates |
|---|-------------------|---|
| Standard Employment Relationship (SER)-like | 26 | Female; sales/office occupations; education/health industry |
| Portfolio | 14 | Older, white, male, highly educated; management and IT jobs |
| Inflexible skilled | 14 | Male, highly educated; education/health industry |
| Dead-end | 17 | Hispanic, immigrant, low education; transportation & manufacturing sectors |
| Optimistic precarious | 12 | Young and old, female, white; retail/service sectors |
| Precarious | 18 | Younger, female non-white, immigrant, low education; retail/service sectors |

Shading indicates significant associations of **better** or **worse** health status compared to the SER-like EQ type.

Employment types among wage earners + demographics (cont.)

| EQ Type Label | % of Wage Earners | Social and job-related correlates |
|---|-------------------|---|
| Standard Employment Relationship (SER)-like | 26 | Female; sales/office occupations; education/health industry |
| Portfolio | 14 | Older, white, male, highly educated; management and IT jobs |
| Inflexible skilled | 14 | Male, highly educated; education/health industry |
| Dead-end | 17 | Hispanic, immigrant, low education; transportation & manufacturing sectors |
| Optimistic precarious | 12 | Young and old, female, white; retail/service sectors |
| Precarious | 18 | Younger, female non-white, immigrant, low education; retail/service sectors |

Shading indicates significant associations of **better** or **worse** health status compared to the SER-like EQ type.

Study 2: Identifying trajectories of EQ in longitudinal data

Eisenberg-Guyot J, Peckham T, Andrea SB, Oddo V, Seixas N, & Hajat A. 2020. Life-course trajectories of employment quality and health in the US: a multichannel sequence analysis. *Social Science & Medicine*, 113327.



Data

Panel Survey of Income Dynamics

- Longitudinal study of American families and their descendants, beginning in 1968
- Economic, social, and health measures
- EQ variables available between: 1985 - 2017

Inclusion criteria (N = 31,313 adults):

- 20 years of follow-up, beginning ages 29-31
 - 90% observable data over study period
- N = 2,738



Operationalization of EQ in PSID

| EQ Dimensions | Available Indicators* |
|---|--|
| [1] Employment stability | [1] Unemployment in past year |
| [2] Material Rewards | [2] Income level [3] Employer-provided health insurance |
| [3] Workers' rights & social protection | |
| [4] Working time arrangements | [4] Working hours |
| [5] Employability opportunities | |
| [6] Collective organization | [5] Union representation |
| [7] Interpersonal power relations | [6] Self-employment status |

*Only available when currently employed.

Other possible states: 1) Self-employed, 2) Not in labor force (NILF), 3) Unemployed



Multichannel sequence analysis

Sequence analysis (SA) consist of two primary steps:

- 1) Compare trajectories (“sequences”) of discrete “states”
 - Similarity based on “cost” of transforming one sequence into another via substitution
- 2) Cluster analysis to identify similar employment trajectories over mid-career life course

In multichannel SA, this procedure occurs across multiple variables (“channels”) simultaneously

- Comparison of multistate sequences
(e.g., high income/no past-year unemployment/health insured/moderate working hours/union member)



Mid-career EQ trajectories among men

| EQ Trajectory Label | % of Men | Characteristics of EQ Trajectories | Health Status | |
|--------------------------------|----------|---|----------------------|---------------------|
| | | | Self-reported health | Mental illness (K6) |
| SER-like non-Union | 31% | Resembles stable SER employment with no union representation | (ref) | (ref) |
| SER-like Union | 16% | Stable, SER employment with union representation | ns | ns |
| Stably High-wage | 24% | Like SER-like non-union but with higher pay and longer hours | Better | Better |
| Wealthy Self-employed | 9% | Began as (high-wage) wage earners, but moved into self-employment as they aged | Better | ns |
| Poor Self-employed | 6% | Began as (precarious) wage laborers and moved into self-employment as they aged | ns | ns |
| Precariously employed | 8% | High unemployment, low pay, low hours, lacking employer health insurance, and no union representation | Worse | ns |
| Exiting the labor force | 6% | Began as wage laborers, but became Not in Labor Force (NILF) as they aged | Worse | Worse |

Mid-career EQ trajectories among men + health

| EQ Trajectory Label | % of Men | Characteristics of EQ Trajectories | Health Status | |
|--------------------------------|----------|---|----------------------|---------------------|
| | | | Self-reported health | Mental illness (K6) |
| SER-like non-Union | 31% | Resembles stable SER employment with no union representation | (ref) | (ref) |
| SER-like Union | 16% | Stable, SER employment with union representation | ns | ns |
| Stably High-wage | 24% | Like SER-like non-union but with higher pay and longer hours | Better | Better |
| Wealthy Self-employed | 9% | Began as (high-wage) wage earners, but moved into self-employment as they aged | Better | ns |
| Poor Self-employed | 6% | Began as (precarious) wage laborers and moved into self-employment as they aged | ns | ns |
| Precariously employed | 8% | High unemployment, low pay, low hours, lacking employer health insurance, and no union representation | Worse | ns |
| Exiting the labor force | 6% | Began as wage laborers, but became Not in Labor Force (NILF) as they aged | Worse | Worse |

Robust Poisson regression, controlling for gender, age, year, race, baseline education, baseline region, baseline marital status, childhood SES, baseline work disability, and baseline SRH. ns = non-significant

Mid-career EQ trajectories among men + demographics

| EQ Trajectory Label | % of Men | Social and job-related correlates |
|--------------------------------|----------|--|
| SER-like non-Union | 31% | |
| SER-like Union | 16% | |
| Stably High-wage | 24% | White; high education, family income, and marriage rate; low childhood poverty; managerial/professional jobs |
| Wealthy Self-employed | 9% | |
| Poor Self-employed | 6% | |
| Precariously employed | 8% | More men of color; lower levels of education, family income, and marriage rates; higher childhood poverty |
| Exiting the labor force | 6% | |

Shading indicates significant associations of **better** or **worse** health status compared to the SER-like EQ type.

Mid-career EQ trajectories among men + demographics (cont.)

| EQ Trajectory Label | % of Men | Social and job-related correlates |
|--------------------------------|----------|--|
| SER-like non-Union | 31% | |
| SER-like Union | 16% | |
| Stably High-wage | 24% | White; high education, family income, and marriage rate; low childhood poverty; managerial/professional jobs |
| Wealthy Self-employed | 9% | |
| Poor Self-employed | 6% | |
| Precariously employed | 8% | More men of color; lower levels of education, family income, and marriage rates; higher childhood poverty |
| Exiting the labor force | 6% | |

Shading indicates significant associations of **better** or **worse** health status compared to the SER-like EQ type.

Summarizing case studies

- Employment relations are a potentially important and understudied component of worker health/inequities
- In two studies using typological measures of EQ, we found:
 - Substantial heterogeneity in patterns/trajectories of employment
 - Different patterns/trajectories associated with health
 - EQ is unequally distributed across workforce



Limitations

- Fundamentally descriptive
- Not appropriate for rigorous causal inference interpretation
 - Violation of consistency and exchangeability assumptions
- Within-class heterogeneity remains

Strengths

- Empirically identify normative patterns of complex, multidimensional constructs
 - Develop richer understanding and testable hypotheses
- Workers experience employment relationships as a package
- Complimentary, not superior, to dimensional approaches!



THANK YOU!

Questions?

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Disclaimer:

The findings and conclusions are my own and do not necessarily represent the official position of NIOSH or NIH.

Extra slides



Employment vs. Work Quality

Work quality – the nature of work tasks and features of the actual physical & social environment in which work takes place

- Working conditions (e.g. physical, biochemical, psychosocial exposures)
- Job content (e.g. tasks)

Employment quality – contractual and relational aspects of the employer-employee relationship

- Determine type of contract, material benefits, hours and schedule, mobility opportunities, and workplace power dynamics, etc.

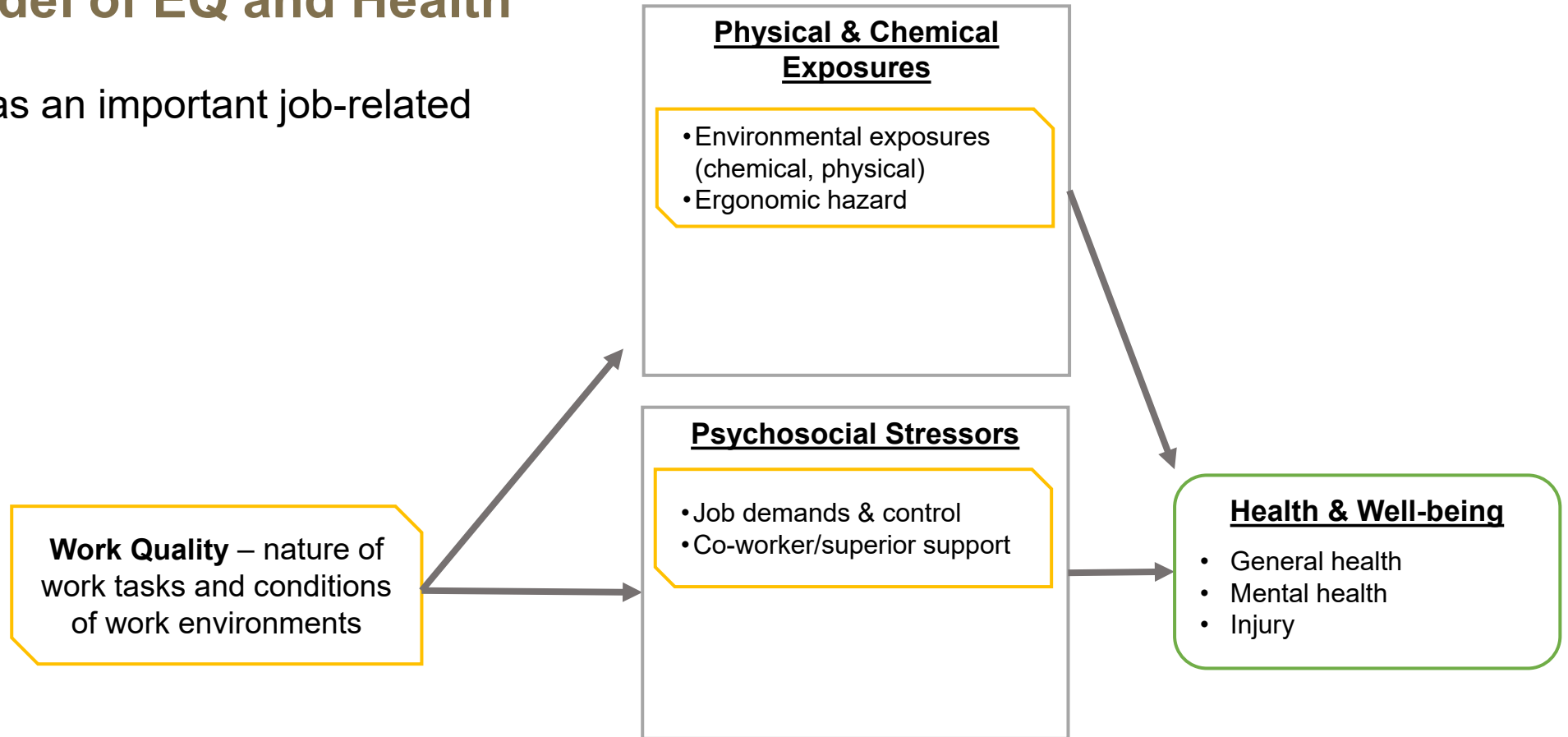


Job Quality

Conceptual Model of EQ and Health

1) Rooted in OH

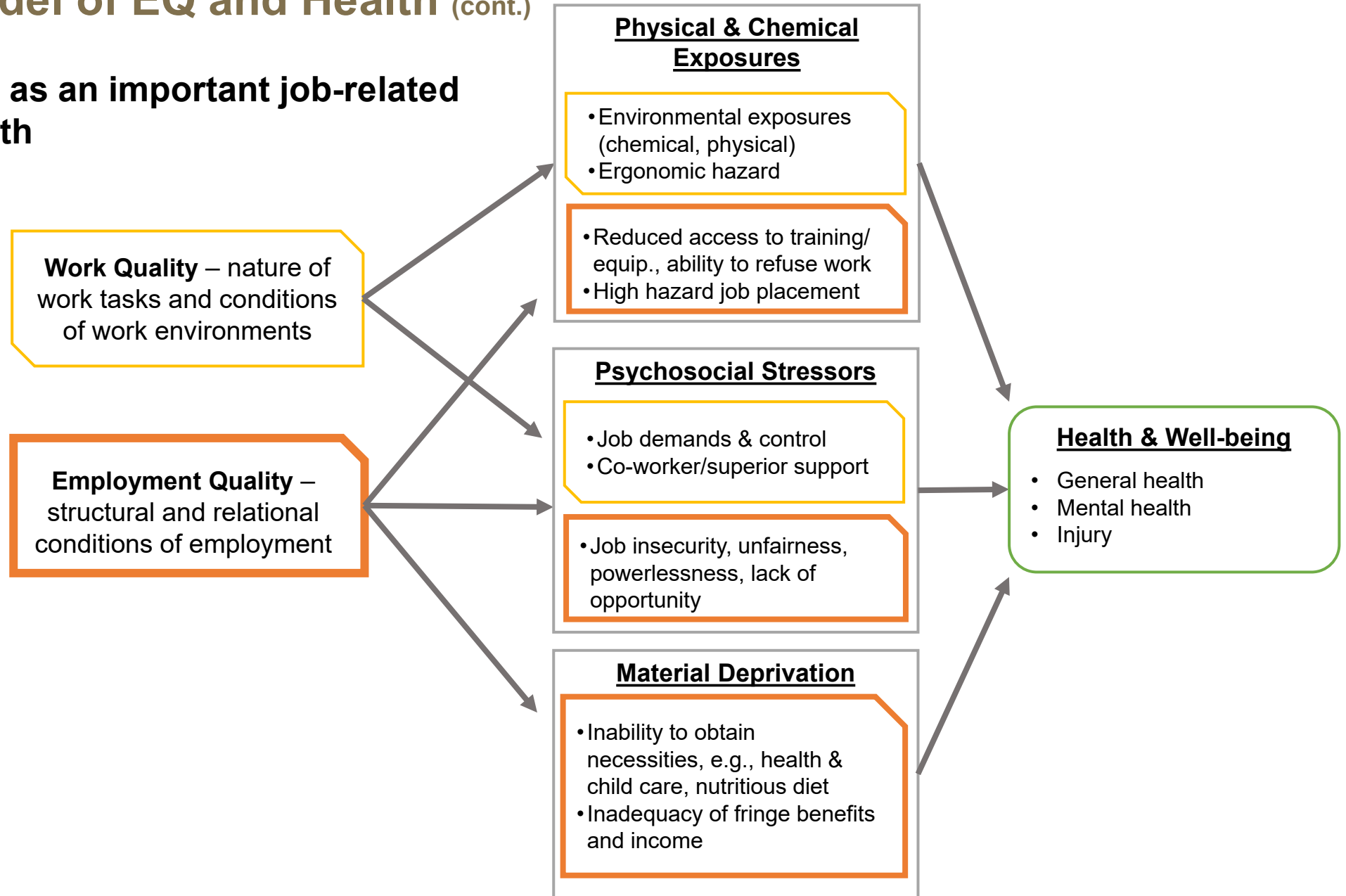
2) Integration of EQ as an important job-related determinant of health

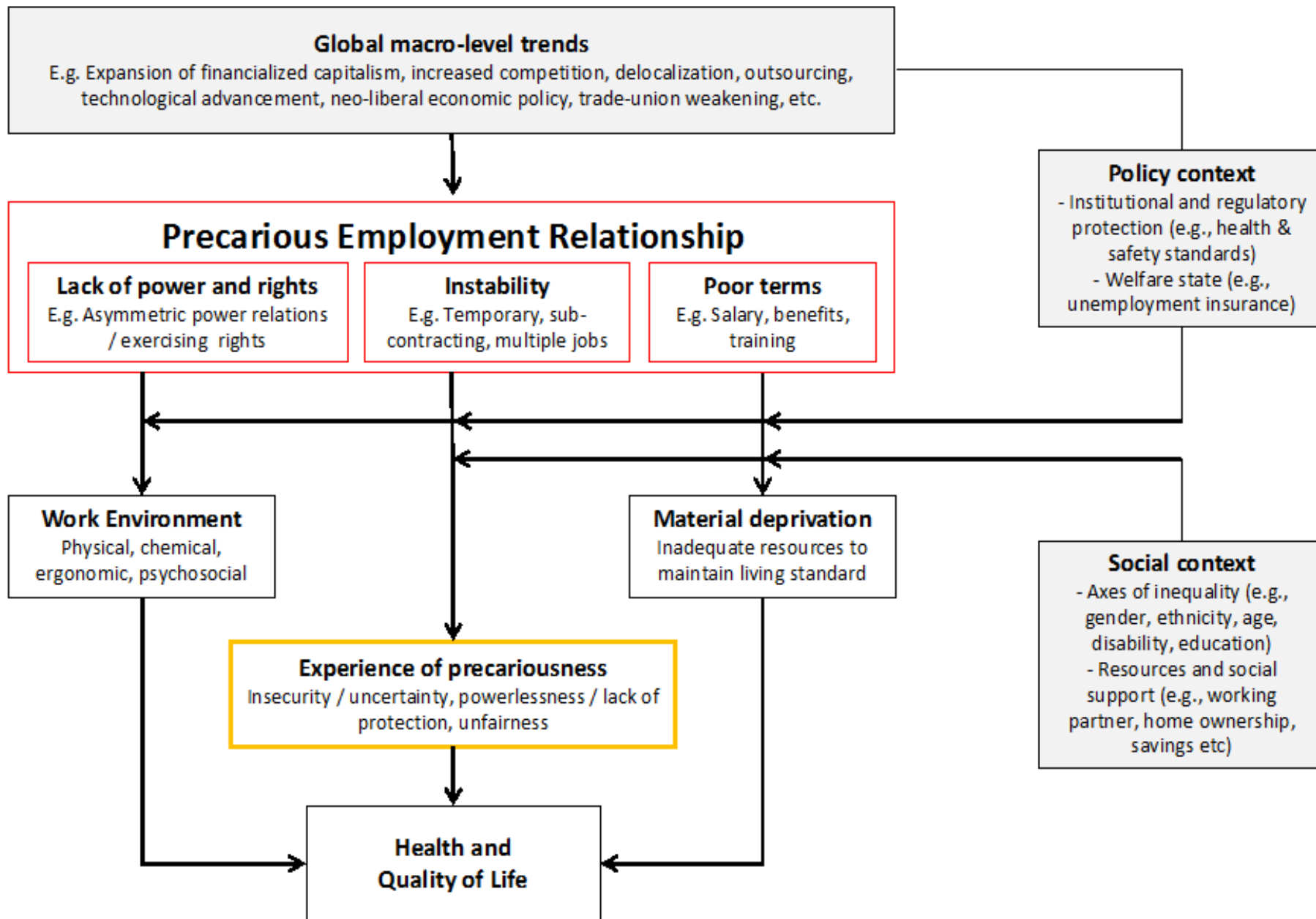


Conceptual Model of EQ and Health (cont.)

1) Rooted in OH

2) Integration of EQ as an important job-related determinant of health





Many definitions...
Many levels of analysis...

For OH research, we are focused at the level of the employment relationship

Figure 1: Theoretical framework for precarious employment

(Bodin et al. 2019)



Extra slides for Study 1: Identifying patterns of EQ in cross-sectional data

EQ associated with all 3 outcomes

| | Self-rated general health | Frequent mental distress | Workplace injury |
|-------------------------------------|---------------------------|--------------------------|-------------------------|
| <i>EQ typology</i> (ref. =SER-like) | | | |
| Portfolio | 0.62 (0.39-0.97) | 1.03 (0.60-1.75) | 0.85 (0.42-1.71) |
| Inflexible skilled | 0.75 (0.50-1.12) | 1.87 (1.20-2.91) | 3.61 (2.04-6.39) |
| Dead-end | 1.84 (1.31-2.57) | 2.76 (1.78-4.28) | 3.93 (2.21-7.00) |
| Precarious | 1.65 (1.15-2.37) | 2.59 (1.66-4.03) | 2.30 (1.25-4.25) |
| Optimistic precarious | 1.31 (0.90-1.89) | 1.58 (0.97-2.58) | 0.97 (0.46-2.05) |
| Skilled contractor | 1.13 (0.64-1.98) | 1.60 (0.79-3.25) | 2.26 (1.03-4.96) |
| Job-to-job | 1.03 (0.69-1.54) | 1.87 (1.16-3.03) | 2.12 (1.05-4.25) |
| AIC | 4252 | 3531.5 | 6663.4 |

Notes: Estimates (95% CI). Bolded: p value < 0.05. All models are adjusted for age, gender, race, nativity, education, and survey year. AIC: Akaike Information Criteria.

Peckham, Fujishiro, Hajat, Flaherty, Sexias. (2019). Evaluating employment quality as a determinant of health in a changing labor market. *Russell Sage Journal for the Social Sciences*.



Extra slides for Study 2: Identifying trajectories of EQ in longitudinal data

Table A7b. Prevalence among men of poor/fair self-rated health (SRH) or moderate mental illness (Kessler K6 \geq 5) among each cluster relative to the prevalence among SER-like non-union workers at the last observed wave of the sequence-analysis period and each wave thereafter.

| | Self-rated health | | | | | | Mental health | | | | | |
|---------------------------|----------------------|--------|------|----------------------|--------|------|----------------------|--------|------|----------------------|--------|------|
| | Model 1 ^b | | | Model 2 ^c | | | Model 1 ^b | | | Model 2 ^c | | |
| | Est. | 95% CI | | Est. | 95% CI | | Est. | 95% CI | | Est. | 95% CI | |
| SER-like non-union (ref.) | 1.00 | - | - | 1.00 | - | - | 1.00 | - | - | 1.00 | - | - |
| SER-like union | 0.78 | 0.52 | 1.18 | 0.86 | 0.56 | 1.31 | 0.72 | 0.45 | 1.15 | 0.75 | 0.47 | 1.20 |
| Stably high-wage | 0.40 | 0.25 | 0.63 | 0.52 | 0.30 | 0.87 | 0.42 | 0.27 | 0.63 | 0.40 | 0.26 | 0.63 |
| Wealthy self-employed | 0.50 | 0.30 | 0.84 | 0.63 | 0.36 | 1.12 | 0.68 | 0.40 | 1.16 | 0.67 | 0.38 | 1.17 |
| Poor self-employed | 1.12 | 0.64 | 1.93 | 1.12 | 0.67 | 1.90 | 1.12 | 0.64 | 1.99 | 1.12 | 0.63 | 1.98 |
| Precariously employed | 1.58 | 1.05 | 2.37 | 1.26 | 0.85 | 1.87 | 1.05 | 0.64 | 1.71 | 1.04 | 0.66 | 1.63 |
| Exiting the labor force | 2.87 | 2.09 | 3.94 | 2.49 | 1.84 | 3.38 | 1.62 | 1.04 | 2.52 | 1.59 | 1.02 | 2.48 |
| Observations | 4,582 | | | | | | 2,651 | | | | | |
| Respondents | 1,174 | | | | | | 759 | | | | | |
| Family clans | 811 | | | | | | 572 | | | | | |

Notes:

Estimates from Poisson generalized estimated equations with family-clan-level exchangeable correlation structure and cluster-robust standard errors. Models run on Panel Study of Income Dynamics data. Mental-health models exclude proxy respondents, who did not have K6 measurements.

^a Standard employment relationship.

^b Models adjusted for age and year.

^c Models adjusted for age, year, race, baseline education, baseline region, baseline marital status, childhood wealth, baseline work disability, and baseline SRH.

Mid-career EQ trajectories among women + health

| EQ Trajectory Label | % of Women | Characteristics of EQ Trajectories | Health Status | |
|--------------------------------------|------------|---|----------------------|---------------------|
| | | | Self-reported health | Mental illness (K6) |
| SER-like non-Union | 46% | Resembles stable SER employment with no union representation | (ref) | (ref) |
| Becoming Self-employed | 6% | Began as wage earners (low/moderate wages), but moved into self-employment as they aged | ns | ns |
| Returning to the labor market | 13% | Began as Not in Labor Force (NILF), but moved into wage labor as they aged (w/ low wages and health insurance) | Worse | ns |
| Precariously employed | 13% | High unemployment, low pay, low hours, lacking employer health insurance, and no union representation | ns | ns |
| Minimally attached | 19% | High levels of (precarious) wage laborer and unemployment at beginning of follow-up, but became NILF as they aged | Worse | Worse |

Mid-career EQ trajectories among women + demographics

| EQ Trajectory Label | % of Women | Social and job-related correlates |
|--------------------------------------|------------|--|
| SER-like non-Union | 46% | |
| Becoming Self-employed | 6% | High education, family income, and marriage rate; low childhood poverty; managerial/professional jobs |
| Returning to the labor market | 13% | |
| Precariously employed | 13% | More women of color; lower levels of education, family income, and marriage rates; higher childhood poverty; |
| Minimally attached | 19% | Southern U.S. |