

RESEARCH ARTICLE

Transitions Between Forms of Employment Quality and Associations With Self-Rated Health and Mental Health in the United States, 2008–2022

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ABSTRACT

Introduction: A growing body of research is focused on the association between employment quality (EQ) and health, yet few studies have explored how transitions between types of EQ impact health in the United States (U.S.). Moreover, unemployed individuals are frequently omitted from EQ studies. The objective of this study was to assess how transitions between different EQ states, including unemployment, are associated with health in the U.S.

Methods: Using U.S. Medical Expenditure Panel Survey data from 2008 to 2022 ($n = 71,957$; weighted $n = 126,312,273$), this study identified five unique EQ types for men: 1. Salaried-Intensive; 2. Standard Employment Relationship (SER)-like; 3. Standard but Economically Vulnerable; 4. Precarious; and 5. Unemployed, and four for women: 1. SER-like, Union; 2. SER-like, non-Union; 3. Precarious; and 4. Unemployed. The probability of transitioning between each EQ type was measured using latent transition analysis (LTA). The probability of reporting poor/fair self-rated health (SRH) and self-rated mental health (SRMH) within each EQ transition was measured descriptively and associations of poor/fair SRH or SRMH with each EQ type were measured using generalized estimating equations.

Results: Respondents transitioning to or from low-EQ arrangements (e.g., precarious employment or unemployment) reported poor/fair SRH and SRMH more frequently relative to high-EQ (e.g., SER-like) types. LTA results suggested some respondents cycled between precarious employment and unemployment, potentially compounding the effects of employment instability on health.

Conclusion: Improving employment conditions, particularly for those caught in cycles of precarious employment and unemployment, may be an avenue for improving population health in the U.S.

1 | Introduction

Employment is a fundamental determinant of population health, connecting workers to financial security, stability, and, in the United States (U.S.), access to health insurance [1].

Employment also offers social connections and a sense of belonging, thereby improving self-worth and self-esteem [2, 3]. Conversely, loss of employment has profound implications for physical and mental health, with transitions into

unemployment—particularly via involuntary job loss—being associated with several adverse health outcomes [4, 5].

Beyond being employed versus unemployed, the *quality* of workers' employment plays a critical role in shaping health outcomes [6]. Accordingly, a growing body of public health research has focused on employment quality (EQ), a multidimensional construct that captures a wide continuum of employment circumstances and represents an employment relationship's stability; financial adequacy; worktime arrangements; workplace rights and benefits (e.g., paid sick leave, paid vacation, health insurance); and collective organization [7, 8]. While these dimensions might influence health through distinct etiologies, researchers have stressed the importance of measuring EQ as a multidimensional construct, as workers experience the effects of EQ in totality, not as isolated exposures [7, 8]. Furthermore, components of EQ often cluster together in distinct groupings, or "EQ types", that reflect measurable patterns of EQ across the workforce [6–10].

Using typological EQ measures, researchers have identified the standard employment relationship (SER) as a high-EQ arrangement that is stable, provides moderate/high wages, and offers workplace benefits [7, 8]. In the U.S., the SER emerged as a common employment arrangement briefly after World War II, when the nation's economy faced little foreign competition; operated under a robust and growing framework of labor rights and protections; and had a high unionization rate, relative to contemporary standards [11]. On the low end of the EQ spectrum is precarious employment, often characterized as non-permanent, low wage, and providing few employment benefits [6–8, 12, 13]. While precarious employment relationships have likely existed in labor markets for centuries, research indicates their prevalence has increased in the U.S. since the post-World War II era's uniquely high EQ and particularly after the 2008 Great Recession and COVID-19 pandemic [14–16]. Additionally, the concept of precarious employment overlaps conceptually with informal employment, as both involve instability and limited protections; however, whereas informality refers to work conducted outside of labor regulations—which is often, but not always, precarious—sociological and epidemiological literature on precarious employment has primarily focused on poor-quality employment within formal arrangements [6–8].

Though prior studies have linked precarious and other low-EQ arrangements to poor health in the U.S., much of this research has been cross-sectional [6, 17]. This limits current understanding of the long-term health effects of low EQ, as well as knowledge on how often workers enter or exit precarious employment arrangements. While one recent U.S.-based study examined health associations with EQ transitions, it did not include unemployed individuals [10]. Given the well-established health risks associated with unemployment, [4, 5, 18] this gap in the literature restricts current knowledge of the interplay between EQ, unemployment, and health. To address these gaps, this study used a nationally representative panel survey to (1) identify unique EQ types in men and women and measure the probability of transitioning between them, and (2) examine associations between EQ transitions and self-rated health and mental health.

2 | Methods

This study used data from the U.S. Medical Expenditure Panel Survey (MEPS), a nationally representative panel survey administered by the U.S. Agency for Healthcare Research and Quality [19]. MEPS respondents provide information pertaining to health expenditures, employment arrangements, and health outcomes in five rounds over a 2-year period. Although MEPS collects data on self-employed workers, we excluded this group of workers because MEPS does not ask certain employment-related questions of self-employed respondents. We used MEPS panels 13–26, which contain data collected from respondents between 2008 and 2022. This timeframe is broadly representative of the period from the end of the Great Recession, which was theorized to have increased the prevalence of precarious employment in the U.S., [20, 21] to most recent data availability. This activity was reviewed by the U.S. Centers for Disease Control and Prevention (CDC), deemed to be research not involving human subjects, and was conducted consistent with applicable federal law and CDC policy.

2.1 | EQ Typology Construction

Our independent variable, a typological measure of EQ, was constructed using latent transition analysis (LTA), a longitudinal extension of latent class analysis (LCA). LTA identifies clusters of individuals with similar characteristics while also measuring the probability of transitioning between these clusters from one time point to another. LTA was conducted using the RStudio package "LMest," which fits latent Markov models to longitudinal data [22, 23]. Due to software limitations, MEPS survey weights could not be incorporated into LTA models.

EQ indicators used in our LTA were selected based on previously published literature, [7, 8] as well as consideration of what information was available in MEPS. EQ indicators were related to employment stability (is job temporary; is job seasonal; length of time at job); material rewards (hourly wage at job; payment structure at job); working time arrangements (hours worked per week); workplace benefits (employer offers insurance; employer offers paid sick leave or paid vacation; employer offers a pension or retirement plan); and collective organization (currently a union member) (Table 1). To include an unemployed type, each EQ indicator included a separate category, "unemployed," for any round at which a respondent was unemployed. Additionally, given the evidence that the character and distribution of EQ differs among men and women, [8, 24–26] LTA and subsequent analyses were performed separately for these groups.

Although best practices for LTA model selection recommend first fitting separate LCA models at each time point, [27] that was not practical in this study given the number of time points and sample stratification. However, simulation studies suggest that use of model fit indices and larger sample sizes (e.g., $n > 1000$) are protective against bias during LTA model selection; [28] our analytic samples met this criterion. Thus, LTA model selection was based on two model fit indices, Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC). Model selection was also informed by substantive interpretation of the conditional probabilities within individual clusters in each potential LTA model; only LTA solutions with

TABLE 1 | Employment quality (EQ) indicators and their operationalizations used to construct EQ types in a sample from the US Medical Expenditure Panel Survey (MEPS), 2008–2022.

EQ Dimension	EQ Indicator	Operationalization
Stability	Is job temporary?	Three categories: (1) Yes; (2) No; (3) Unemployed
	Is job seasonal?	Three categories: (1) Yes; (2) No; (3) Unemployed
	Length of time at job	Three categories: (1) ≤ 1 year; (2) > 1 year; (3) Unemployed
Material Rewards	Hourly wage at job	Four categories from panel-specific quartiles: (1) Low wage (Q1); (2) Moderate wage (Q2/Q3); (3) High wage (Q4); (4) Unemployed
	Payment structure at job	Three categories: (1) Salaried; (2) Non-salaried; (3) Unemployed
Working time arrangements	Hours worked per week	Four categories: (1) < 35 h/week; (2) 35–48 h/week; (3) > 48 h/week; (4) Unemployed
Workplace benefits	Employer offer insurance	Three categories: (1) Yes; (2) No; (3) Unemployed
	Employer offers paid sick leave or paid vacation	Three categories: (1) Yes; (2) No; (3) Unemployed
	Employer offers a pension plan	Three categories: (1) Yes; (2) No; (3) Unemployed
Collective organization	Currently a union member	Three categories: (1) Yes; (2) No; (3) Unemployed

Note: EQ indicators were selected based on previously selected literature,^a as well as consideration of what information is available in MEPS

^aPeckham T, Flaherty B, Hajat A, Fujishiro K, Jacoby D, Seixas N. What does non-standard employment look like in the United States? An empirical typology of employment quality. *Soc Indic Res.* Sep 2022;163(2):555–583. doi:10.1007/s11205-022-02907-8; Van Aerden K, Moors G, Levecque K, Vanroelen C. Measuring Employment Arrangements in the European Labour Force: A Typological Approach. *Soc Indic Res.* 2014;116(3):771–791. doi:10.1007/s11205-013-0312-0

one unemployed type were considered to prevent the emergence of non-informative unemployed types. Once an optimal LTA solution was identified, we evaluated longitudinal measurement invariance (i.e., that each EQ type is representative of the same construct over time) by inspecting round-specific conditional probabilities within each EQ type. Finally, based on interpretation of conditional probability output from each LTA compared to prior empirical research and theory, we assigned labels to individual EQ types that represented the distinct constellations of employment conditions that characterize workers' experiences within each category.

2.2 | Self-Rated Health and Self-Rated Mental Health

This study used two outcome measures, self-rated health (SRH) and self-rated mental health (SRMH). MEPS measures SRH and SRMH at each round of data collection using a Likert scale with response options of “poor,” “fair,” “good,” “very good,” and “excellent.” Aligning with previous research using these MEPS variables, [29] as well as previous studies on EQ and SRH using data with an identical Likert scale construction, [6, 17] these measures were dichotomized with levels of “poor/fair” and “good/very good/excellent.” Although these measures are self-reported, previous research indicates that SRH and SRMH correlate with objective physical health outcomes (including mortality) and validated mental health scales, respectively [30–32].

2.3 | Confounders

We included variables hypothesized to confound the relationship between EQ and SRH/SRMH, including age (18–34, 35–64, and ≥ 65 years), nativity status, family size, education (less than school/GED, high school/GED, 1–3 years of college, and

≥ 4 years of college), marital status, region, occupation, and industry. MEPS codes occupation and industry data to US Census occupation and industry coding standards [33].

2.4 | Analytic Sample

Using the RStudio package “MEPS” to extract data from AHRQ's publicly available data repository, [34] we created an initial sample of 101,394 employed respondents from MEPS panels 13–26. We excluded respondents who were not interviewed at one or more rounds; whose information was reported by a proxy; were aged < 18 years at round one; were unemployed at any round for any reason other than “can't find work” (e.g., going to school, retired); were missing employment status information at any round; or self-employed at any round of data collection. After applying these exclusion criteria, our final analytic sample included 71,957 MEPS respondents (Supporting Information S1: Figure 1), corresponding to 359,785 observations across five rounds of data. To account for missing data in our EQ indicators and confounding variables, all analyses, including LTA modeling, were conducted on five imputed datasets created using the RStudio package “amelia” and results were pooled using Rubin's rules [35, 36].

2.5 | Statistical Analysis

Descriptive statistics were calculated both overall and for each EQ type at baseline (i.e., MEPS round one). The probability of reporting poor/fair SRH and SRMH was calculated for each EQ type both at baseline and for each possible transition between EQ types; this longitudinal portion of the analysis used data from MEPS rounds 2–4 (287,828 total observations) because respondents' EQ type at a previous round was unavailable at baseline (i.e., round one, the start of data collection). We also estimated prevalence ratios (PR) with 95% confidence intervals

measuring the association of EQ type with poor/fair SRH or SRMH with EQ type using generalized estimating equations (GEEs) with a Poisson distribution and log link. To specifically assess the associations with transitions in and out of unemployment, employment status at the round immediately preceding a given observation (i.e., employed vs. unemployed) was included as an interaction term with current EQ type. This analysis was performed both on our entire analytic sample and on a sub-sample composed only of observations in which a respondent reported good/very good/excellent SRH and SRMH at the preceding round. GEEs used an exchangeable correlation structure and were adjusted for the potential confounders, as well as each respondent's MEPS panel. Race/ethnicity was reported as a descriptive statistic but was not included in multi-variable models. For unemployed respondents, their occupation at a previous round (or future round, where necessary) was used in GEEs. Industry was not included in GEEs given its high multicollinearity with occupation.

3 | Results

3.1 | Employment Quality Typology and Transition Probabilities

LTA identified five distinct EQ types for men and four for women (Table 2). For men, EQ types were labeled Salaried-Intensive (3.8% of overall sample); SER-like (23.0%); Standard but Economically Vulnerable (SEV; 11.1%); Precarious (10.1%); and Unemployed (3.4%). For women, types were labeled SER-like, Union (4.9%); SER-like, non-Union (25.2%); Precarious (15.0%); and Unemployed (3.4%). These LTA solutions exhibited the lowest AIC/BIC in each sample (Supporting information S1: Figure 2) and were conceptually coherent based on substantive author interpretation. The identification of SER-like and precarious employment types in both samples aligns with prior EQ research and theory, which commonly positions these categories as conceptual bookends representing high and low EQ, respectively [7, 8]. Other types are aligned with previously identified classes—such as our Salaried-Intensive and SEV classes being similar to prior studies' "Portfolio" and "Dead-end" types, respectively—but reflect slight variations in the combination EQ indicators [8, 10].

EQ types associated with mostly favorable employment features had a low probability of transitioning into another EQ type or becoming unemployed across both sexes (Figure 1A, B; Supporting Information S1: Table 2); very few transitions occurred between low and high-EQ states in both men and women. For example, Salaried-Intensive men and SER-like types in both sexes remained in their current EQ state $\geq 97\%$ of the time. Lower-EQ types had slightly lower probabilities of remaining in their current state, (e.g., 0.90 and 0.92 for Precarious men and women, respectively). Among the employed, those in precarious employment had the highest probability of transitioning into unemployment (0.07 for men, 0.06 for women). Among the unemployed, both men and women most often remained unemployed (0.44 for both) or transitioned into precarious employment (0.38 for men, 0.48 for women). Unemployed men sometimes transitioned to SEV (0.12) or SER-like (0.05) employment, but almost never directly to Salaried-Intensive employment (< 0.01). Unemployed women sometimes

transitioned to SER-like, non-Union employment (0.08), but rarely to SER-like, Union employment (0.01).

3.2 | Sociodemographic Characteristics and Self-Reported Health at Baseline

Our analytic sample (unweighted $n = 71,957$) was representative of 126,312,273 million U.S. workers employed between 2008 and 2022. The overall sample was 51.5% male, and a majority were aged 35–64; White, non-Hispanic; born in the U.S.; and married (Table 3). Mean family size was 2.9 members, and a majority of the sample had 1–3 years or 4 or more years of college education. In the overall sample, the most common occupations were Professional and Related Occupations; Management, Business, and Financial Operations; and Service Occupations; while most common industries of employment were Education, Health, and Social Services; Wholesale and Retail Trade; and Manufacturing.

Younger and older respondents made up a higher proportion of those in low-EQ types relative to high-EQ types. Relative to high-EQ types for both men and women, respondents in low-EQ types tended to be non-white, born outside of the U.S., have larger families, be non-college-educated, and be non-married. Among men, respondents in high-EQ types were concentrated in Management, Business, and Financial Operations and Professional and Related occupations. Women in high-EQ types also tended to cluster in Professional and Related occupations. Precarious types in both sexes had a relatively higher concentration of employment in Service occupations. By industry, a higher proportion of men in the Precarious type were employed in Construction and Leisure and Hospitality industries relative to higher-EQ types. A high proportion of women in each EQ type were employed in Education, Health, and Social Services industries.

At baseline, men in Salaried-Intensive (SRH = 5.1%; SRMH = 2.2%) and SER-like (SRH = 6.4%; SRMH = 2.8%) employment displayed the lowest probability of reporting poor/fair SRH/SRMH. In contrast, men in SEV (SRH = 9.7%; SRMH = 4.0%), Precarious (SRH = 9.7%; SRMH = 5.6%), or Unemployed (SRH = 8.9%; SRMH = 6.1%) types demonstrated higher probabilities of reporting poor/fair SRH/SRMH. For women, those in SER-like, Union (SRH = 8.4%; SRH = 4.3%) and SER-like, non-Union (SRMH = 7.3%; SRH = 3.5%) employment at baseline reported the lowest probabilities of poor/fair SRH and SRMH. Conversely, women in Precarious (SRH = 11.1%; SRMH = 6.2%) and Unemployed (SRH = 11.5%; SRMH = 8.1%) EQ types exhibited higher probabilities of reporting poor/fair SRH/SRMH.

3.3 | EQ Transitions and Self-Reported Health

Associations between EQ transitions and health outcomes suggest that both the starting point and the destination of transitions are important. Relative to transitions in or out of high-EQ types, transitions in or out of low-EQ types were generally associated with elevated probabilities of reporting poor/fair SRH/SRMH in the subsequent survey round (Figure 1B–F; Supporting Information S1: Table 2). For instance, men in Precarious employment displayed a higher probability of reporting poor/fair SRH/SRMH if they were

TABLE 2 | A multidimensional typology of employment quality (EQ) identified via latent transition analysis in a sample of men and women in the US Medical Expenditure Panel Survey (MEPS), 2008–2022.^a

EQ type	Characteristics	Proportion of overall sample at baseline
Men		
Salaried, Intensive	Respondents in this type were nearly all salaried workers (conditional probability = 0.99) with high wages (0.98) and long working hours (0.99). They had low probabilities of being temporary (0.01) or seasonal workers (0.01), a high probability of most workplace benefits, and a low probability of union membership (0.08). They had a very low probability of becoming unemployed (0.01) or transitioning to another EQ type between rounds.	0.038
Standard Employment Relationship (SER)-like	This type most closely resembled an SER. Respondents in this type were stably employed with a high probability of moderate wages (0.57) and moderate working hours (0.84). They had a moderate probability of being paid in a salaried structure (0.45) and a high probability of having most workplace benefits. While these respondents had an overall low probability of union membership (0.21), they had the highest probability of being union members of any EQ type in our sample of men. They also had a low probability of becoming unemployed (0.01) or transitioning to another EQ type.	0.230
Standard but Economically Vulnerable (SEV)	This type was similar to the SER-like type described above in terms of stability and many workplace benefits. However, these respondents had a higher probability of low wages (0.28) and low probability of having a pension or retirement plan through their employer (0.19). They also had a slightly higher probability of transitioning into unemployment (0.03) relative to respondents in the Salaried-Intensive or SER-like types.	0.111
Precarious	These respondents had low probabilities of reporting temporary (0.17) or seasonal work (0.13); however, their probabilities of reporting temporary or seasonal work were higher than the SER-like or SEV types. They also had a moderate probability of reporting low or medium wages; a high probability of non-salaried pay structures; and a low probability of reporting workplace benefits or union membership. This type had the highest probability (0.07) of transitioning into unemployment of any EQ type (other than “Unemployed”).	0.101
Unemployed	Respondents in this type had a zero probability of reporting employment-related levels of any EQ indicator. This EQ type had a moderate probability (0.44) of staying unemployed, a moderate probability of transitioning into the Precarious type (0.43), and a low probability of transitioning into the SEV, SER-like, or Salaried-Intensive types.	0.034
Women		
SER-like, Union	Respondents in this type were nearly all union members (conditional probability = 0.99). They also had low probabilities of temporary work (0.02), seasonal work (0.06), or being in their current position for less than or equal to one year (0.07). Moreover, these respondents had a moderate probability of salaried pay structure (0.46), a high probability of having either moderate (0.54) or high (0.39) hourly wages, and high probabilities of each workplace benefit. This type had a low	0.049

(Continues)

TABLE 2 | (Continued)

EQ type	Characteristics	Proportion of overall sample at baseline
SER-like, non-Union	probability of transitioning into unemployment (0.01) or a different EQ type. These respondents had employment arrangements similar to SER-like, Union type — high employment stability, moderate/high wages, and a high probability of many workplace benefits — but had a very low probability of union membership (< 0.01). This type had a low probability of transitioning into unemployment (0.02) or a different EQ type.	0.252
Precarious	These respondents had low probabilities of reporting temporary (0.11) or seasonal work (0.08); however, their probabilities of reporting temporary or seasonal work were higher than either SER-like type noted above. They also had a moderate probability of reporting low (0.62) or moderate (0.33) wages; a high probability of non-salaried pay structures (0.92); and a low probability of reporting workplace benefits or union membership (0.03). This type had the highest probability (0.06) of transitioning into unemployment of any EQ type (other than “unemployed”) identified within our sample of women.	0.150
Unemployed	Respondents in this type had a zero probability of reporting employment-related levels of any EQ indicator. This EQ type had a moderate probability (0.44) of staying unemployed, a moderate probability of transitioning into precarious employment (0.48), and a low probability of transitioning into the SER-like, Union (0.01) or SER-like, non-Union (0.02) types.	0.034

^a Conditional probabilities reflective of the distribution of each indicator within EQ types are presented in Supporting Information S1: Table 1.

previously employed in SEV (SRH = 9.6%; SRMH = 4.8%), Precarious (SRH = 8.1%; SRMH = 4.9%), or Unemployed (SRH = 8.2%; SRMH = 6.3%) (Figure 1C, E) EQ types relative to those previously in Salaried-Intensive (SRH = 1.9%; SRMH = 1.9%) or SER-like (SRH = 5.1%; SRMH = 4.0%) employment. Conversely, among men who transitioned *out* of Precarious employment, those who transitioned into Salaried-Intensive (SRH = 2.5%; SRMH = 0.7%) or SER-like (SRH = 3.9%; SRMH = 4.4%) employment had better health statuses than those who remained in the Precarious employment (SRH = 8.1%; SRMH = 5.0%) or transitioned into SEV (SRH = 5.5%; SRMH = 3.1%) or Unemployed (SRH = 11.9%; SRMH = 7.8%) EQ types. Similar gradients were observed seen for SRMH among unemployed men: those transitioning *from* Salaried-Intensive or SER-like employment had a lower probability of reporting poor/fair SRMH (4.9% and 6.7%, respectively) compared to those transitioning from SEV, Precarious, or Unemployed EQ types (7.2%, 7.8%, and 9.1%, respectively). Among previously unemployed men, those transitioning *into* Salaried-Intensive (SRH = 7.4%; SRMH = 5.2%) or SER-like (SRH = 6.2%; SRMH = 4.4%) employment had better health statuses than those who remained unemployed (SRH = 9.0%; SRMH = 9.1%) or transitioned into Precarious employment (SRH = 8.2%; SRMH = 7.8%).

Similar patterns were observed among women (Figure 1D, F). Those in Precarious employment who transitioned *from* the highest EQ SER-like, Union employment displayed a lower probability of reporting either poor/fair SRH (4.2%) or SRMH (3.4%) when compared to those transitioning from the SER-like,

non-Union (SRH = 9.5%; SRMH = 10.3%); Precarious (SRH = 9.4%; SRMH = 6.5%); or Unemployed (11.3%; 8.5%) EQ types. Among women in the Unemployed EQ type, those transitioning *from* Precarious employment displayed the highest probability of reporting either poor/fair SRH (12.5%) or SRMH (10.9%), compared to lower probabilities in those transitioning from SER-like, Union (SRH = 9.7%, SRMH = 5.1%); SER-like, non-Union (SRH = 8.9%; SRMH = 9.3%); or Unemployed (SRH = 11.0%; SRMH = 9.8%) EQ types. Among those transitioning out of the Unemployed EQ type, those transitioning into higher EQ SER-like, Union (SRH = 8.6%; SRMH = 2.6%) and SER-like, non-Union (SRH = 7.5%; SRMH = 5.2%) employment had lower probabilities reporting poor health relative to those transitioning into Precarious employment (SRH = 11.3%; SRMH = 8.5%) or remaining unemployed (SRH = 11.0%; SRMH = 9.8%).

Among men, there was a significant association between poor/fair SRH and employment in SEV (Adjusted PR = 1.33; 95% CI = 1.19–1.49), Precarious (Adjusted PR = 1.42; 95% CI = 1.28–1.57), and Unemployed (Adjusted PR = 1.89; 95% CI = 1.65–2.17) types compared to those in SER-like employment. Similarly, an association between poor/fair SRMH and EQ was observed among men in SEV (Adjusted PR = 1.30; 95% CI = 1.13–1.49), Precarious (Adjusted PR = 1.56; 95% CI = 1.35–1.82), and Unemployed (Adjusted PR = 2.10; 95% CI = 1.76–2.51) types. There was no significant association with poor/fair SRH or SRMH observed among men in Salaried, Intensive employment. Among women, there was a significant association with poor/fair SRH those employed in SER-like,

TABLE 3 | Descriptive statistics of the analytic sample used in this study using data from the US Medical Expenditure Panel Survey (MEPS) from 2008 to 2022, both overall and by sex and employment quality (EQ) type.

Characteristic	Men					Women				
	Overall Weighted N = 126,312,273	Salaried- Intensive Weighted N = 4,842,728	SER-like Weighted N = 29,008,123	SEV Weighted N = 14,076,183	Precarious Weighted N = 12,750,718	Unemployed Weighted N = 4,346,031	SER-like, Union Weighted N = 6,176,802	SER-like, Non- Union Weighted N = 31,808,090	Precarious Weighted N = 18,984,955	Unemployed Weighted N = 4,318,644
Age										
18-34	38.1	20.1	28.8	41.3	54.2	70.8	22.4	30.4	47.4	67.1
35-64	58.4	78.1	69.3	54.6	38.6	27.3	75.3	67.2	46.1	30.6
>= 65	3.5	1.8	1.9	4.1	7.2	1.9	2.3	2.4	6.5	2.3
Sex										
Male	51.5	100.0	100.0	100.0	100.0	100.0	0.0	0.0	0.0	0.0
Female	48.5	0.0	0.0	0.0	0.0	0.0	100.0	100.0	100.0	100.0
Race/Ethnicity										
Asian only, non-Hispanic	6.0	5.9	6.4	5.8	5.0	6.4	6.1	6.2	5.2	7.8
Black/African American only, non-Hispanic	12.0	5.1	10.5	11.7	10.5	14.4	16.7	12.4	13.2	17.7
Hispanic	17.0	6.2	11.8	24.5	29.4	24.6	14.1	11.3	20.4	25.3
Other race, Non-Hispanic	2.6	2.7	2.3	2.6	2.6	4.1	2.1	2.5	2.7	3.1
White only, non-Hispanic	62.5	80.2	68.9	55.4	52.5	50.6	60.9	67.5	58.6	46.1
Country of Birth										
Born in US	82.1	87.2	85.4	75.9	71.8	83.1	84.4	86.1	80.3	80.1
Born outside of US	17.9	12.8	14.6	24.1	28.2	16.9	15.6	13.9	19.7	19.9
Family Size - Mean (SD)	2.9 (1.5)	3.0 (1.4)	2.8 (1.5)	2.9 (1.6)	2.9 (1.7)	3.2 (1.7)	2.8 (1.4)	2.7 (1.4)	2.9 (1.6)	3.3 (1.7)
Education										
>= 4 Years of College	37.1	77.0	44.1	20.7	16.6	14.4	57.9	49.8	23.5	18.1
1-3 Years of College	27.7	13.7	26.6	28.4	27.9	29.7	21.4	28.0	32.9	29.7
High School Degree/GED	26.6	8.8	25.5	36.8	35.9	33.8	17.0	19.2	31.2	33.6
Less than High School Degree/GED	8.7	0.4	3.9	14.1	19.7	22.1	3.6	2.9	12.4	18.7
Marital Status										

(Continues)

TABLE 3 | (Continued)

	Men					Women				
	Overall Weighted N = 126,312,273	Salaried-Intensive Weighted N = 4,842,728	SER-like Weighted N = 29,008,123	SEV Weighted N = 14,076,183	Precarious Weighted N = 12,750,718	Unemployed Weighted N = 4,346,031	SER-like, Union Weighted N = 6,176,802	SER-like, Non-Union Weighted N = 31,808,090	Precarious Weighted N = 18,984,955	Unemployed Weighted N = 4,318,644
Divorced, separated, or widowed	14.3	8.7	11.6	11.9	10.6	8.0	18.8	19.0	17.0	11.6
Married	52.3	76.5	64.0	51.1	36.5	21.6	58.3	56.8	42.4	28.9
Single	33.4	14.7	24.4	37.1	52.9	70.4	22.9	24.2	40.7	59.6
Region										
Midwest	22.1	22.7	24.1	20.7	19.5	18.5	22.5	22.3	23.1	18.1
Northeast	18.1	20.0	18.4	16.5	16.6	18.0	32.1	17.1	16.1	19.8
South	36.7	33.7	34.7	39.2	38.4	35.6	17.2	40.2	38.4	37.4
West	23.0	23.6	22.8	23.7	25.5	28.0	28.1	20.4	22.4	24.6
Occupation										
Professional and Related Occupations	24.3	34.5	27.7	12.9	10.2	0.0	56.6	33.2	19.7	0.0
Construction, Extraction, and Maintenance	6.7	2.5	12.1	15.4	18.6	0.0	0.5	0.5	0.6	0.0
Farming, Fishing, and Forestry	0.6	0.1	0.2	1.1	2.4	0.0	0.1	0.1	0.7	0.0
Management, Business, and Financial Operations	15.0	44.6	18.4	11.4	5.3	0.0	6.5	23.8	6.1	0.0
Military Specific	0.1	0.0	0.3	0.1	0.1	0.0	0.0	0.1	0.0	0.0
Office and Administrative Support	12.0	3.0	7.6	7.6	7.7	0.0	15.1	21.2	16.1	0.0
Production, Transportation, and Material Moving	11.2	2.7	17.5	24.1	18.7	0.0	5.9	4.8	6.5	0.0
Sales and Related Occupations	7.8	7.5	6.4	9.2	9.5	0.0	2.0	7.0	14.5	0.0
Service Occupations	14.4	4.4	8.6	16.4	25.1	0.0	12.4	8.1	34.7	0.0
Unclassifiable	1.2	0.6	1.2	1.8	2.5	0.0	0.7	1.1	1.1	0.0
Unemployed	6.9	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0

(Continues)

TABLE 3 | (Continued)

Characteristic	Men					Women				
	Overall Weighted N = 126,312,273	Salaried- Intensive Weighted N = 4,842,728	SER-like Weighted N = 29,008,123	SEV Weighted N = 14,076,183	Precarious Weighted N = 12,750,718	Unemployed Weighted N = 4,346,031	SER-like, Union Weighted N = 6,176,802	SER-like, Non- Union Weighted N = 31,808,090	Precarious Weighted N = 18,984,955	Unemployed Weighted N = 4,318,644
Industry										
Education, Health, and Social Services	24.4	18.2	15.2	11.2	9.8	0.0	63.5	39.8	32.6	0.0
Construction	4.7	4.4	6.4	8.8	16.0	0.0	0.4	1.2	1.3	0.0
Financial Activities	6.0	9.1	6.4	4.1	3.1	0.0	0.7	11.0	3.9	0.0
Information	2.1	3.6	3.5	2.0	1.4	0.0	1.8	2.0	1.5	0.0
Leisure and Hospitality	7.4	3.1	2.4	10.0	19.2	0.0	1.6	3.1	18.8	0.0
Manufacturing	10.3	17.4	19.4	14.8	5.9	0.0	3.7	8.6	4.1	0.0
Military	0.1	0.0	0.2	0.1	0.1	0.0	0.0	0.1	0.0	0.0
Natural Resources and Mining	1.4	2.0	1.5	2.8	3.6	0.0	0.1	0.6	1.0	0.0
Professional and Business Services	10.1	17.8	11.6	11.0	11.5	0.0	1.6	11.1	9.6	0.0
Public Administration and Other Services	9.5	9.2	13.2	8.3	7.0	0.0	16.4	9.4	9.0	0.0
Transportation and Utilities	4.7	5.2	8.7	7.1	6.2	0.0	6.5	2.1	1.8	0.0
Wholesale and Retail Trade	12.0	9.7	11.3	19.3	15.5	0.0	3.5	10.6	16.3	0.0
Unclassifiable	0.4	0.4	0.3	0.6	0.7	0.0	0.2	0.4	0.4	0.0
Unemployed	6.9	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Self-Rated Health										
Excellent/Very Good/Good	91.7	94.9	93.6	90.3	90.3	91.1	91.6	92.7	88.9	88.5
Poor/Fair	8.3	5.1	6.4	9.7	9.7	8.9	8.4	7.3	11.1	11.5
Self-Rated Mental Health										
Excellent/Very Good/Good	95.8	97.8	97.2	96.0	94.4	93.9	95.7	96.5	93.8	91.9
Poor/Fair	4.2	2.2	2.8	4.0	5.6	6.1	4.3	3.5	6.2	8.1

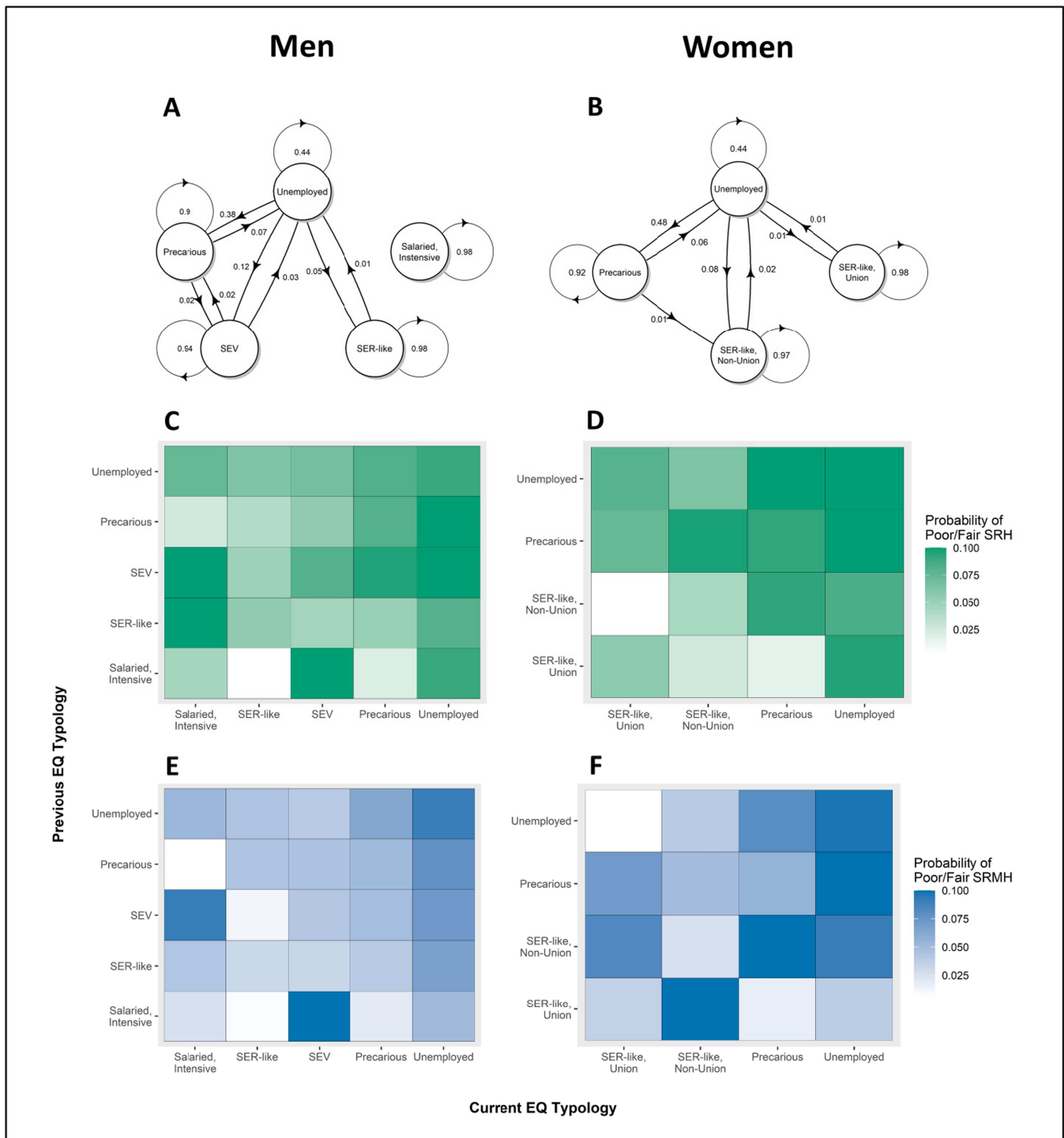


FIGURE 1 | Average transition probabilities between employment quality (EQ) types (panels A–B) and associated probabilities of reporting poor/fair self-rated health (SRH; panels C–D) and self-rated mental health (SRMH; panels E–F) in a sample of wage-earning men and women from the US Medical Expenditure Panel Survey, 2008–2022 (For visualization purposes, only transition probabilities of 0.01 or greater are shown [top row] and probabilities of reporting poor/fair SRH [middle row] and SRMH [bottom row] are truncated at 0.10. Full results are displayed in Supporting Information S1: Table 2). [Color figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

Union, Precarious, and Unemployed EQ types compared to those employed in SER-like, Non-Union types. Similarly, there was an association with poor/fair SRMH among those employed in Precarious and Unemployed EQ types, but not those in SER-like, Union employment. Previous unemployment showed a non-significant association with poor/fair SRH in men (adjusted PR = 1.21; 95% CI = 0.79–1.86) and women (adjusted PR = 1.28;

95% CI = 0.93–1.77), which remained similar in our sensitivity analysis (including only those reporting good/very good/excellent SRH/SRMH at the immediately preceding round) for both men (adjusted PR = 1.24; 95% CI = 0.66–2.34) and women (adjusted PR = 1.23; 95% CI = 0.71–2.13). A similar non-significant association was observed between previous unemployment and poor/fair SRMH, which moved towards a null association in our sensitivity

analysis in both men (adjusted PR = 1.04; 95% CI = 0.49–2.20) and women (adjusted PR = 0.96; 95% CI = 0.55–1.67).

4 | Discussion

To the authors' knowledge, this study is among the first to use LTA as a method of simultaneously identifying EQ types and measuring workers' probability of transitioning between them. We also measured associations with SRH/SRMH, noting that respondents transitioning to or from low-EQ types reported poorer health relative to those in high-EQ types. Respondents in low-EQ arrangements tended to remain in a cycle between unemployment and precarious employment, suggesting a pattern of employment instability that may compound adverse health outcomes.

We noted a gradient of health across the EQ spectrum, with those in high-EQ arrangements reporting poor/fair SRH/SRMH less frequently than those in low-EQ arrangements (Tables 3–5). Precariously employed workers reported a health status similar to unemployed respondents, a finding previously reported by European EQ studies [37]. We also noted patterns of health across EQ transitions that suggest health may differ both by a respondents' current and previous EQ state (Figure 1). [Correction added on 19 February 2026, after first online publication: The citation for "Supporting Information S1: Table 3" in the preceding sentence has been removed, and the Supporting Information available

online has been replaced with an updated version.] For instance, among men transitioning from precarious employment, those who transitioned into higher EQ Salaried-Intensive employment appeared to have better mental health than those who transitioned into unemployment or remained precariously employed (Figure 1E). Conversely, unemployed respondents had better mental health if they transitioned from a high-EQ state, as opposed to transitioning from precarious employment. Similar findings were recently reported by Vanderleyden et al., who used LCA to identify EQ types among U.S. workers and noted that transitioning from SER-like to low-EQ employment was associated with poorer health relative to those who remained in SER-like employment [10]. While our results do not fit into these patterns in their entirety, some transitions rarely occurred (e.g., from Salaried-Intensive to Precarious) and presented few opportunities for measuring their associated health status.

Our findings suggest that instability and risk of job loss are central features of precarious employment. However, they also indicate that unemployed individuals are likely to return to precarious employment upon re-entering the workforce; unemployed respondents rarely transitioned into high-EQ arrangements and vice versa. This evokes a labor market in which certain workers are caught in a cycle between precarious employment and unemployment, highlighting a potential pathway through which workforce EQ stratification persists over time.

TABLE 4 | Associations between employment quality (EQ) type, previous unemployment, and poor/fair self-rated health (SRH), measured as prevalence ratios (PR), in a sample from US Medical Expenditure Panel Survey (MEPS), 2008–2022.^a

Characteristic	Full Sample		Sensitivity Analysis ^b	
	Unadjusted PR (95% CI)	Adjusted PR (95% CI)	Unadjusted PR (95% CI)	Adjusted PR (95% CI)
Men				
Current EQ Type				
Salaried, Intensive	0.81 (0.67–0.98)	0.97 (0.80–1.17)	0.84 (0.70–1.00)	1.04 (0.86–1.25)
SER-like	(ref)	(ref)	(ref)	(ref)
SEV	1.43 (1.29–1.60)	1.33 (1.19–1.49)	1.43 (1.29–1.58)	1.28 (1.15–1.43)
Precarious	1.45 (1.32–1.59)	1.42 (1.28–1.57)	1.43 (1.30–1.58)	1.33 (1.19–1.49)
Unemployed	1.86 (1.63–2.13)	1.89 (1.65–2.17)	1.99 (1.66–2.40)	1.97 (1.63–2.38)
Employment Status in Previous Round				
Employed	(ref)	(ref)	(ref)	(ref)
Unemployed	1.1 (0.71–1.70)	1.21 (0.79–1.86)	1.11 (0.59–2.09)	1.24 (0.66–2.34)
Women				
Current EQ Type				
SER-like, Union	1.15 (1.01–1.32)	1.19 (1.04–1.36)	1.12 (0.972–1.28)	1.14 (0.992–1.31)
SER-like, Non-Union	(ref)	(ref)	(ref)	(ref)
Precarious	1.47 (1.35–1.59)	1.25 (1.14–1.36)	1.43 (1.32–1.55)	1.16 (1.06–1.27)
Unemployed	1.69 (1.49–1.91)	1.47 (1.29–1.66)	1.82 (1.54–2.15)	1.53 (1.29–1.81)
Employment Status in Previous Round				
Employed	(ref)	(ref)	(ref)	(ref)
Unemployed	1.26 (0.90–1.76)	1.28 (0.926–1.77)	1.17 (0.67–2.03)	1.23 (0.714–2.13)

^aAssociations measured using generalized estimating equations (GEEs) with an exchangeable correlation structure. Adjusted GEEs included age, nativity status, family size, education, marital status, region, occupation, and MEPS panel as covariates.

^bIncludes only observations in which respondents reported good/very good/excellent SRH/SRMH at the preceding round of data collection.

TABLE 5 | Associations between employment quality (EQ) type, previous unemployment, and poor/fair self-rated mental health (SRMH), measured as prevalence ratios (PR), in a sample from US Medical Expenditure Panel Survey (MEPS), 2008–2022.^a

Characteristic	Full Sample		Sensitivity Analysis ^b	
	Unadjusted PR (95% CI)	Adjusted PR (95% CI)	Unadjusted PR (95% CI)	Adjusted PR (95% CI)
Men				
Current EQ Type				
Salaried, Intensive	0.85 (0.67–1.08)	1.03 (0.80–1.32)	0.84 (0.65–1.07)	1.03 (0.80–1.33)
SER-like	(ref)	(ref)	(ref)	(ref)
SEV	1.36 (1.19–1.56)	1.30 (1.13–1.49)	1.27 (1.08–1.48)	1.21 (1.03–1.42)
Precarious	1.59 (1.39–1.81)	1.56 (1.35–1.82)	1.42 (1.24–1.64)	1.39 (1.18–1.64)
Unemployed	2.16 (1.83–2.56)	2.10 (1.76–2.51)	2.13 (1.70–2.65)	2.03 (1.60–2.56)
Employment Status in Previous Round				
Employed	(ref)	(ref)	(ref)	(ref)
Unemployed	1.39 (0.83–2.31)	1.36 (0.83–2.22)	1.09 (0.523–2.29)	1.04 (0.49–2.20)
Women				
Current EQ Type				
SER-like, Union	1.15 (0.98–1.35)	1.13 (0.97–1.33)	1.09 (0.91–1.31)	1.08 (0.89–1.30)
SER-like, Non-Union	(ref)	(ref)	(ref)	(ref)
Precarious	1.50 (1.36–1.66)	1.37 (1.23–1.53)	1.35 (1.21–1.51)	1.23 (1.08–1.39)
Unemployed	2.14 (1.86–2.46)	1.91 (1.66–2.21)	2.21 (1.80–2.71)	1.92 (1.56–2.36)
Employment Status in Previous Round				
Employed	(ref)	(ref)	(ref)	(ref)
Unemployed	1.20 (0.81–1.78)	1.10 (0.75–1.62)	1.06 (0.61–1.85)	0.96 (0.55–1.67)

^a Associations measured using generalized estimating equations (GEEs) with an exchangeable correlation structure. Adjusted GEEs included age, nativity status, family size, education, marital status, region, occupation, and MEPS panel as covariates.

^b Includes only observations in which respondents reported good/very good/excellent SRH/SRMH at the preceding round of data collection.

Outside of the typological EQ framework, economic studies have noted that workers who experience job loss often return to employment arrangements with low levels of autonomy and few workplace benefits, features generally associated with precarious employment [4]. These effects may have lasting effects on health, with life course EQ studies noting that precarious EQ trajectories, which have a high probability of previous unemployment relative to SER-like trajectories, are associated with poor health [24].

Performing LTA separately for men and women, we identified both similarities and differences in EQ between these groups. Both samples included Precarious and SER-like types that were similar to those of previous U.S. studies [8, 10, 17]. However, SER-like employment was split into union and non-union types within women, potentially because the majority of women in our sample were employed in Education, Health, and Social Services industries, some of which have relatively high unionization rates [38]. Additionally, we identified a high-wage “Salaried-Intensive” type present in men but not women. A cross-sectional study of EQ in the U.S. found a similar type, labeled “Portfolio,” which was composed of a high proportion of men relative to the study’s SER-like type [8]. Similarly, life course studies of EQ have identified certain high-wage EQ trajectories among men but not women, [24] as well as high-EQ-to-retirement trajectories that contain a high proportion of

men [39]. These patterns are likely multifactorial but may be influenced by differences in the career effects of reproductive labor, with women more likely to temporarily stop working when they become parents [40–42].

Our findings suggest that improving the employment conditions of low-EQ workers may be a pathway towards improving population health. As EQ is a multidimensional exposure, a wide range of interventions could have a positive impact on health, including increasing insurance access among lower-income workers and providing paid sick leave so that workers can take time off work to access healthcare resources [43, 44]. Unemployed respondents in our sample reported poor/fair health more frequently than employed respondents, suggesting that removing barriers to healthcare access and providing unemployment insurance to this population may be particularly beneficial. Finally, providing unemployed individuals with career counseling services and connecting them with high quality employment opportunities may reduce the health effects of their previous unemployment, which our findings suggest may be persistent were they to re-enter into low-EQ arrangements.

This study’s findings are subject to at least four limitations. First, since MEPS does not collect information related to respondents’ perspectives of their employment arrangement (e.g., autonomy in the workplace) and, as a result, our EQ

indicators primarily represented the contractual aspects of employment. Second, although our sensitivity analyses excluded observations in which respondents reported poor/fair SRH/SRMH at the immediately preceding round, we cannot remove the possible influence of reverse causality between EQ and poor health from our findings (e.g., we did not have data on the SRH/SRMH status of respondents before their entrance into MEPS). Third, due to software limitations, our LTA models could not incorporate MEPS' complex survey design, and our EQ types are therefore representative only of our MEPS sample. However, the EQ types identified were similar to those in previous U.S. studies, particularly the identification of SER-like and precarious types [8, 10, 17]. Fourth, our sample did not include self-employed respondents, some of whom may have been employed within the growing "gig economy." Self-employment includes a wide range of potential EQ, with some arrangements likely resembling precarious employment (e.g., gig workers) and others having potentially high EQ (e.g., large, incorporated business owners). Thus, developing an EQ typology among self-employed individuals is an area in which much future research is warranted.

5 | Conclusion

This study is among the first to study transitions between EQ types, including unemployment, using LTA. Our findings suggest that precariously employed workers have poorer health and a higher probability of unemployment relative to workers in high-EQ arrangements. Once unemployed, these workers tend to transition back into precarious employment, potentially compounding the health effects of low EQ and unemployment. Future research may explain the effects of this cycle on workers' health and the EQ of their subsequent employment arrangements. Interventions focused on improving population health might focus on improving the EQ of workers transitioning out of unemployment, as well as providing a safety net for workers who become unemployed.

Author Contributions

Eric W. Lundstrom downloaded the data used in this study, performed all analyses, and drafted the manuscript for submission. Trevor Peckham and Vanessa M. Oddo provided content expertise on the measurement, conceptualization, and operationalization of employment quality and its association with health. All authors were involved in the conceptualization of the study and reviewed/approved the final manuscript before submission.

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Disclosure

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the National

Institute for Occupational Safety and Health, Centers for Disease Control and Prevention.

Ethics Statement

This activity was reviewed by CDC, deemed research not involving human subjects, and was conducted consistent with applicable federal law and CDC policy.

Data Availability Statement

The data used in this study are publicly available at <https://meps.ahrq.gov/mepsweb/index.jsp>.

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