Employment Quality, Health, and Health Inequities in the Modern U.S. Economy

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A dissertation

submitted in partial fulfillment of the

requirements for the degree of

Doctor of Philosophy

University of Washington

2020

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Program Authorized to Offer Degree:

Environmental and Occupational Health Sciences

University of Washington

ABSTRACT

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Social, economic, political, and technological trends over the past several decades have caused a number of adaptive changes in the labor market, including the fundamental transformation of the nature and organization of employment. One of the most notable changes is the decline in the number of jobs resembling the Standard Employment Relationship (SER; i.e., permanent, full-time, regularly-scheduled work, with secure wages and benefits). Compared to the last several generations, workers today are more likely to experience non-permanent contractual arrangements; volatile and asocial work schedules; stagnant wages and decreased access to fringe benefits; less opportunity to develop skills; and generally more imbalanced employer-worker power dynamics, including the lack of collective bargaining or other involvement in workplace decision-making. These changes are thought to have far-reaching consequences for the labor market experiences of millions of Americans, and are likely to disproportionately impact marginalized working populations. However, these employment trends have not been adequately examined from a public health perspective.

This dissertation aims to improve our understanding of the linkages between employment, health, and health inequities, with a specific focus on advancing both theory and methods needed to approach this topic from occupational health and social epidemiologic perspectives. First, we develop a novel

conceptual model that attempts to embed the work-health relationship within a broader social context. We argue that researchers should direct more attention to the many ways in which work influences health beyond the physical and psychosocial hazards that are typically emphasized—including the quality of the employment relationship, how work structures non-work life (e.g., determining one's non-work-life schedule), and the contribution of work to one's overall status within a society. We then detail specific mechanisms by which workers may be differentially exposed to, or be differentially impacted by, adverse work characteristics.

Next we conduct a series of three empirical studies to advance the multidimensional construct of employment quality, which accounts for both the contractual and relational aspects of employment that effect health independently of physical and psychosocial environments. First, we used data from the U.S. General Social Survey and a latent class analysis approach to identify eight distinct forms of employment in the U.S. Consistent with theory and prior research, one EQ type resembled the historical conception of the SER, while other EQ types were characterized by various configurations of beneficial and unfavorable employment conditions. We also found that EQ is unequally distributed across sociodemographic groups and throughout the labor market. In the second study, we found that EQ was associated with three measures of health, including self-reported health (SRH), frequent mental health (FMD), and occupational injury. We also found support for three hypothesized mechanisms linking EQ to health, including material deprivation (e.g., inadequate income), employment-related stressors (e.g., job insecurity), and occupational risk factors (e.g., physical exposures). These mediators may represent potential avenues for interventions to improve workers' health. In the third study, we found evidence that the unequal distribution of EQ across women and men played a significant role in observed gender inequities in SRH and FMD. In particular, our results suggest that if women had the same EQ as men, they would report significantly better health. While employment conditions have received less attention compared to other aspects of socioeconomic position, such as education and income, EQ is identified as a potentially important mechanism contributing to social gradients in population health.

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ACKNOWLEDGEMENTS

There are so many people that have supported and inspired this research—and my personal growth—over the last four years. First and foremost, I would like to sincerely thank my Dream Team doctoral committee, Noah Seixas, Anjum Hajat, Butch de Castro, Brian Flaherty, and Kaori Fujishiro. I'm deeply indebted to each of them for their mentorship, wisdom, and friendship (and for putting up with my procrastination, tendency to get lost in theoretical mazes, and many other quirks). The ambition of this research was to take an interdisciplinary approach, and it would not have been possible without their wide knowledge and immense amount of time and energy they dedicated to this project. Some particular thanks are needed for Noah, who quite literally recruited me to do this research; I will miss busting into his office at all hours of the day to discuss the last paper I read and what it means for the field of OH.

I was lucky to be a part of so many communities of colleagues and friends, across the DEOHS, SPH, UW, and all around the globe. A special thanks is in order for Marissa Baker. I have basically tried to follow in her footsteps my entire time as a PhD student, and she has been an amazing mentor and collaborator. I also don't know what I would have done without my 1st Floor Roosevelt Crew, especially Hannah, Frank, and the Field Group team. With too many other individuals to name, I would also like to broadly acknowledge my folks at the Harry Bridges center, the OHSR program, the ERC, the CSDE working group on employment and population health, Anjum's EQ team, Senator Karen Keiser's office, the UBC Cascadia Collaboration on precarious employment, NIOSH, Vrije Universiteit Brussels, Karolinska Institute, Universitat Pompeu Fabra, and all my fellow students and colleagues over the years.

This dissertation was funded by the National Institute on Minority Health and Health Disparities of the National Institutes of Health (F31MD013357) and the National Institute for Occupational Safety and Health (18IPA1816712). I am grateful for additional financial support during my studies from: APHA OHS Section, Pacific Northwest Section of AIHA, Harry Bridges Center for Labor Studies, Boeing, AHIA, UW Graduate School, and UW Population Health Initiative. I would also like to thank staff at DEOHS who also provided me financial, administrative, and emotional support.

Last, but certainly not least, I would not be here today without the incredible love and support of my friends and family. Thank you so much to the Peckham Family, especially my parents Desiree and Phil, and to Jon and Julia! And my greatest thanks of all goes to my uh-mazing wife, Britt Weldon, who has always been my most important source of strength, sanity, and adventure. WIL.

Chapter 1. Introduction

The world of work is changing. As a result, scholars from occupational and public health have increasingly acknowledged the need to broaden work and health research to adapt to the realities of the modern economy (Kompier, 2006; Peckham et al., 2017; Schulte et al., 2019). This dissertation focuses on arguably one of most important contemporary labor market trends affecting workers' health and well-being: the widespread shift away from models of stable, secure employment relationships toward more flexible and insecure employment practices. The crux of this issue can be framed as the general decline in the number of jobs resembling the historical conception of the Standard Employment Relationship (SER; i.e., permanent, full-time, regularly-scheduled work, with secure wages and benefits), and the concurrent rise in so-called 'non-standard' arrangements (e.g., temp work, independent contractor) (Benach et al., 2014; Kalleberg, 2009; Weil, 2014). While much of the research and discussion in this area has focused on the nature of the employment contract (e.g., permanent vs. temporary, employee vs. contractor), other dimensions of work have also become de-standardized, including more irregularity with respect to working hours, decreased opportunities for advancement, and less balanced power dynamics between workers and employers (Scott-Marshall & Tompa, 2011; Tompa et al., 2007). These changes are thought to have far-reaching consequences for the labor market experiences of millions of Americans, and are likely to disproportionately impact marginalized working populations. However, these employment trends have not been adequately examined from a public health perspective.

This transformation compels the need for re-conceptualizing the elements of work that are important for health. The field of occupational health has mostly focused on physical environmental conditions of the workplace, such as exposure to chemical agents or physically dangerous labor processes. Within the field of occupational health psychology, significant attention has also been directed to aspects of the social work environment, including circumstances such as pressure to complete work tasks quickly. Both of these approaches fundamentally assess risks arising from within the work environment, and are

less well adapted to consider the contractual and relational features of the employee-employer relationship. Therefore, new approaches are needed to both theorize and operationalize these elements within epidemiologic analysis. Further, such research frameworks will need to integrate a multilevel perspective that accounts for mechanisms that contribute to a differential health burden of flexible employment across working populations.

1.1. SER and the changing nature of employment relations

The decades following WWII are generally considered the high water mark for employment relations within industrialized economies. This era was characterized by a Fordist model of industrial production, generous welfare systems, and politically-influential labor unions. Within this context, a compromise between capital and labor emerged which prioritized the development of stable workforces. In exchange for mostly yielding to the prerogatives of management, workers were provided secure jobs with relatively substantial protections and compensation. It is with a retrospective gaze to this particular period that the historical conception of the SER originates. The SER construct is typically described as permanent, full-time, regularly-scheduled employment, with adequate compensation, pathways for upward mobility, and a high degree of fringe benefits and rights, including, for example, collective representation and protections against arbitrary dismissal (Bosch, 2004; Kalleberg, 2009). However, the utility and generalizability of the SER construct has been questioned. SER-like employment was certainly never equitably distributed across all workers; it was mostly a privilege experienced by native White men in certain sectors of the economy. Further, the SER archetype developed in accordance with a patriarchal male-breadwinner model of social organization, in which the division of paid and unpaid labor was heavily bifurcated across gender (Vosko, 2010). Others have noted that it is actually an aberration when considering a longer historical perspective of capitalism (Kalleberg & Vallas, 2017; Quinlan, 2012). In any case, it is hard to deny that the SER has been especially influential in shaping norms around what a 'standard job' should be. For example, it is the basis for most workplace regulations and worker protections. Thus, the SER construct is used throughout this dissertation as an 'alloyed' (i.e., imperfect)

gold standard for employment quality and security, and a reference point with which to evaluate contemporary employment arrangements.

Beginning in about the 1970s, a series of interrelated economic, political, social, and technological trends have worked to generally shift power away from workers and toward employers—ultimately undermining the occurrence of the SER model (see Kalleberg, 2011). Economic growth significantly decelerated, never returning to levels seen in the post-WWII decades and diminishing employers' capacity to maintain stable and generous employment terms for their employees. At the same time, decreased governmental revenues lead to reductions in social welfare provisions and pushes for privatization of state functions. The globalization of product and labor markets dramatically increased employers' opportunity to outsource work to areas with cheaper labor costs and less regulatory burden—including historically middle-class jobs within American industrial sectors. In turn, governments were pressured to indulge business interests by enacting neoliberal labor market policies, which often involve the erosion of labor protections for the sake of improved flexibility (from the employer's perspective). Relatedly, there has been a steady decline in labor unions' political strength and membership, decreasing workers' ability and willingness to raise concerns about, or attempt to improve, their working and employment conditions. This decline is exacerbated by economic shifts away from manufacturing and toward industries with more diffuse, distributed work locations (e.g., healthcare, services), which lessens workers' ability to organize and has contributed to stagnant wages. The growth of technological alternatives to manual (and, increasingly, cognitive) labor has likewise weakened the bargaining power of many workers. Additionally, advances in information technologies have significantly reduced transaction and coordination costs associated with contracting outside entities, facilitating a 'fissuring of the workplace' (Weil, 2014) in which business increasingly use contract labor for non-core services (e.g., janitorial work, payroll accounting) and just-in-time staffing. Occurring alongside these economic and technological changes has been major demographic changes to makeup of the workforce, such as an increased share of immigrant, older, more educated, and women in the labor force. It is worth quickly noting that the feminization of the labor market is sometimes given as an example of a 'supply-side' (i.e.,

worker-led) demand for non-standard employment, as two-income households may prefer increased job flexibility to cope with domestic needs such as child-rearing. However, evidence suggests that employers' preferences (e.g., cost savings), not workers', are primarily responsible for the increase in non-standard employment (Golden & Appelbaum, 1992; Kalleberg et al., 2000; Price & Burgard, 2008).

Flowing from these developments is the following broad concern: as employers have sought to decrease costs, limit their liability, and increase their flexibility with respect to their labor force, the quality of employment as experienced by workers has become worse. In one of the more comprehensive treatments of this topic, Kalleberg (2011) documents a number of aggregate trends that warrant such a concern. Namely, he points out that over time there has been an increase in the prevalence of non-standard employment contracts (relative to the 1970s), involuntary job-loss, perceived job insecurity, and long-term unemployment, while workers' tenure at any given job has declined. In another analysis of similar intent, Tilly (1996) summarized his assessment of employment trends with the following statement, "Overall, jobs have unambiguously gotten worse. Wages have fallen, and fringe benefits and due process have become less widely available. Small advances in family-friendly schedule flexibility have been overwhelmed by unwelcome schedule constraints imposed by employers. More frequent job changes and a shift from intra-firm to inter-firm mobility represent new opportunities for some, but translate into less favorable wage trajectories for the average worker" (pg. 13). More recently, Howell and Kalleberg (2019) find that the share of low-waged jobs has increased since 1979—especially among young workers without a college degree—with some evidence that access to employment-related fringe benefits has concurrently declined. Concerns of this nature, and their potential impact on population health, represent primary motivations for this dissertation. It is critical to note, however, that the relevance of this topic for health research doesn't depend on whether or not there are identifiable trends of a worsening of employment—however defined. Regardless if such a trend is identifiable—which is a tremendous analytical challenge given the paucity of data (Howell & Kalleberg, 2019)—it is undeniable that there has been more attention in recent decades from public health researchers and policy makers on the topic of the quality of employment conditions and their relation to population health.

1.2. Past approaches to epidemiologic research on flexible employment conditions

The changing nature of employment was initially studied largely within the social sciences, especially sociology and economics. As understanding and awareness of these trends has expanded, health researchers have increasingly concerned themselves with examining the associations with health of various aspects of flexible employment relations. However, these researchers have struggled with the conceptualization and measurement of employment for epidemiologic analysis. Nevertheless, a number of different lines of evidence provide insight as to possible health impacts resulting from the de-standardization of employment (see Benach et al., 2014 for a comprehensive review).

One relevant body of health literature has focused on major organizational restructuring and downsizing. These studies involve examining health effects associated with anticipated job loss, as well as the job conditions and health of employees remaining after major organizational changes. From the workers' perspective, these circumstances create uncertainty related to future job prospects, which can initiate stress processes that result in a host of physical and mental health issues (Ferrie et al., 2008). A review of fifteen longitudinal studies of workplace closures, nearly every study identified increased adverse health effects during the anticipation phase (i.e., prior to termination) (WHO, 1999; see Ch. 4). Additionally, workers that remain employed after downsizing events are often shouldered with increased workloads, worse psychosocial work environments, and increased job insecurity—all of which contribute negatively to health (Ferrie et al., 2008). The findings from these studies overlap conceptually with the broader topic of jobs becoming more insecure, and negative health impacts from organizational practices such as leaner workforces (Quinlan & Bohle, 2009).

A related and large literature has focused more directly on the experience of job insecurity, which concerns workers' experience of uncertainty regarding the continuity of their job, especially fear of involuntary job loss or relinquishing other valued job features. Job insecurity is a chronic (as opposed to acute) stressor, which affects a significantly higher portion of the workforce than actual job loss. Decades of high-quality studies have produced substantial evidence for a causal relationship between job

insecurity and numerous physical and mental health outcomes (De Witte et al., 2016). In fact, there is some indication that health impacts stemming from the experience of job insecurity are similar—and, in some cases, worse—than unemployment (Griep et al., 2016). A theme in this literature is the acknowledgment of some of the aforementioned employment trends—that is, that employment is broadly becoming more insecure. However, job insecurity is a subjective experience, and is thus measured as such. Therefore, the link between job insecurity and health is inherently conditional on non-job related contexts, such as those at the individual- (e.g., expectations, other sources of income) or macro-levels (e.g., unemployment rate). This makes it difficult to elucidate the employment conditions that produce feelings of insecurity, and is likewise less useful for identifying interventions to improve workers' health.

Another body of research has focused on various forms of non-standard employment arrangements, especially those engaged in temporary (or fixed-term) contracts and temp agency employees. One rationale for this approach is the notion that these arrangements are fundamentally more insecure compared to regular, permanent employment, and therefore represent an objective measure of job insecurity; that is, the source of job insecurity can be externally attributed (to the nature of the employment contract itself), rather than based solely on workers' self-reports. These workers do generally report higher levels of job insecurity (e.g., Balz, 2017), and worse working conditions (e.g., Goudswaard & Andries, 2002). However, the experience in these jobs will also vary depending on a variety of factors. For instance, some workers in temporary or contract arrangements will be able to leverage scarce/valuable skills for premium wages, while maintaining higher levels of agency over their work than are typically allowed within traditional employment relationships. Indeed, Pirani (2017) finds that voluntariness is a key factor differentiating mental health among workers in non-standard employment. For this reason, the existing health evidence using measures of non-standard contracts is mixed, with some studies finding an adverse effect and others finding small or no effects (Benach et al., 2014).

Developing from these various approaches has been a gradual acknowledgment that the relationship between employment and health depends on many dimensions. Over the last several decades, there have been several multidimensional approaches for conceptualizing and measuring flexible

employment, and this remains an active area of research. Of note, are Lewchuk and colleagues' employment strain model (Lewchuk et al., 2008) and Quinlan and colleagues' Pressures-Disorganization-Regulatory Failures model (Underhill & Quinlan, 2011). But perhaps the most influential concept in this space has been the construct of precarious employment. While a precise definition is elusive, Benach et al. (2014) describe precarious employment as, "a multidimensional construct encompassing dimensions such as employment insecurity, individualized bargaining relations between workers and employers, low wages and economic deprivation, limited workplace rights and social protection, and powerlessness to exercise workplace rights" (pg. 230). However, there is no consensus about how to operationalize this construct within quantitative analyses (Bodin et al., 2019; Kreshpaj et al., 2020). (Note that despite the emphasis on multidimensionality, the precarious employment term has often been applied to unidimensional measures, such as non-permanent contract type (e.g., Kim et al., 2008).) Many have used Rodgers (1989) as their point of departure, who outlined four distinct dimensions of insecurity related to employment: temporal insecurity (e.g., non-permanent or seasonal contracts), organizational insecurity (e.g., lack of control over work processes), economic insecurity (e.g., inadequate wages), and social insecurity (e.g., lack of access to social security benefits). Scott-Marshall and Tompa (2011) created a framework of precarious employment that appended an additional four dimensions to those of Rodgers, including access to training opportunities. Another approach influenced by Rodgers is the employment precariousness scale (EPRES) developed by Vives et al. (Vives et al., 2010, 2015), which is currently the only validated question instrument related to this construct. The EPRES instrument consists of six subscales, including: temporariness (e.g., contract duration), disempowerment (e.g., level of negotiation of employment conditions), vulnerability (e.g., defenselessness to authoritarian treatment), wages (e.g., economic deprivation), rights (e.g., entitlement to workplace rights and social security benefits), and ability to exercise rights (e.g., powerlessness to exercise workplace rights) (see Vives et al. 2010, pg. 549). The key contribution of the precarious employment concept is its recognition that multiple aspects of employment can affect workers' experience in that job. In particular, it has helped expand health researchers' attention beyond a sole focus on the contractual aspects of employment (e.g., contract type,

wages) to also account for worker-employer power dynamics—a primary concern related to the shift toward more flexible employment.

However, many have noted challenges associated with the precarious employment construct, namely its tendency to mean different things across disciplinary and national contexts. Campbell and Price (2016) note that "as currently used by researchers, precariousness spans at least five different levels of social life" (pg. 315), including the level of the employment relationship (the focus herein), the level of work itself (as in, categories of bad jobs that exhibit several aspects of precariousness, such as janitorial work), and the level of a class of workers with shared labor market insecurities (such as Standing's (2011) notion of the 'precariat') (Campbell & Price, 2016). In documenting the lack of progress in developing a more precise definition for use in cross-national comparative research, Barbier (2011) stated that this failure pointed "to the fact that research about 'employment precariousness' – if such a concept ever existed as a universal equivalent – has been and will remain a Sisyphean task" (pg. 2).

It is safe to say that scholars within public and occupational health have been more directly focused on characterizing precarious employment at the level of the employment relationship (Bodin et al., 2019); even so, it remains an open question as to how to best theorize and measure this for health research. For instance, the EPRES scale, perhaps the most widely used construct-specific approach, relies too on inherently subjective appraisals of workers' experience (e.g., whether workers are treated in an "authoritarian manner", or whether their salary covers their basic needs) (Vives et al., 2015). Similar to concerns expressed above regarding measures of perceived job insecurity, responses to such items will depend at least somewhat on circumstances external to the objective character of one's employment relationship. Further, while the EPRES scale might do well to identify workers in truly precarious employment situations—especially those experiencing major imbalances in power dynamics, which are more difficult to measure than contractual aspects of employment—it may make it less well-equipped to characterize workers at the opposite end of the precariousness spectrum. From a pragmatic standpoint, it is also expensive to validate and administer surveys; thus, there is value for accumulating knowledge on

this topic to be able to conduct secondary data analysis, operationalizing whatever chosen construct within of existing social and economic surveys.

1.3. The employment quality construct

Taken together, the discussion in the prior section suggests that choosing an approach to conceptualizing the employment relationship for health research should be done with certain criteria in mind. For one, the construct should capture characteristics of the employment relationship, rather than those of workers or the work itself. Second, it should characterize employment in as objective of terms as possible. Third, it should be multidimensional in its content, especially moving beyond a sole focus on contractual aspects of employment. Another consideration is its ability to characterize a broad range of employment, rather than focusing only on the highly disadvantaged. Lastly, from a pragmatic perspective, it would be beneficial if the construct was able to be used within secondary data analysis. The employment quality (EQ) construct, as articulated by Van Aerden et al. (2014) and others (Eurofound, 2013a; Julià et al., 2017), fulfills each of these criteria, and is the primary construct used in this dissertation.

EQ is a multidimensional concept characterizing the terms and conditions of the employer-employee relationship that potentially affect worker health and well-being (see Van Aerden et al., 2014). Seven conceptual dimensions of EQ have been identified, which include both contractual and relational aspects of the employment. The first dimension of EQ is ***employment stability***, including factors such as contract type, which indicates the certainty of future employment. Second, ***material rewards***, especially wages, are a primary mechanism of having an acceptable standard of living; therefore, low income is associated with low quality employment (Julià et al., 2017). Non-wage benefits (e.g., health insurance, paid leave) are a second important component of material rewards, and are typically included in high quality employment. The third dimension is ***workers' rights and social protections***, which are designed to promote living standards for individuals during non-work periods and vary by firm, sector, and state. The fourth dimension is ***standardized working time arrangements***, which concerns length and regularity of work hours. SER workers are protected by working hour regulations, resulting in working weeks of

approximately 40 hours (Bosch, 2004). Additionally, irregular work schedules can conflict with human chronobiology and normative social patterns concerning sleep-work-leisure cycles (Costa et al., 2006). The fifth dimension is ***training and employability opportunities***. Opportunities to develop skills is a component of high quality employment, as it may lead to better future employment prospects. The sixth dimension is ***collective organization***, which concerns the ability of workers to advocate for their interests at the worksite- or industry-level. Having insufficient information, equipment, or training can be considered to be a problem in the communication between management and employees (Underhill & Quinlan, 2011). The last dimension consists of ***interpersonal power relations***, which refers to the division of power over workplace decision making between workers and their superiors. Low quality jobs are deemed to involve more vulnerability toward management authority, intimidation, discrimination, or, in extreme cases, harassment or abusive treatment.

It should be noted that the EQ construct has largely developed alongside the multidimensional precarious employment constructs that have been applied within the public health literature. They share very similar theoretical foundations with respect to the dimensions of the employment relationship included, with both emphasizing, in particular, the need to incorporate aspects of worker-employer power relations (e.g., Julià et al., 2017). However, EQ represents a comparatively broader and more generic approach that may be useful in characterizing a fuller spectrum of employment experiences than the precarious employment construct. For instance, a key difference between the two constructs is that EQ includes a dimension related to working time arrangements. Attention to this aspect of employment is supported by a growing body of evidence finding that today's workers are increasingly experiencing unstable, asocial, and short work hours, and that this impacts their health and well-being (Lambert et al., 2019; Schneider & Harknett, 2019). Taken together, we believe the EQ construct is useful to capture the multidimensional and complex nature of modern employment for the purposes of epidemiologic research to examine how labor market trends may impact workers' health.

1.4. Employment quality as a social determinant of health and health inequities

A growing body of health research has found that several measures of EQ (and the closely-related construct of precarious employment) are associated with a range of adverse physical and mental health outcomes, including depression, cardiovascular disease, and work-related injuries (Benach et al., 2014; Kim et al., 2012; Van Aerden et al., 2016). Employment quality is thought to affect health through several pathways (Julià et al., 2017). First, workers in low quality employment may be exposed to more hazardous working conditions compared to those with high quality employment, independent of job content or work environment. These workers may receive less training, be less familiar with job hazards, and be reluctant to refuse hazardous tasks (Aronsson, 1999; Foley, 2017; Quinlan et al., 2001; Tompa et al., 2007). Second, low quality employment may limit workers' control over their professional and personal lives, creating feelings of job insecurity, unfairness, powerlessness, and lack of future opportunity—all powerful psychosocial stressors (Clarke et al., 2007; Lewchuk et al., 2008). These employment-related stressors can also contribute to negative work-family spillover (Allen & Armstrong, 2006; Frone et al., 1994). The third pathway, material deprivation, is driven by insufficient income, as well as non-wage material benefits (e.g., health insurance), and can lead to difficulty obtaining necessities, hamper long-term life planning, and independently contribute to psychological stress (Bosmans et al., 2016; Julià et al., 2017; Tompa et al., 2007).

These dynamics position EQ as an important and understudied social determinant of health (Benach et al., 2014; Clougherty et al., 2010). More so than traditionally-studied working conditions (e.g., chemical exposures), which tend to remain within the boundary of the worksite, EQ readily structures non-work life. For example, labor income represents the primary way most people obtain economic resources, while work schedules fundamentally influence how much time one has to fulfill familial obligations, socialize, exercise, or sleep. Further, by acknowledging the relational power dynamics between workers and employers, EQ provides a point of departure for understanding the role of work in producing an inequitable allocation of social and material resources across modern societies. This relates directly to the fundamental cause theory of health inequities. This theory posits that it is the unequal and

unjust distribution of flexible resources—such as power, prestige, knowledge, and status—that principally structures the persistent health differences observed across social groups (Link & Phelan, 1995). Because work, including EQ conditions, is so intertwined with the accumulation of these flexible resources, scholars have recently called for work to be considered as a fundamental cause (Ahonen et al., 2018).

These considerations are important for the study of employment and health because EQ is not distributed evenly across all workers. For instance, it has been robustly documented that low EQ—whether examined as individual components, or with multidimensional measures—is more common among women, people of color, immigrants, younger workers, and lower-skilled and lower-educated workers (Eurofound, 2013b; Hipple, 2001; Menéndez et al., 2007; Nollen, 1996; Puig-Barrachina et al., 2014; Van Aerden et al., 2014; Vives et al., 2011). Additionally, recent economic evidence suggests a polarization of the labor market in wealthy economies; that is, job growth is occurring primarily in high-wage and low-wage service work, such that a larger portion of the population has access only to low quality employment (Dwyer & Wright, 2019; Howell & Kalleberg, 2019). The unequal distribution of favorable and adverse employment conditions has major implications for inequities in population health, as the availability and quality of employment within a society can determine both opportunity for flourishing and exposure to risk (Burgard & Lin, 2014). In addition to bearing a disproportionate burden of poor EQ, there is some evidence that marginalized populations are more susceptible to its health-damaging effects. For example, several studies have shown women are differentially affected by EQ (Campos-Serna et al., 2013; De Moortel et al., 2014; Kim et al., 2008; Menéndez et al., 2007). Further research is needed to disentangle the mechanisms by which work contributes to health inequities, especially aspects beyond the physical and social work environment (Clougherty et al., 2010; Landsbergis et al., 2014; Lipscomb et al., 2006).

An important gap in the literature on EQ, health, and health inequities concerns the lack of research and evidence from the U.S. Recent studies using multidimensional constructs of EQ and precarious employment have mostly been restricted to E.U. and Canada (e.g., Jonsson et al., 2019; Scott-Marshall & Tompa, 2011; Van Aerden et al., 2016, 2017; Vives et al., 2015). Yet the generalizability of

European research to the U.S. context should be considered limited given vast differences between the respective labor markets, policy regimes, and social safety nets. Further, social gradients in health are less severe in Europe relative to those in the U.S. (Avendano et al., 2009; Avendano & Kawachi, 2014b). Different social and policy contexts could affect the patterning of EQ within a country, as well as its relationship to health and health inequities; therefore, it is critical to specifically investigate EQ within the U.S. context.

1.5. Operationalizing employment quality

Once one decides that employment relationships should be conceived of as a multidimensional construct, such as EQ, there remains a methodological decision as to how to operationalize such a construct as a quantitative research variable. Most often, researchers have taken the approach of developing scales that aggregate multiple dimensions of employment into a continuum of low to high (e.g., Lewchuk et al., 2014; Vives et al., 2015). However, it is likely that the market-driven search for flexibility and competitiveness has resulted in a more diverse set of employment arrangements than can be adequately captured by gradational measures that assume a linear continuum (Van Aerden et al., 2014). Further, there is compelling evidence to suspect that various EQ features will cluster together within specific jobs or segments of the labor market (Vanroelen, 2019). As such, a series of recent studies in the European Union, United Kingdom, and Belgium have applied latent class analysis (LCA) to identify distinct patterns of employment within contemporary labor markets (Van Aerden et al., 2014, 2016, 2017). LCA is a measurement model used to identify latent subgroups within heterogeneous populations based on a combination of categorical variables (Masyn, 2013). Importantly, the LCA approach allows for conceiving of jobs as packages of employment features, and thus facilitates the conceptualization that health consequences of EQ will depend on specific patterns of features to which one is exposed. The researchers were able to characterize distinct employment forms based on patterns of proxy indicator variables spanning multiple dimensions of EQ. Consistent with theoretical expectations, these studies identified a SER-type class. Additionally, they distinguished several other forms of employment that

deviated from the SER model in various ways and to different extents—indicating a reality of substantial heterogeneity with respect to workers' experience of modern employment. Employment in standard jobs was associated with better physical and mental health, as well as increased job satisfaction, compared to all other EQ clusters (Van Aerden et al., 2015, 2016, 2017). Further, EQ clusters were strongly associated with covariates such as the socio-demographic profile of workers, organization-level features, and indicators of traditionally measured working conditions (e.g., exposure to environmental hazards) (Van Aerden et al., 2014). By emphasizing the structure and distribution of simultaneously occurring employment conditions—which better represents a worker's experience in that job—a typological measurement approach compliments the more frequently-used dimensional approaches that presume one or more employment conditions can be specified onto a ladder of low to high quality.

1.6. Specific aims

In summary, there is a pressing need to explore the linkages between employment quality, health, and health inequities in the modern U.S. economy. The overarching goals of this dissertation are to advance the theory and methods needed to approach this research topic from occupational health and social epidemiology perspectives. This is accomplished by addressing four specific aims, each representing a chapter herein. Setting the stage is a theoretical chapter that outlines the need to expand traditional work and health research frameworks to account for the health relevance of EQ, as well as exploring the role of work in contributing to inequities in health across different working populations. The following three chapters are empirical investigations of EQ in the U.S., including elucidating the character of EQ, the sociodemographic distribution thereof, and its associations with health and health inequities. Each of these empirical studies operationalize EQ with a multidimensional, typological measurement approach using data on a representative sample of U.S. workers from the General Social Survey.

Aim 1. Develop a conceptual framework of work, health, and health inequities. We develop a novel conceptual model that aims to elucidate important mechanisms by which workers may be differentially exposed to, or be differentially impacted by, adverse work characteristics.

Aim 2. Identify patterns of employment quality in the U.S. labor market. We construct a typology of EQ within a representative sample of U.S. workers, identifying distinct employment types based on indicators representing the seven dimensions of EQ.

> **Subaim 2a. Identify sociodemographic, family, and job-related correlates of EQ.** We assess whether EQ types are associated with indicators of sociodemographic, family, and labor market-related characteristics.

Aim 3. Test whether employment quality is associated with worker health. We examine the association between EQ and self-rated health, mental health, and occupational injury outcomes.

> **Subaim 2a. Explore proposed mediating mechanisms of the EQ-health association.** We examine three hypothesized mediators of the EQ-health relationship (material deprivation, employment-related stressors, and occupational risk factors).

Aim 4. Explore the mediating role of EQ in explaining gender health inequities. We perform exploratory mediation analysis to examine whether an unequal distribution of EQ across women and men contributes to gender inequities in general and mental health.

Chapter 2. The Social Production of Occupational Health: A Conceptual Model of Work, Health, and Health Inequities

1. INTRODUCTION

Despite recognition of work as an important determinant of *health*, and an important element of one's overall social position, a detailed conceptualization of the ways by which work contributes to and perpetuates *health inequities* is relatively underdeveloped. The challenge of integrating concepts of work within research on health inequities is at least partially due to the complexity of work as a concept, and the numerous and multilevel mechanisms by which work influences individual and population health (Ahonen et al., 2018). The content, character, and quality of work is extremely heterogeneous, with numerous health-relevant dimensions—many of which are difficult to operationalize within quantitative analyses. Work can be both health-promoting or deleterious, and influence health across multiple levels ranging from the proximal (e.g., exposure to hazardous materials) to the distal (e.g., contributing to one's social status within society). Further, work is fundamentally intertwined with other drivers of health inequities (e.g., educational attainment, income, social class). Several research frameworks developed in the fields of occupational health, social epidemiology, sociology, anthropology, economics, and psychology each provide insight to the importance of work-related determinants of health inequities. However, these parallel approaches have not been adequately integrated, leading to fragmentation in thinking and incomplete understanding of the contribution of work to the persistent social patterning of health and well-being (Ahonen et al., 2018). The lack of understanding of the role of work is a potentially important gap in health inequities research.

Studying how work contributes to health inequities is critical for several reasons. First, the quality of one's employment and working conditions is modifiable through interventions initiated at both policy and employer (or worksite) levels. Work thus represents a concrete venue by which to intervene to reduce health inequities: improving employment and working conditions may improve the health of millions, but

particularly benefit groups that are disproportionately impacted by low quality jobs. Additionally, the connection between work and health inequities has implications not only for the health of individuals but also for families, communities, and the larger society. For example, because healthy workers are more productive, reducing health inequities will benefit not only workers at the lower end of the socioeconomic spectrum, but also their employers and the economy at large—making this an area that could yield cooperation and effective solutions. Lastly, improving our understanding of work as a determinant of health inequities is increasingly important at this moment in time, as widening health inequities coincide with substantial shifts in labor markets, including the general erosion of models of stable/secure jobs toward more flexible and competitive employment practices (Kalleberg, 2009, 2011). The population health implications of these labor market trends, including who benefits or suffers from such changes, have not been adequately examined and compel further investigation (Benach et al., 2014; Peckham et al., 2017; Scott-Marshall & Tompa, 2011).

To date, much of the study of work and health has occurred within disciplines in which biomedical models of research are dominant (e.g., epidemiology, occupational health). Such research typically focuses on individuals as the unit of analysis, and thus seek to identify individual-level risk factors (e.g., exposure to biophysical agents, behaviors) responsible for disease (Wemrell et al., 2016); consequently, the topic of social health inequities is often largely ignored. When research on health inequities does consider work-related concepts, they are primarily incorporated in two specific forms. First, researchers use occupation-based indicators of socioeconomic status (SES; e.g., occupation code, required skills) to identify social gradients in health (as in, for example, the landmark Whitehall studies (Marmot et al., 1991)). Second, researchers examine the contribution of work-related factors in explaining observed socioeconomic health gradients, often via mediation analysis (e.g., see Dieker et al. (2019)). However, both forms of analysis are susceptible to eliding the complex relationships between work, health, and the socio-structural processes that shape unequal population health. For instance, in the first form, occupational indicators of SES do not reveal the actual mechanisms by which resources and status unequally accumulate across society, and thus produce health inequities (McCartney et al., 2019;

Muntaner et al., 2010). In the second form, these studies overwhelmingly focus on a narrow array of work-related factors—namely physical and psychosocial workplace exposures—despite the myriad linkages between work and health. In either form, researchers often evoke concepts such as differential exposure (i.e., when different working populations systematically experience disproportionate exposure to adverse job-related hazards) or differential susceptibility (i.e., when specific job-related hazards are more dangerous to certain working populations) without explicit attention to the social processes underlying such dynamics. To address these limitations, researchers investigating the relationship between work and health need to look 'upstream' (Ahonen et al., 2018; Lipscomb et al., 2006; Peckham et al., 2017).

Here we attempt to improve conceptual clarity around the pathways and mechanisms by which work may contribute to social health inequities. To guide our discussion, we start with a simplified model of the interrelationships between social position, work, and health (Figure 1). From our perch within the field of occupational health, we are fundamentally focused on the relationship between work and health (Fig. 1, pathway a). However, to understand how work relates to health inequities, we must acknowledge that status, power, and resources are unequally distributed among groups of workers within a society. Thus, we integrate into the traditional work-health model the concept of social position, which denotes "relative advantage and disadvantage in hierarchical societies" (Braveman, 2006; pg. 180). The work one does is highly intertwined with an individual's social position. For instance, work is an important source of socioeconomic resources such as existing material resources (e.g., income) and status (e.g., occupational prestige) (pathway e). Further, one's social position affects the type and quality of work they're able to access (pathway b), thus determining one's opportunity for livelihoods and exposure to risk across their work life. Social position also influences a workers' accumulation and access to non-work resources. This not only directly affects an individual's health (pathway d), but also modifies the relationship between one's work and health (pathway c). These relationships also operate in a reciprocal nature, with health affecting both social position (pathway f) and opportunity/ability to work (pathway g).

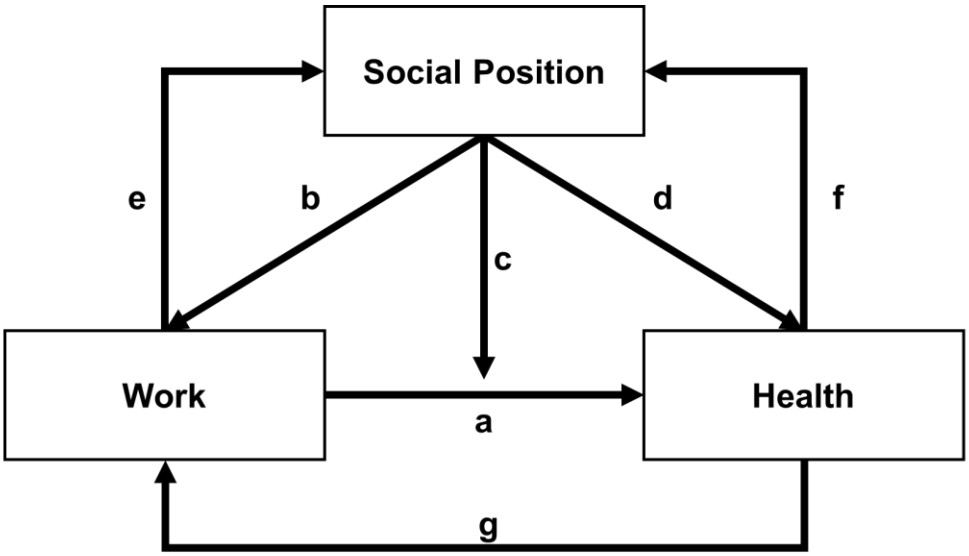

Figure 1. The complex interrelationships between social position, work, and health. Various dimensions of work affect health (pathway **a**). Resources and power within society are unequally distributed based on one's social position. This leads to a non-random distribution of work (**b**) and other non-work-related resources that affect health (**d**), the latter of which leads to differential work-health associations based on social position and its attendant resources (**c**). These relationships likely also work in reverse, with the work one does shaping their social position (**e**) and their health status influencing both social position (**f**) and the work they're able to do (**g**).

In the course of this paper, we examine each of these pathways in more depth. First, we argue that the conception of the work-health relationship (pathway a) must be expanded beyond the typical set of job-related environmental hazards considered in most work and health research. We call specific attention to the important topic of employment relations, a key potential pathway between work and health inequities (Benach et al., 2014; Muntaner, Solar, et al., 2010). We further clarify work as an important source of individuals' resources and status, and thus a determinant of social position (pathway e), which has implications for health through "non-work" pathways (pathway d). Finally, we apply the social production of disease framework from Diderichsen and colleagues (2001) to the occupational context, developing a conceptual model that clarifies specific socio-structural processes by which work contributes to social inequities in health: differential exposure to positive and negative work features (pathway b); differential susceptibility to these work features (pathway c); and differential long-term social and health consequences therefrom (pathways f and g). Our conceptualization provides several opportunities to advance research in this arena, as well as insight for possible interventions to reduce health inequities.

1.1. A note on terminology and scope

Our use of important terms follows the definitions in Ahonen et al. (2018). *Employment* refers to the legal relationship between buyers and sellers of labor (typically an employer and employee, respectively), which determines the rights, expectations, and responsibilities of each party. *Working conditions* represent the physical and social circumstances in which a worker performs their jobs, and *job characteristics* describe the nature of specific tasks. *Occupation* is used to organize the workforce into groups of workers that are assumed to have shared tasks and skills. We use the terms *job* and *work* to generally represent the package of employment relations, working conditions, job characteristics and occupation (Ahonen et al., 2018).

As noted above, we conceptualize social position as relative advantage and disadvantage within unequal societies (Braveman, 2006). It is important to clarify that social position is broader than just socioeconomic position. The latter is defined by Krieger and colleague's (1997) as consisting of two dimensions: (1) existing resources and (2) status, or the ability to obtain resources as needed based on rank or prestige within society. As described below, work is an important determinant of socioeconomic position. However, we use the broader concept of social position to also include other social characteristics and identities, such as race/ethnicity, gender, disability status, or geographic location. These other dimensions of social position are antecedent to and intersectional with, socioeconomic position, and, critically, are key determinants of work-related exposures and outcomes that contribute to differential health.

Our attention is focused primarily on formal economic work occurring within rich, industrialized economies; however, we acknowledge the strong need for further research on both informal employment and the role of working and employment conditions in producing health within low- and middle-income countries (which, like rich countries, are being greatly impacted by neoliberal globalization trends) (Benach et al., 2013). We also do not address directly the subject of unemployment, as it is large enough an issue that it deserves specific attention—although it is closely intertwined with many topics important in our discussion (e.g., job insecurity, material deprivation).

2. EXPANDING THE CONCEPTION OF THE WORK-HEALTH RELATIONSHIP

While the study of the work and health relationship (Fig. 1, pathway a) has a rich tradition, the vast majority of existing research has focused on a relatively narrow array of work-related factors. Notably, the field of occupational health (OH) has focused mostly on physical environmental hazards, such as exposure to toxic chemicals or physically demanding or dangerous work tasks. As developed economies transitioned away from industrial production and toward service-based industries, psychological and social work environments gained more attention with regard to consequences for health. The field of occupational health psychology (OHP), often using conceptual frameworks of work-related stress such as the Job Demand-Control-Support (Karasek et al., 1998; Karasek, 1979) and Effort-Reward Imbalance (Siegrist, 1996) models, has provided convincing evidence that the workplace psychosocial environment is associated with worker health (Daniels et al., 2007; Siegrist et al., 2007). However, scholars have increasingly deemed these existing models incomplete, arguing for an expansion of work and health research frameworks (Peckham et al., 2017; Schulte et al., 2017, 2019; Tompa et al., 2007). In particular, the OH and OHP approaches fundamentally assess risks arising from job characteristics and working conditions—that is, the nature of work tasks and the physical and social environments in which work takes place. This flattening of the concept of work to mean merely hazardous "exposures" occurring in the workplace is widely adopted, but does a disservice to the goal of deepening understanding of the causes of health inequities. Thus, to establish our discussion of health inequities, we first explore several important yet underappreciated pathways in which work affects health.

2.1. Accounting for conditions of the employment relationship

One key pathway between work and health that deserves more attention is the character and quality of the employment relationship. Within health research, initial treatment of this topic mostly entailed examining 'non-standard' work arrangements, especially non-permanent contracts (Benach et al., 2014; Kim et al., 2012). There is some wisdom in this approach, especially to the extent that these forms of employment

are useful proxies for an experience of increased job insecurity, which has a well-established relationship to poor physical and mental health (De Witte et al., 2016). However, a worker's experience in, and the health relevance of, any given employment relationship clearly transcends the expected duration the labor contract, or a single-dimensional focus on insecurity related to fear of losing one's job (Benach et al., 2014; Scott-Marshall & Tompa, 2011). Thus, developing more sophisticated approaches to conceptualizing and operationalizing the multidimensional nature of the employment relationship, and its relation to worker health, is an active area of research (Kreshpaj et al., 2020; Olsthoorn, 2014; Van Aerden et al., 2014; Vives et al., 2015).

One useful model is the job quality framework, which makes a conceptual and analytical distinction between *work quality*—the physical and social environmental factors studied extensively in OH and OHP research—and *employment quality*—which concern the terms and conditions of the employee-employer relationship (Holman & McClelland, 2011; Muñoz de Bustillo et al., 2009; Peckham et al., 2019; Van Aerden et al., 2014). In particular, employment quality focuses attention to both contractual (e.g., type of contract, wages/benefits, working time arrangements) and relational (e.g., interpersonal and collective power dynamics) aspects of one's employment (Julià et al., 2017; Van Aerden et al., 2014; Vanroelen, 2019). Employment quality thus fundamentally shapes a worker's overall experience in a job, such as the material rewards they receive, their perceptions of job security, or their control over their work (and, therefore, non-work life) schedules. Fittingly, a growing body of research has linked employment quality to a variety of physical and mental health indicators, including occupational injury, musculoskeletal disorders, cardiovascular events, fatigue, antidepressant use, and psychological distress (Benach et al., 2014; Kim et al., 2012; Peckham et al., 2019; Van Aerden et al., 2016, 2017).

Workers experience both work quality and employment quality simultaneously, which together contribute to the overall quality of one's job (Holman & McClelland, 2011; Muñoz de Bustillo et al., 2009). Yet, by parsing out the two, researchers can build upon the rich literature of working conditions to provide a more comprehensive understanding of job-level determinants of worker health and well-being.

Figure 2 expands the traditional OH framework to account for employment quality features (shown with rounded/shaded rectangles) that contribute to health independently of physical and psychosocial work quality, and demonstrates the pathways through which employment quality may affect health (Benach et al., 2014; Julià et al., 2017; Peckham et al., 2019). First, it is hypothesized that workers in low quality employment are exposed to more hazardous working conditions compared to those with high quality employment. These workers may receive less training, be less familiar with job hazards, placed in jobs with poorer conditions, and be reluctant or unable to refuse hazardous tasks (Aronsson & Göransson, 1999; Foley, 2017; Quinlan et al., 2001). Second, low quality employment may limit workers' control over their professional lives, creating feelings of job insecurity, unfairness, powerlessness, and lack of future opportunity—all powerful psychosocial stressors (Clarke et al., 2007; W. Lewchuk et al., 2008; Muntaner, Solar, et al., 2010). The third pathway between low quality employment and poor health, material resources, is driven by insufficient income or non-wage benefits (e.g., paid leave), and can lead to difficulty obtaining necessities, hamper long-term life planning, and independently contribute to psychological stress (Bosmans et al., 2016; Lewchuk et al., 2015; Premji, 2018; Tompa et al., 2007). By distinguishing work- and employment-focused aspects of job quality, we can integrate the quality of employment relationships into familiar OH and OHP framework. This is a useful approach to expanding the future of work and health research.

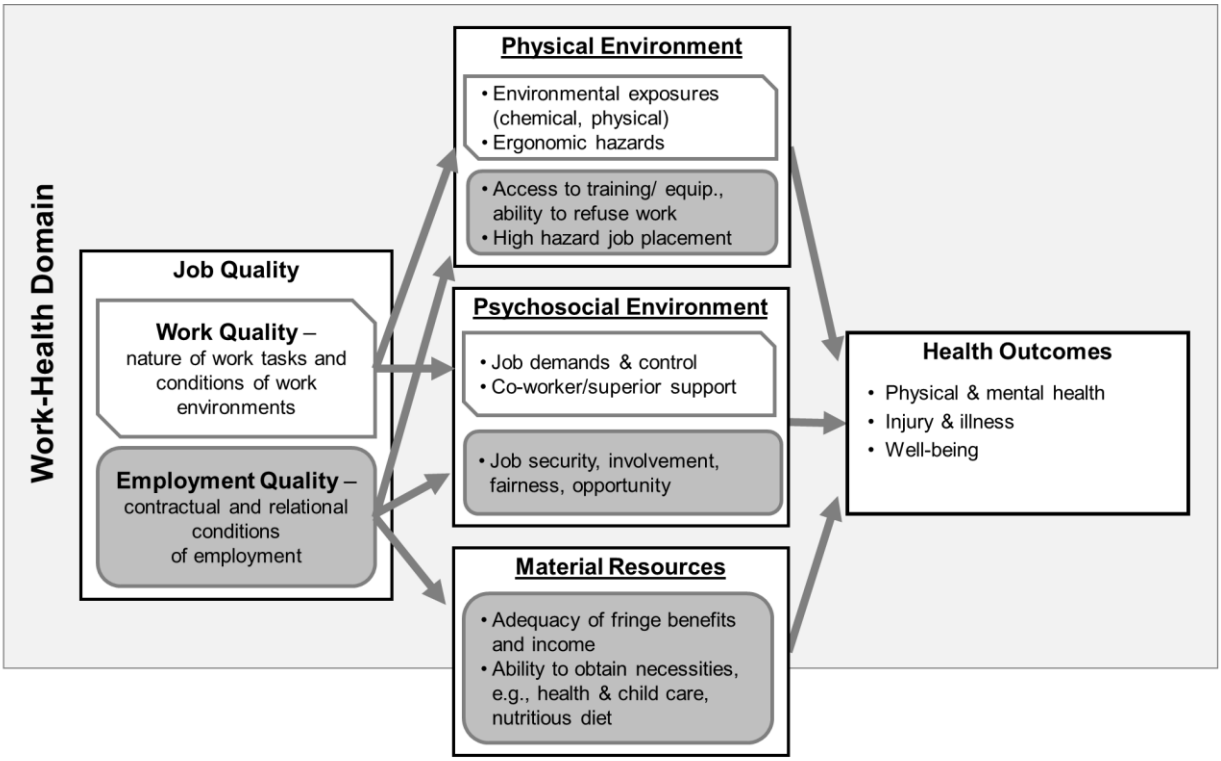

Figure 2. The work-health relationship, expanding the traditional conception of occupational "exposures" that impact health to include *employment quality* (rather than only *work quality*) conditions.

3. WORK AS A DETERMINANT OF SOCIAL POSITION

Extending our focus from work quality to employment quality also directs our attention to how work influences one's social position (Fig. 1, pathway e), and, thus, health through numerous "non-work" pathways (Fig. 1, pathway d). In particular, work contributes to the socioeconomic dimensions of overall social position, including, most directly, as a major determinant of one's level of actual resources (Fig. 2). Employment quality also explicitly acknowledges the role of social relations and power dynamics inherent in the relationship between buyers and sellers of labor, which provides a jumping off point to consider how work contributes to one's status and social class within a society.

3.1. Work as an important determinant of individuals' resources

For the majority of people, earnings from selling their labor is the most important means of obtaining the economic resources to achieve material well-being. In addition to labor income, one's job can also be a primary source of other material resources such as retirement savings, paid leave, or health insurance. These work-related resources greatly influence the conditions in which workers (and their families) live outside of work. For example, they may largely determine the quality and location of their housing and neighborhood; access to education; and ability to obtain health enhancing goods and services, such as nutritional food, medical care, or means of transportation (An et al., 2011).

In terms of non-material resources determined by work, time is a critical consideration: the timing and number of work hours, as well as workers' ability to modify them without detriment to their employment status, are major determinants of how employed individuals spend their non-working time. For example, one's work affects everything from their daily schedule, including when they are asleep and awake; when and how much time they can care for and socialize with friends and family; and how much time they have for leisure and rest. Work schedules and obligations can conflict and interfere with non-work life, affecting the health of both the worker and their family (Arlinghaus et al., 2019). Further, because basic health behaviors require some control over one's time and ability to plan, the type and level of control of work schedules influences workers' health behaviors (Escoto et al., 2010; Kivimäki et al., 2001; Winkler et al., 2018). In addition to time-based conflicts, work can strain non-work life by contributing to fatigue, anxiety, irritability, or other negative states that make it difficult to thrive in, or comply with demands from, non-work domains (Geurts & Demerouti, 2003). Although scholars have noted that both domains can influence each other, the large empirical literature on the work/non-work interface (including related concepts such as work-life balance or work-family conflict) seems to suggest negative influences are more likely to initiate from the work domain compared to the non-work domain (Geurts & Demerouti, 2003).

Work has been associated with a variety of other social and psychological resources. For instance, work can be an important source of social capital. Workplace social capital might represent beliefs and

attitudes shared among co-workers like trust, solidarity, or reciprocity, or practices such as collective action and mutual responsibility (Kouvonen et al., 2006). Social capital at work has been associated with workers' self-reported health, mental health, and mortality (Murayama et al., 2012; Oksanen et al., 2011). Other lines of research have related work to opportunities for social engagement and role enhancement (Barnett & Hyde, 2001; Thoits, 1995). Additionally, in societies where employment is the norm, work may be central to one's identity, meeting important psychological needs and contributing to meaning and overall productivity (Waddell & Burton, 2006).

3.2. Work as a determinant of status and social class

Work contributes to social positioning beyond simply being a source of material and social resources. Indeed, researchers concerned with social inequalities have long recognized that the work one does is a powerful proxy for social standing and overall life chances (Connelly et al., 2016). Thus, work-based measures of social position—based on information such as occupation (or job title), required skills, earnings, and leadership functions—intend to characterize "fundamental forms of social relations and inequalities to which income is merely epiphenomenal" (Connelly et al., 2016; pg. 2). Two helpful ways of conceptualizing the connection between work and social position include status and social class.

Status can be conceptualized as the ability to obtain resources as needed based on one's relative position within a socially ranked hierarchy (Krieger et al., 1997). Several studies have found that occupational classifications of status predict health after controlling for other SES measures including income and education (Barbeau et al., 2004; Fujishiro et al., 2011), suggesting that the status specifically provided by one's occupation may provide health advantage. Such measures of status, often referred to specifically as socioeconomic status, place an individual on a continuous or ordinal scale from low to high—so-called indicators of stratification. One well-theorized measure of work-related status is occupational prestige, which assesses society's collective perception regarding the status of a given occupation (Nakao & Treas, 1994). This metric has been associated with health, after adjustment for education, income, occupational category, or traditionally measured job stressors (Eaker et al., 2004;

Fujishiro et al., 2010). Higher occupational status could operate through mechanisms such as increased self-esteem, higher job satisfaction, and more positive social interactions (Fujishiro et al., 2010)—all of which may operate independently of work-health pathways discussed so far.

An alternative approach to measures of rank-based stratification is to use relational measures of social class. Relational social class theory posits that a society's distribution of resources and status is a result of interactions and relations (e.g., conflict) between discrete groups (Krieger et al., 1997; Muntaner, Borrell, et al., 2010). Many of the most common social class approaches seek to identify groups that occupy a similar position within the economic system of production. For these approaches, work is at the heart of social class: class designation is based on an individual's relations to control over productive assets (e.g., ownership of capital, management authority, or skills/credentials) as determined by their employment relations (e.g., owner vs. manager vs. frontline worker) (Eisenberg-Guyot & Prins, 2020; Muntaner, Borrell, et al., 2010). Its proponents argue that relational social class approaches provide an explicit theory as to mechanisms by which social inequalities are produced (e.g., exploitation and domination of workers by owners and managers, hoarding of opportunities by empowered classes), whereas stratification indicators like occupational prestige, income, or education are conceptualized at the individual-level (and thus ignore social relations) (Muntaner, 2019; Muntaner & Gunn, 2019). Further, in contrast to purely hierarchical concepts of stratification, social class theorizes that the relationship between social position and health need not take the form of a continuous, monotonic grade (although it often will) (Muntaner, Borrell, et al., 2010; Prins et al., 2015).

4. THE SOCIAL PRODUCTION OF OCCUPATIONAL HEALTH INEQUITIES

So far we have shown that there are many health-relevant aspects of work, which exert a strong influence over the physical, emotional, and social elements of *health* beyond simply "exposures" to beneficial or hazardous job-level factors. To focus our attention to the role of work in creating *health inequities*, we attempt to further embed the work-health relationship within a broader macrosocial context. In particular, we posit that by integrating theory about social stratification—which acknowledges the inequitable

distribution of resources and status (and power, knowledge, property, opportunity, etc.) across working populations—we can better conceptualize the specific mechanisms by which work contributes to social inequities in health. We further add theories from the relational social class literature to shed light on specific allocation mechanisms underlying social stratification. One helpful conceptual basis for understanding these dynamics lies in Diderichsen and colleagues' (2001) model of the social production of disease, which outlines four primary processes that lead to social health inequities: social stratification, differential exposure, differential susceptibility, and differential consequences. We relate this framework to the work-health context, and introduce a novel conceptual model that synthesizes the pathways linking social position, work, and health inequities (Figure 3).

4.1. Social stratification

Social stratification concerns the unequal allocation of resources, status, power, and knowledge across society based on social position, and is a foundational concept for understanding how work contributes to social health inequities. A specific component of social stratification is segmentation of the labor market, which considers how work is distributed across populations (Fig. 1, pathway b). Work segmentation occurs at the level of the labor market (e.g., selection of groups into particular occupations or firms) and at the level of the workplace (e.g., unequal distribution of tasks, employment conditions, rewards, and opportunity within organizations and worksites) (Avent-Holt et al., 2019; Storer et al., 2019). As with other social sorting processes, stratification of the labor market occurs along many social axes, including race/ethnicity, gender, citizenship status, social class, and education level (Reich et al., 1973; Wootton, 1997).

Several mechanisms by which social stratification is generated have been proposed, including those emanating from relational social class theory. From within Weberian-based social class theory, the mechanism of social closure describes the active prevention of certain groups from accessing favorable positions within the occupational structure. This hoarding of opportunities by those in high social positions can occur through processes such as 'credentialing'—that is, the process by which socially

valuable skills and knowledge are unevenly allocated throughout society, and then high quality jobs are limited to those with specific credentials (McCartney et al., 2019). Alternatively, Marxist-based social class theory emphasizes the control over productive assets that leads to exploitation and domination of workers in low social positions. Exploitation involves the appropriation of economic benefits generated by the labor of workers (i.e., the exploited) by those that own the means of production (i.e., the exploiters), thus creating material inequalities between classes. Domination concerns processes by which those with management authority control the activity of those in lower classes (e.g., surveillance, sanctions, hiring/firing), which has significant implications for workers' autonomy and security in both work and non-work life domains (McCartney et al., 2019; Muntaner, Ng, Chung, et al., 2015).

Another key mechanism contributing to the unequal allocation of work across society is discrimination, in which individuals are treated differently based on their membership within certain socially-defined groups. Group-based discrimination can occur regardless of economic position, and is intersectional with abovementioned mechanisms that create social class (McCartney et al., 2019). Observational and experimental evidence has documented the role of discriminant or biased hiring and promotion practices leading to negative labor market outcomes across race, gender, sexual orientation, and age groups (Badgett et al., 2009; Quillian et al., 2017). Others have noted that labor market stratification reflects broader historical injustices that result in unfair access to employment opportunities, for example, poor education systems in the U.S. predisposing Black workers to poor quality jobs (Haggerty & Johnson, 1995).

4.2. Differential exposure

The social distribution of work engenders differential exposure to various job conditions across working populations (Fig. 1, pathway b). It is well documented that marginalized social groups are selected into more dangerous occupations; consequently, these groups experience a disproportionate burden of exposures to traditional workplace physical and chemical hazards (Lipscomb et al., 2006; Murray, 2003). Employment quality is also unequally distributed across society: women, people of color, immigrants,

younger workers, and lower-skilled and lower-educated workers are overrepresented in jobs that are non-permanent, part-time, irregularly scheduled, or low wage (Menéndez et al., 2007; Puig-Barrachina et al., 2014; Scott-Marshall, 2010). In addition to segmentation into different occupations, stratification occurs at firm-level; that is, certain workers are sorted into firms that offer poorer quality jobs. For example, a recent analysis of precarious work schedules (e.g., canceled shifts, asocial working times) found that firm-level sorting by race contributed substantially to inequalities in employment quality between white and non-white workers (Storer et al., 2019). Stratification can also take place within firms and worksites, such that more hazardous jobs or tasks are differentially assigned to disempowered working populations (Lipscomb et al., 2006; Meyer, 2014; Okechukwu et al., 2014). A classic example of racial discrimination leading to disproportionate exposures at the worksite-level is Lloyd's 1971 report of the steel workers: they found that black workers had 10-times the risk of lung cancer compared to white workers, due to their disproportionate assignment to working on the topside of the coke ovens where the highest chemical exposures occurred (Lloyd, 1971). Krieger et al. (Krieger et al., 2008) deemed these dynamics the "inverse hazard law," which posits that "accumulation of health hazards tends to vary inversely with the power and resources of the populations affected" (pg. 1970).

Many have noted that work-related psychosocial exposures have a more complicated distribution across occupational groups. Whereas lower status jobs typically have more exposure to low job control and job strain (a combination of low control and high demands), high status jobs are commonly characterized by high demands and autonomy, which can lead to higher levels of work-life interference and potentially worse health outcomes (Clougherty et al., 2010; Qiu et al., 2012; Vanroelen et al., 2010). Research using social class frameworks have identified higher risk of mental health disorders in those within "contradictory" class locations; that is, lower- and middle-level managers that may have some management authority and higher wages than frontline workers, but are required to enforce company policies in which they had little input in developing, while also facing animosity from their subordinates (Muntaner et al., 1998; Prins et al., 2015).

4.3. Differential susceptibility

Social stratification may also contribute to differential susceptibility to health-damaging features of work (Fig. 1 pathway c). In the first place, workers within low social positions may be more susceptible to health risk from any specific work-related hazard due to multiple concurring social and environmental hazards occurring outside of work. For example, these groups may be more likely to experience economic deprivation, poor housing or neighborhood conditions, or exposure to violence. These non-work sources of adversity can contribute to chronic stress, reduced immune function, and/or generally limit one's ability to cope with physiologic or stress-related insults (McEwen & Seeman, 1999). Thus, even if the quality and character of work was equally distributed across all groups, differences in susceptibility, as structured by social positioning, could contribute to social gradients in health. On the other hand, this dynamic can also be mutually reinforcing: low quality jobs provide less access to resources, which creates poor social and material conditions that further limit workers' access to resources to promote health. It is also important to consider the influence of multiple coinciding social identities that affect both stratification processes and differences in work-health relationships across populations. Scholars have recently evoked theories of intersectionality (Ahonen et al., 2018; de los Reyes, 2017) or "overlapping vulnerabilities" (Cunningham et al., 2018) as useful frameworks to evaluate work and health inequities.

4.4. Differential consequences

The fourth mechanism in the social production of disease theory concerns differential consequences resulting from poor health (Fig. 1, pathways f and g). Applied here, this means that deleterious health effects from one's work may result in variable longer term social and economic impacts depending on a worker's existing social position. Similar to susceptibility, differential consequences may be a result of an uneven distribution of the social and material resources and ability to cope with ill health caused by adverse working and employment conditions. One straightforward and documented example is the differential experience of occupational injuries. Because the direct costs of workplace injury and illnesses are often largely borne by workers and their families, low-wage workers are disproportionately impacted

(Dembe, 2001; Michaels, 2015; Sears et al., 2019). Likewise, workers in low social positions who become injured face additional barriers for safely returning to work, such as more severe administrative burden to accessing workers compensation systems, limited knowledge of rights, language barriers, or fear of retaliation (Michaels, 2015). Indeed, evidence shows that Latino workers, for example, are not only more likely to experience severe injuries (perhaps due to differential exposure and/or susceptibility to physical hazards), but are also less likely to have access to insurance that will cover care and have greater difficulty resolving workers compensation claims compared to white workers (Nicholson et al., 2008)—all of which are likely to lead to worse long-term outcomes. This dynamic relates to the concept of syndemics developed within medical anthropology, in which certain populations suffer from co-occurring or sequential "synergistic epidemics", promoted by social and environmental conditions, that create additional health problems (Singer et al., 2017). The syndemics framework has been used specifically to examine Latino workers who suffer occupational injuries, which, fueled by existing vulnerabilities, leads to subsequent poorer health and reduced economic activity (Unterberger, 2018). This highlights the importance of reciprocal relationships between health and both work and social position; that is, health status can determine the type of work one is able to do (if any)—with existing poor health associated with worse quality jobs (Burgard & Lin, 2014)—as well as influence future social position (Mulatu & Schooler, 2002).

4.5. A Conceptual model of work, health, and health inequities

Taken together, the social production of disease model provides a useful conceptual basis for integrating the work-health relationship into a macrosocial context to elucidate the contribution of work to differential risk, and thus health inequities, across working populations. To synthesize our full discussion, we introduce a more detailed conceptual model (Figure 3).

The model shows schematically how social position relates to the work-health relationship, and attempts to elucidate specific pathways and mechanism contributing to social health inequities. As noted above, one's social position is determined by a multitude of factors, including the resources and status

from one's work. Social position is further determined by non-work-related sources of power and resources, such as education or wealth, as well as social characteristics, such as gender or race/ethnicity. Social stratification within labor markets and organizations based on one's relative dis/advantage results in differential exposure to positive and adverse job features. A worker's social position also determines their social and material conditions outside of the workplace, which contributes to differential susceptibility to (or ability to benefit from) these features, as well as influence ability to cope (or flourish) in the longer term, which has further implications for differential consequences related to various social, financial, health-related outcomes. The differential exposure, susceptibility, and consequence processes are overlaid onto the familiar OH exposure-disease framework.

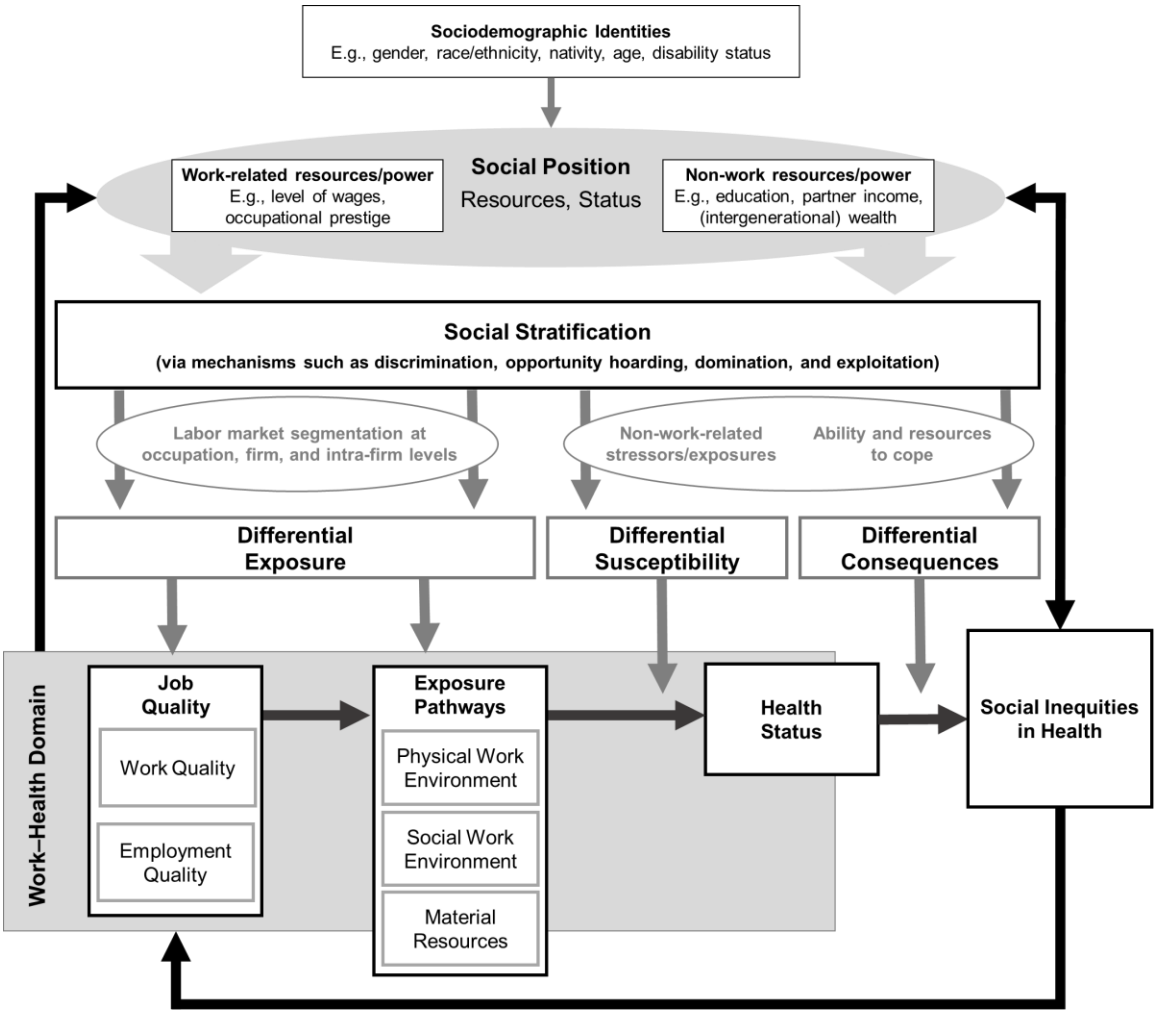

Figure 3. A conceptual framework for work and health inequities.

5. DISCUSSION

In this essay we attempt to highlight the complex connections between work, health, and health inequities. By acknowledging the unequal societal distribution of advantage and disadvantage, as well as the work's central role in the allocation thereof, we believe our perspective helps clarify important work-related social processes that lead to differential health experience across working populations. We additionally hope to promote further data collection and testing of proposed pathways and mechanisms.

5.1. Research implications

Our conceptual model builds upon numerous recent efforts to conceptualize work and health inequities (Benach et al., 2014; Burgard & Lin, 2014; Clougherty et al., 2010; Landsbergis et al., 2014; Lipscomb et al., 2006; Murray, 2003; Okechukwu et al., 2014; Schnall et al., 2016). The earliest studies on this topic, rooted within a traditional occupational health exposure-disease framework, focused primarily on documenting group differences in exposure to physical and chemical hazards, or incidence of occupationally-associated disease and injury (for example, see Davis (1977) or Robinson (1987)). Subsequent studies have emphasized the contribution of the psychosocial work environment (Hoven & Siegrist, 2013; Schnall et al., 2016) and the character of employment relations (Benach et al., 2014). A key concept within much of the existing literature on work and health inequities is that workers within various groups are differentially exposed and/or susceptible to work-related hazards. However, to identify effective policy to reduce such inequities, we will need to develop a deeper understanding about the specific pathways and mechanisms by which these inequities are created and maintained.

One influential conceptual approach to studying health disparities is to focus on specific mediating pathways (Diez Roux, 2012). This approach entails examination of how upstream determinants of health (e.g., socioeconomic status) are "explained" by more proximal risk factors, for example, using mediation analysis techniques to quantify the extent that the magnitude of health disparities change when the downstream factors are modified. In this way, the 'pathways model' approach (Diez Roux, 2012) ostensibly identifies targets for interventions that will reduce health inequities. However, given the vast

range of potential drivers of health inequities, it is critical to consider what factors are included in such analyses: this choice implicates which types of interventions or policies might be identified as effective in reducing disparities. While we acknowledge that different disciplines will understandably emphasize different pathways, we nevertheless argue that work-related factors are relatively understudied in relation to their potential contribution to health disparities. When work-related factors are considered, it tends to be limited to physical, chemical, and psychosocial work hazards. Even within this narrow conceptualization of work, evidence suggests these aspects of work quality make a meaningful contribution to explaining social gradients in health (Dieker et al., 2019; Hoven & Siegrist, 2013). Our model suggests at least two specific improvements by which analyses using a pathways approach could better elucidate the contribution of work to health inequities.

First, rather than only considering aspects of work quality, future research should also account for employment quality-based aspects of jobs. Health researchers should continue to build and innovate on the rich literature examining distributional impacts associated with various contractual aspects of employment relationships (e.g., contract types, schedules, wages/benefits); however, public health must also better conceptualize the multidimensional nature of employment relationships, including recognizing it as a location by which macro- and micro-level social processes converge to create power imbalances between workers and employers. Relational employment dynamics (e.g., workers' access to training, participation, and collective representation) are much less studied from a population health lens. To do so, we will need better and more detailed surveillance of employment conditions, as well as methodological development of how to integrate such conditions into epidemiologic analyses. Note that employment quality shares similar theoretical foundations as the construct of precarious employment, which has a rich history within social science scholarship and is increasingly gaining traction within health research (Benach et al., 2014; Bodin et al., 2019; Julià et al., 2017; Kreshpaj et al., 2020). In practice, however, the precarious employment construct also suffers from serious conceptual challenges, having different meanings, and applications across different levels of analyses, within the many disciplines for which it is an influential concept (Barbier, 2011; Bodin et al., 2019; Campbell & Price, 2016). Thus, we favor the

relative simplicity of the job quality framework as a way to facilitate wider attention to the character of employment relationships within the epidemiology of work and health inequities.

Second, it should be noted that mediation analysis is primarily relevant to characterizing disparities related to differential exposure across groups, while the role of differential susceptibility is less often addressed within empirical research (Diderichsen et al., 2018; Hoven & Siegrist, 2013; Vanroelen et al., 2010). Susceptibility can be operationalized with the statistical concept of interaction, in which the joint effect of two (or more) exposures on a health outcome is examined (Vanderweele, 2009); for instance, those exposed to both high levels of psychosocial job stressors and low social position may experience worse health compared to those exposed to similar levels of job stress but with higher social position. Recent advances in mediation analysis, based on a counterfactual framework, have made it possible to examine both mediation and interaction simultaneously (Diderichsen et al., 2018; Vanderweele, 2014). Accordingly, researchers can use these methods to better understand hypothesized pathways between social position and health, including how much of the health association is due to differential exposure or differential susceptibility (Diderichsen et al., 2018). This is particularly important in cases of 'mediated interaction'; that is, when the effect of social position may depend on a mediator, but the level of exposure to the mediator is also influenced by social position. As outlined in our conceptual model, this is precisely what we expect for many aspects of work: social position influences health at least partially based on proximal working and employment conditions, but these conditions themselves are non-randomly distributed across populations based on social positioning.

However, our model suggests the relevant mechanism are largely social in nature, and are not adequately addressed by purely biomedical or 'risk factor' research models that tend to dominate occupational epidemiology. Indeed, rather than simply a collection of different risk factors, we have attempted to clarify work as a social determinant of health that operates through a wide variety "non-work" pathways. This notion relates closely to another influential conceptual approach in health inequities scholarship: the fundamental causes model. Fundamental causes theory posits that social gradients in health are rooted in differential access to a wide range of flexible resources, such as knowledge, power,

money, prestige, and social connections, that can be leveraged to achieve good health (Link & Phelan, 1995; Phelan et al., 2010). Because one's job is so intertwined in generating and attaining these resources, some researchers have suggested that work itself be considered a fundamental cause of health inequities (Ahonen et al., 2018). This framework emphasizes a process by which distal factors continuously create health inequities, even if proximal factors change or are replaced over time. In this way, the fundamental causes model can be conceived of as a "metamechanism" (Lutfey & Freese, 2005) that compliments an approach concerned with the unequal distribution of proximal risk factors: it helps account for the wide variety of health outcomes that exhibit social gradients, and emphasizes the necessity of intervening upstream to address social mechanisms of health. However, we believe researchers should continue to strive to conceptualize and operationalize specific socio-structural mechanisms by which health inequities are generated. For instance, researchers examining social class-based health inequalities have recently explored different approaches to operationalize worker exploitation within epidemiologic analyses (Muntaner, et al., 2015; Prins et al., 2019). Theoretically-grounded frameworks focused on discrimination-based health inequities (e.g., Public Health Critical Race praxis) have likewise emphasized the need to explicitly investigate underlying contributing mechanisms (Thrasher et al., 2012).

Lastly, our model also focuses attention to the importance of differential consequences in producing health inequities, which requires getting beyond a simple exposure-outcome model. In other words, because workers have different experiences after any given work-related health event, research that simply characterizes associations between exposures and occupational health outcomes will not capture important dimensions of inequities occurring across longer time sequences. This suggests strongly that work and health inequities researchers adopt a life course perspective (Amick et al., 2016).

6. CONCLUSION

Researchers seeking to understand and reduce health inequities should consider the role of work. In addition to traditionally studied aspects of the work environment, the quality of the employment relationship also contributes substantially to a worker's health and well-being. Both work quality and

employment quality concern job-level characteristics; yet, work readily bleeds into non-work realms, including determining one's resources and contributing to a worker's social status within society. As a result, the work-health relationship needs to be placed within the context of social stratification in order to better understand the creation and perpetuation of health disparities and to identify effective interventions.

Chapter 3. What does non-standard employment look like in the U.S.? An empirical typology of employment quality

1. INTRODUCTION

A growing body of research has suggested dramatic changes in the organization and character of employment relations over the last several decades. Understanding contemporary employment arrangements is critical for several reasons. Most directly, the nature and quality of employment is of paramount importance for individuals' social and economic well-being. This can be illustrated, for example, in the growing body of research linking various aspects of employment to worker's physical and mental health (Benach et al., 2014; Kim et al., 2012). Further, employment relations are implicated in the generation and reproduction of social inequalities, as beneficial and adverse employment conditions are unevenly distributed across major axes of social stratification (e.g., race/ethnicity, gender, class) (Puig-Barrachina et al., 2014; Scott-Marshall, 2010). The employment relationship is also the level at which many labor regulations and interventions are designed and implemented. Yet, despite sustained interest in this topic, researchers have struggled with conceptualizing and operationalizing the multifaceted and heterogeneous nature of modern employment within quantitative research frameworks.

One useful way to describe recent labor market trends is the observation that—due to a variety of economic and sociopolitical drivers, such as decelerated economic growth, technological innovation, and the globalization of product and labor markets—there has been a general decline of the so-called "Standard Employment Relationship" (SER) (Benach et al., 2014; Kalleberg, 2003, 2011). The SER concept gained footing as the normative gold standard for employment relations in the Post-WWII era, being conceptualized as stable, full-time employment, with regularly scheduled hours, secure pay and benefits, collective representation, and adequate social protections (Bosch, 2004; Kalleberg et al., 2000). Although SER was never truly a 'standard' labor market experience—women and people of color were often excluded even during its supposed apex, nor is it typical within a broader historical perspective of

capitalism (Kalleberg & Vallas, 2017; Michael Quinlan, 2012)—it provides a useful point of departure for studying contemporary employment relationships in a nuanced and comprehensive manner (Van Aerden et al., 2014). In particular, we highlight two key insights from the SER concept that elucidate paths toward improved measurement of employment relationships for quantitative analysis.

For one, the 'decline of SER' framing reveals that employment relations can shift across multiple dimensions relevant to workers' experience in their jobs. For instance, the de-standardization of employment could manifest as increasingly insecure contracts, lower levels of compensation, irregular working hours and schedules, or more unbalanced worker-employer power dynamics. Yet most researchers investigating the character of employment relations have used unidimensional approaches, focusing on only one aspect of employment at a time (Hudson, 2007). Further, much of the existing literature on employment relations has focused on a narrow set of employment characteristics, namely various forms of non-permanent contractual arrangements (e.g., Fuller & Vosko, 2008; Scherer, 2009). While such studies have provided valuable insights, we believe that acknowledging the multidimensional nature of employment relationships is a key first step in advancing measurement thereof.

Second, the SER concept calls attention to the fact that worker's experience employment relationships as a package, consisting of various configurations of favorable and adverse features—it is the combination of stability, adequate compensation, social protections, etc., that position SER as the ideal-type employment. Therefore, in addition to recognizing employment relationships as a multidimensional phenomenon, we must account for the fact that the multiple dimensions can deviate from the SER ideal to various degrees, creating numerous potential patterns of employment. This insight calls into question empirical approaches that assume that the quality of employment can be adequately captured as a dichotomous variable or positioned within continuous scales from low to high—for example, along axes of income or insecurity (Van Aerden et al., 2014). On the other hand, research traditions such as labor market segmentation are explicitly based on theory in which good and bad job features are thought to cluster together (Doeringer & Piore, 1971). However, analyses from this literature typically do not empirically investigate how various aspects of employment relationships are actually

patterned. Instead, they assume certain labor market divisions exist (e.g., dualist theories of 'insiders' vs. 'outsiders') and document the extent to which they can be observed (Yoon & Chung, 2016). More recently, scholars have attempted to identify different configurations of employment in contemporary labor markets using data-driven approaches (e.g., Doerflinger et al., 2019; Van Aerden et al., 2014); however, this work has been mostly confined to the European context.

This study is focused on advancing the ways in which employment relationships are theorized and measured within empirical research. Specifically, we construct a typology of the multidimensional construct of employment quality within a representative sample of the U.S. labor force, following closely the approach proposed by Van Aerden et al. (2014). First we outline the theoretical and methodological rationale for such an approach.

2. BACKGROUND

2.1. Developing a meaningful measure of employment relations

In considering how to construct a useful measurement of employment relationships, we are influenced by recent scholarship concerned with operationalizing job quality in the European Union (Muñoz de Bustillo et al., 2009). This literature is particularly useful due to its goal of imposing structure to the wide variety of potential job-related benefits and risks, specifically to develop quantitative indices for comparative research (Christophe Vanroelen, 2019). Several critical reviews and syntheses of the many proposed job quality metrics provide useful insight regarding the development of an employment measure (Holman & McClelland, 2011; Munoz de Bustillo et al., 2011; Muñoz de Bustillo et al., 2009; Piasna et al., 2017).

First, there is widespread agreement that examining the character and quality of jobs involves measuring multiple dimensions. Job quality researchers further make a conceptual and analytical distinction between *work* features and *employment* features (Holman & McClelland, 2011; Muñoz de Bustillo et al., 2009). Work features concern the intrinsic characteristics of job tasks (e.g., complex, varied) and the physical and psychosocial environments in which work takes place (e.g., chemical exposures, psychological demands). On the other hand, in this study we are focused on employment

features, which include the nature of the employment contract and worker-employer relations. Although terms such as ‘quality of employment’, ‘working conditions’, and ‘job quality’ are often used interchangeably (Burchell et al., 2014), herein we use ‘employment’ in a purposeful way; for instance, in characterizing employment relationships, we are not interested in the character of job tasks or measures of job stress (such as those based on the job demand-control model proposed by Karasek (1979)).

A second insight cautions against the usage of purely subjective measures (Burchell et al., 2014; Muñoz de Bustillo et al., 2009; Piasna et al., 2017). Job quality scholars have noted that subjective assessment of job satisfaction, for example, depends largely on workers’ individual preferences and expectations (Piasna et al., 2017). With regards to measurement of employment relationships, this is analogous to assessments of subjective job insecurity, which typically concern workers’ perceptions related to the threat of involuntarily job loss or fear of losing other valued job features (De Witte et al., 2016). Perceived job insecurity measures are likewise susceptible to variation by both individual-level (e.g., expectations) and macro-level contextual factors (e.g., unemployment rates), rather than capturing the reality of actual employment conditions (Benach et al., 2014). Such measures are therefore not suitable for characterizing the objective structure of modern employment relationships.

A third concern is the appropriate level of analysis. Here, we are focused on the level of the employment relationship itself, as we are interested in capturing the conditions of worker-employer relationships. Other levels of analysis, such as workers themselves (e.g., gender, human capital endowments) or labor market institutions and regulatory policy regimes (e.g., union density, generosity of welfare state), are important in understanding the causes and consequences of various forms of employment, but should not be included in measures thereof (Bodin et al., 2019; Burchell et al., 2014; Piasna et al., 2017). In other words, we seek to separate workers’ experience within a job (e.g., perceived insecurity) as downstream of actual employment conditions, and moderated by their personal circumstances; similarly, regulatory and other sociopolitical forces that shape labor markets are antecedent to the type and distribution of employment arrangements, and also moderate worker-level outcomes. This approach differs, for example, from other studies that have operationalized precariously-

employed *workers*, combining employment characteristics with aspects of workers' individual social and policy contexts into a single variable (e.g., see Olsthoorn, 2014).

2.2. The multidimensional construct of employment quality

In terms of what aspects of employment to measure, we start from a broad and idealized conception of the SER. We specifically desire to move beyond a dynamic in which SER is operationalized as simply whether or not a worker is engaged in a permanent, ongoing contract, distinguishing these workers from all others within various forms of 'non-standard' employment contracts (e.g., fixed-term direct hires, temporary agency workers, part-time) (e.g., see Kim et al., 2006). In our view, the SER concept is instead meant to conjure a broader social contract between worker and employer, manifesting in security and stability across workers' compensation, working times, rights and protections in the workplace, development opportunities, collective representation, and participation in decision-making (e.g., see Bosch 2004). As with contract type, other aspects of employment are often examined individually; for example, many studies have measured the quality of employment as a function of wages (e.g., see Howell and Kalleberg 2019). The use of such approaches is at least somewhat a practical issue, for example, based on limitations of existing data sources. However, the nature of one's employment clearly goes beyond employment stability and wages. For instance, research focused on the timing, stability, and flexibility of work schedules has found that scheduling practices resulting in volatile and inflexible work hours (e.g., little advanced notice, varying number and timing of hours, limited worker input/control over working times) are widespread in the contemporary labor market (Lambert et al., 2018; Schneider & Harknett, 2019). To be fair, the use of pragmatic measures such as contract type or wages is justified to the extent that these variables are often correlated with other dimensions of employment. For instance, workers with temporary contracts have, on average, lower wages, less fringe benefits, and less access to training and skill development (Green, 2008; Scherer, 2009). However, these narrowly-defined metrics are inherently limited, and a multidimensional approach is needed to better understand the microstructures of existing employment relationships.

To address the multidimensional reality of employment relations, we use the construct of employment quality (EQ). Building on a series of recent studies, we conceptualize EQ as consisting of the following seven dimensions: [1] employment stability, [2] material rewards, [3] workers' rights and social protections, [4] working time arrangements, [5] training and employability opportunities, [6] collective organization, and [7] interpersonal power relations (Julià et al., 2017; Peckham et al., 2019; Van Aerden et al., 2014, 2015, 2016, 2017). We argue that the EQ framework maps on well to a broad view of the SER, accounting for the numerous aspects of an employment relationship that can potentially de-standardize. Indeed, the EQ construct largely developed alongside more recent attempts to operationalize precarious employment within occupational health research (see Julià et al., 2017). These researchers have the specific goal of characterizing health implications of non-standard and insecure employment, building upon a large body of health research that showed that work-related insecurity can arise from a range of factors beyond non-permanent contracts (Ferrie et al., 2003; Scott-Marshall, 2010; Tompa et al., 2007). Perhaps because of the particular focus on worker health and well-being, both EQ and more recent precarious employment measures emphasize relational dimensions of employment arrangements—for example, workers' rights, union representation, and participation in workplace decision-making—rather than only contractual dimensions related to employment status, wages, and working times. Importantly, prior research has shown that it is possible to operationalize EQ in accordance with the criteria described in the previous section using proxy indicators from secondary data—i.e., a multidimensional measure, consisting of objective characteristics of the employment relationship itself (Van Aerden et al., 2014).

2.3. Typological measurement of employment quality

Within a quantitative analytic framework, acknowledging the multidimensionality of employment quality poses a methodological decision regarding choice of multivariate measurement approach. The typical method has been to assume that different aspects of employment can be meaningfully aggregated into a continuous measurement scale—for example, on a dimension from low to high job quality or employment precariousness. Mechanically, this can be accomplished by developing a composite index (e.g., Patil et

al., 2020), scale (e.g., Vives et al. 2015), or with data reduction techniques such as principle component or factor analysis (e.g., Hudson 2007). Subscales or systems of indicators can also be examined individually (Muñoz de Bustillo et al., 2009).

Alternatively, we argue that it is more valuable to conceptualize employment relationships as packages of multiple simultaneously occurring features—good or bad, from the workers' perspective—that can be configured in various ways within any given arrangement. The extent to which different features combine together within jobs can be better characterized using a typological measurement approach, which assumes population heterogeneity in the studied phenomena and identifies patterns (or types) based on covariance structure of the multiple constituting indicators. Typological measurement, also called a person-centered (as opposed to variable-centered) approach (Bergman & Magnusson, 1997), prototypically involves cluster or class-based methods. One such approach is latent class analysis (LCA), which identifies unobserved subgroups in a given population based on responses to a set of observed indicators. Scholars have noted that LCA has specific statistical advantages that make it useful for studying employment relationships, including ability to (a) elucidate complex patterns of multidimensional constructs; (b) test for measurement invariance across different contexts (e.g., year, country); and (c) estimate and adjust for model misclassification error when examining correlations to external variables (Lukac et al. 2019).

The notion that different employment characteristics cluster together in predictable combinations is an influential concept in the research of employment relations, especially within the labor market segmentation tradition. In particular, dual labor market theory proposes the existence of primary and secondary labor markets, with the former consisting of high quality, SER-like jobs, and the latter resembling an accumulation of poor employment features (Doeringer & Piore, 1971). More recently, however, scholars have criticized the labor market dualism concept as too simplistic, and have sought more complex and detailed descriptions of existing employment segments (Davidsson & Naczyk, 2009; Christophe Vanroelen, 2019; Yoon & Chung, 2016). In contrast to a dichotomous labor market, a more likely scenario is that employers have responded to increasingly competitive economic trends with a

number of different adaptation strategies in regards to the structuring of employment relations (Van Aerden et al., 2014; Christophe Vanroelen, 2019). A 'high road' strategy could involve establishing a core group of highly-skilled and strategically important workers that receive favorable employment conditions in exchange for increasing their range of tasks, responsibilities, and commitment (e.g., an expectation of working overtime hours). This strategy provides a firm with functional versatility and high employee performance, while also enhancing workers' career opportunity and bargaining power (Kalleberg, 2003; Christophe Vanroelen, 2019). On the other hand, 'low road' strategies involve a general diminishing of commitments and rewards directed to workers, with the goal of increasing firms' ability to adjust the size of its workforce and externalizing costs and risks onto workers or third-party entities (e.g., staffing agencies) (Kalleberg, 2003; Van Aerden et al., 2014). Low road strategies could manifest as insecure contracts, irregular and asocial working hours, low compensation, and generally poor relations between workers and employers. The pursuit of various high and low road strategies is thought to lead to multiple versions of 'non-standard' employment (Christophe Vanroelen, 2019).

A series of recent studies have empirically investigated employment patterns using typological measurement approaches, finding more heterogeneity than simplistic dualist insider/outsider or standard/non-standard dichotomies. The present study follows most directly the approach of Van Aerden and colleagues (2014, 2015, 2016, 2017), who employed latent class analysis to characterize patterns of EQ among wage earners in European Union. These researchers identified five EQ 'types', including a SER-like group and various distinct EQ configurations consistent with both high and low road de-standardization strategies. Using different conceptual frameworks to guide their measurement, other studies from the labor market segmentation literature have identified between three and seven employment forms in the United Kingdom (Yoon & Chung, 2016) and European Union (Doerflinger et al., 2019; Lukac et al., 2019). However, to our knowledge no such analysis has been conducted in the U.S. context, even though the quality of employment is likely to have outsized importance on livelihoods in the U.S. given the weak social wage provided by governmental benefits and insurance programs.

Further, these studies typically ignore self-employed workers, which make up a substantial portion of the overall workforce typically deemed 'non-standard'.

2.4. The current study

In this study, we investigate the character and distribution of employment relationships in the United States, using a nuanced, theoretically-grounded approach that attempts to address methodological limitations present in the existing literature. Our approach, originally proposed by Van Aerden et al. (2014), uses the multidimensional construct of EQ, which includes both contractual (e.g., wage, hours) and relational (e.g., employee representation and participation) aspects of employer-worker relationships (Eurofound, 2013a; Van Aerden et al., 2014). Further, we employ a typological measurement approach, using LCA, to explicitly examine how the multiple aspects of EQ cluster together in the modern U.S. labor market. To assess the utility of our EQ measure, and to further understand how labor markets contribute to persistent social inequalities, we additionally examine how identified employment patterns are correlated with sociodemographic, family-level, and labor market-related characteristics. Lastly, we contextualize our findings with those from similar studies examining the European labor market.

3. DATA AND METHODS

3.1. Data

To examine employment quality in the U.S. context, we use data from the General Social Survey (GSS), a nationally representative, repeated cross-sectional survey of non-institutionalized American adults (T. W. Smith et al., 2019). Every four years since 2002, the GSS has included a Quality of Work Life (QWL) module, which assesses a variety of employment and working conditions among GSS respondents engaged in paid labor. Sample weights provided by the GSS are included in all analyses to account for number of adults in each household and nonresponse. Across five survey waves (2002, 2006, 2010, 2014, and 2018), a total of 7,407 respondents completed the QWL module and indicated that they were

currently employed (i.e., working full- or part-time, or temporarily not working due to strike, vacation, or temporary illness).

3.2. Measures

3.2.1. Employment quality indicators

We operationalize the EQ construct using 11 proxy indicators available within the GSS, each representing various aspects of the seven conceptual EQ dimensions. These indicators are similar to those used in prior research on EQ conducted in the European Union (Van Aerden et al., 2014, 2016, 2017). The first dimension of EQ, employment stability, contains a single measure of ***employment contract***. This item indicates whether a worker's main job is 1) regular, permanent employment or a 2) non-permanent (i.e., independent contractor; working under a contractor; employment on an on-call basis, or paid by temporary agency). The second dimension, material rewards, includes an indicator of ***income level***. This item uses year-specific sample quartiles of individual labor income from their principal job to create three categories: 1) lowest; 2) second and third; and 3) highest quartile. The third EQ dimension, workers' rights and social protections, includes one indicator of ***mandatory days of extra work hours***. This indicator is measured by combining a) an item regarding the number days per month the respondent works extra hours beyond their usual schedule with b) an item denoting if these extra hours were required by their employer. This measure has three categories: 1) zero days; 2) between 1 and 10 days; and 3) >11 days. Two proxy indicators are included to represent the dimension of working time arrangements. The ***number of working hours*** indicator has four categories: 1) <24 hours; 2) 25-36 hours; 3) 37-48 hours; and 4) >48 hours. The indicator for ***regularity of working times*** distinguishing between 1) day shift; 2) afternoon or night shift; and 3) split, irregular, on-call, or rotating shifts. The fifth dimension, training and employability opportunities, contains an indicator for ***opportunity to develop abilities***. This is a dichotomous measure indicating if the worker has an opportunity to develop their own special abilities: 1) yes ('very true' or 'somewhat true') and 2) no ('not too true' or 'not at all true'). The sixth dimension, collective power dynamics, includes two indicators. An indicator for ***having adequate information,***

equipment, and training combines two items asking if workers have enough a) help and equipment, and b) information to get their job done. This measure is dichotomized to 1) yes ('often' or 'sometimes' responses to both items) and 2) no (responses of 'rarely' or 'never' on at least one). Another indicator denotes ***union membership***: 1) yes and 2) no. The last dimension, interpersonal power relations, includes three indicators. The ***employee involvement*** indicator has three response categories indicating whether the respondent is 1) 'often'; 2) 'sometimes'; and 3) 'rarely' or 'never' able to make decision on the job that affect them. The indicator for ***control over schedule*** is based on two items about whether workers are able to a) change starting/finishing times and b) take off work for personal/family reasons. This measure has three categories: 1) high control; 2) medium control; and 3) low control. The final indicator is ***abusive treatment***. This measure combines two items denoting having been a) sexually harassed or b) threatened or harassed in any other way by anyone while one the job in the last 12 months: 1) yes ('yes' to either item) and 2) no.

3.2.2. Sociodemographic measures

To understand the social profile of workers within different types of EQ, we examine five sociodemographic characteristics that are hypothesized to predict labor market position. These measures include ***gender*** (man, woman), ***race/ethnicity*** (non-Hispanic White, Black, Hispanic, Asian/Pacific Islander, American Indian/Alaska Native), ***nativity*** (born in U.S., born outside of U.S.), and ***age***. Age contains three categories: early career (<30 years), mid-career (30–50 years), and the late-career period (>51 years). ***Educational attainment*** contains five categories: less than high school; high school; associate degree; bachelor's degree; and graduate degree.

3.2.4. Family-level measures

We additionally examine several family-level indicators. ***Family income*** includes income from all persons within the household, and is included as quartiles based on constant 1986 dollars (first quartile: <$16,999; second quartile: $17,000 - $29,999; third quartile: $30,000 - $46,999; fourth quartile:

>$47,000). We also examined ***marital status*** (married, divorced/widowed/separated, never married), ***spouse employment status*** (employed, unemployed/no spouse), and ***urban, suburban, or rural residence*** (central city, suburb within the 100 largest Standard Metropolitan Statistical Areas, unincorporated city, other areas).

3.2.4. Labor market-related measures

To provide additional information on the character of EQ types, as well as the location and distribution of EQ in the U.S. labor market, we examine five labor market-related variables, including ***occupation*** (U.S. Census and Standard Occupational Classification codes), ***industry*** (U.S. Census and North American Industry Classification System codes), ***size of employer*** (1-9; 10-49; 50-499; >500), ***multiple job holding*** (does/does not have second job), and ***job tenure*** (<1 year; 1-5 years; 6-10 years; 11-19 years; >20 years at current job).

3.3. Analytic approach

3.3.1. Constructing a typology of employment quality

We use LCA to identify a typology of EQ based on the degree of similarity in workers' responses to the 11 EQ indicators. We employ the mixture modeling function with maximum likelihood (ML) estimation in Mplus Version 8 (Linda K Muthén & Muthén, 2017). Missing values are handled with ML estimation assuming missing at random.

In creating our typology, we model wage-earner and self-employed working populations separately, as fundamental differences in these types of employment might contribute to dissimilar meanings of some EQ indicators (e.g., working time arrangements might be self-imposed among self-employed). Self-employment was identified using the item, "Are you self-employed or do you work for someone else?", and respondents with no information for this item were excluded (n=13). We further excluded respondents missing information on at least two EQ indicators (n=24); over 97% of respondents had information for at least 9 of the 11 EQ indicators. The final unweighted sample used to identify the

EQ typology was 7,368 workers (6,389 wage earners, 979 self-employed). Descriptive statistics for the weighted sample are included in Table A1.

For model selection, we rely on both statistical and theoretical considerations. We first compare fit statistics across models with step-wise increases in the number of clusters (i.e., Akaike's information criterion [AIC], Bayesian information criterion [BIC], Vuong-Lo-Mendell-Rubin likelihood ratio test [VLMR-LRT]) to evaluate parsimony (Nylund et al., 2007). We then evaluate candidate models for conceptual clarity by interpreting the relationship between EQ types and conditional item response probabilities (i.e., the probabilities of endorsing a particular response, given membership in a particular EQ type). This substantive interpretation is both common practice and vital to determine the most stable and meaningful model (Masyn, 2013). The final models provide the number of distinct EQ clusters in the population, the relative size of each cluster, and conditional item response probabilities—the latter of which provide conceptual understanding for the character of the identified EQ types.

3.3.2. Examining measurement invariance across survey wave

Because we are pooling data across multiple years, we test our latent EQ variables for measurement invariance (also known as measurement equivalence) across survey waves. This testing evaluates whether our indicators are a) able to be interpreted similarly, and b) measure the EQ concept equivalently, across the different time points. To accomplish this, we use the approach recommended by Kankaraš et al. (2010). Briefly, this involves estimating a series of multi-group latent class models (in this case, with survey wave as the grouping variable) with various levels of parameter constraints. Starting from a model of "complete homogeneity", in which item response probabilities and cluster sizes are held equal across waves, we compare fit statistics across three subsequent models in which these constraints are relaxed. In the "structural homogeneity" model, item response probabilities are held equal, but the relative size of clusters is allowed to vary. For the "partial homogeneity" model, item response probabilities values can differ across groups, but the relationship between the latent variable and the indicators is retained (i.e., the conceptual meaning of the clusters is comparable across groups). Cluster sizes can also vary across group

in partial homogeneity models. The final model is the "heterogeneity" model in which all parameters are freely estimated across groups; this is akin to fitting LCA models separately for each wave's data (see also, Lukac et al. 2019).

3.3.3. Identifying correlates of employment quality

We assess the correlation of all sociodemographic, family-level and labor market-related measures on EQ cluster membership using multinomial logistic regression, treating EQ cluster membership as the response. Specifically, we use three-step auxiliary variable approach for latent class predictors within Mplus (i.e., the R3STEP procedure) (Asparouhov & Muthén, 2014) to estimate odds ratios and 95% confidence intervals. This procedure accounts for classification uncertainty estimated in the LCA model when evaluating relationships between latent class variables and auxiliary covariates, and is superior to classify-then-analyze approaches that use modal assignment (i.e., individuals are assigned to their most likely cluster) (Mclarnon & O'neill, 2018; Vermunt, 2010). To examine the social distribution of EQ in the U.S., we first examine the five sociodemographic variables in both univariate and multivariate analyses. We then examine the relation between EQ and each of the family-level and labor market-related indicators individually, controlling for sociodemographic characteristics. Given the descriptive nature of our regression analyses, we handle missingness among covariates with pairwise deletion, maintaining as much observed data for each analysis.

4. RESULTS

4.1. Model selection

For wage earners, model fit indices indicate the optimal solution includes between five and eight classes (Table 1), with the BIC and VLMR-LRT choosing a 5-class solution and the AIC continuing to improve to the largest, 8-class model. Based on thorough substantive interpretation of conditional probabilities for models containing four through eight clusters, we find that the 6-class solution is the most unequivocally interpretable. The 7-class solution added a small, less interpretable EQ type. Additionally, several readily-

interpretable clusters were stable across the model set, strengthening confidence that the identified latent structure was meaningful. In the self-employed sample, BIC and VLMR-LRT identified the 2-class model as fitting the data best, while AIC, again, improved in each subsequent model (Table 1). Based on conceptual interpretation, we chose the 2-class model as the most meaningful. Thus, based on the combination of fit, interpretation, and cluster size, we identified eight distinct patterns of EQ in the U.S., with six among wage earners and two among the self-employed. Entropy is a measure of how well latent classes are identified; values approaching 1 indicate clearer delineation. Our results show both models have values around 0.6, suggesting modest separation of classes. The latter finding bolsters the need to account for classification uncertainty during covariate analysis.

4.2. Examining measurement invariance

Results of testing for measurement invariance are shown in Table 2. For the 2-class self-employed model, there is strong support for measurement invariance across waves. Both the AIC and BIC select the complete homogeneity model, meaning that relaxing parameter constraints to allow for any amount of measurement variance did not improve model fit. Results from the 6-class wage earner model are less conclusive. Importantly, the heterogeneity model (in which all parameters are allowed to vary across wave) was not estimable. This suggests that our sample size within each wave is too small for the complexity of the model. Examining fit indices in the other three models, BIC indicates the complete homogeneity model is optimal; however, AIC indicates better fit in the partial homogeneity model (which allows variance in item response probabilities, but retains the conceptual interpretation of the clusters across waves). As a qualitative comparison, we see that the fit information for the best fitting (but not replicated) heterogeneity model is not substantially different from that of the three homogeneity models. Further, the overall trend in the BIC across both models suggests that adding parameters to allow for measurement variance does not substantially improve model fit. On the whole, we believe that our models have achieved a reasonable level of measurement invariance, allowing for the pooling of these data across survey waves.

4.3. Patterns of employment quality in the United States

The eight identified EQ types are characterized by examining patterns of conditional item response probabilities within each cluster (Tables 3 and 4). Conditional probabilities are the model-estimated probabilities that an individual in a given EQ type endorses a particular response category. These parameters reveal the character of each EQ type, which are given labels based on their characteristic features.

The first EQ type is identified as '*SER-like'* jobs, as these jobs most resemble the historical conception of SER employment described in the literature (Bosch, 2004; Van Aerden et al., 2014). This group is characterized by generally favorable employment conditions. SER-like jobs have a high probability of a permanent employment arrangement, full-time hours, and a day shift. Additionally, this group has a low probability of low income, long work hours, mandatory extra work hours, a lack of information or equipment, or experiencing threats or harassment at work. However, these jobs have only an average probability of having union representation, and moderate scores on opportunity to develop, control over their schedule, and employee involvement. This is the largest EQ type, representing 28 percent of wage earners and 24 percent of the total workforce.

The second group is characterized overall by very beneficial indicators of EQ, except for a high probability of working long hours and lack of union representation. These jobs are similar to SER, with permanent arrangements and standard shifts, but are distinguished by having the highest income, most opportunity to develop, most control over schedule, and highest employee involvement. These jobs have a low probability of experiencing threats or harassment, lacking information or equipment, working atypical shifts, and being in a union. This highly advantaged group of workers, which represents 17 percent of wage earners and 15 percent of the total workforce, has been identified in prior theoretical and empirical research, including Van Aerden's modeling of EQ within the E.U. workforce (Van Aerden et al., 2014, 2016, 2017). Noting the resemblance to the independent, flexible, and high skilled workers that

Standing (2011) describes as 'Proficians', Van Aerden et al. deemed this group as the *'portfolio'* EQ type—which we also adopt.

The third category consists of jobs with a similarly high probability of several positive EQ attributes seen in portfolio jobs, including high income, opportunity to develop, and involvement in decision-making. However, this EQ type has the highest levels of working long hours, irregular shifts, and being subjected to mandatory extra work hours, even though they have high union representation. These jobs also have very low schedule control, and a somewhat higher probability of being in a non-permanent arrangement, experiencing workplace harassment, and lacking necessary information and equipment. In other words, these jobs seem to be distinguished by requiring a high level of skill—which translates to high wages, opportunity for advancement, and involvement—and very inflexible and excessively long working time arrangements. This cluster, which represent 15 percent of wage-earners workers and 13 percent of the total workforce, is therefore labeled as *'inflexible skilled'*.

The fourth EQ category is made up of permanent, full-time arrangements with high union representation, and middle-to-high wages, similar to the inflexible skilled jobs, but is characterized by several other negative employment conditions. These jobs are likely to have long hours, mandatory extra work hours, and irregular shifts, and score very poorly on the following indicators: control over schedule, employee involvement, opportunity for development, having necessary information and equipment to do job, and experiencing harassment at work. Thus, while these jobs seem to be stable, they also have imbalanced power dynamics that may contribute to adverse employment experiences, including offering little opportunity for advancement or involvement. This group is therefore labeled as *'dead-end'*. *Dead-end* jobs represent 14 percent of wage earners and 12 percent of the total workforce.

The fifth and sixth clusters are similar across several EQ dimensions, and are distinguished from the previous four EQ categories of wage earners by being the farthest from the historical conception of standard employment in character. In particular, these EQ types have the highest probabilities of low wages, non-full-time hours, irregular shifts, and being in a non-permanent employment contract, as well as low probabilities of union representation. However, these two non-standard job categories diverge

distinctly across indicators of opportunity, schedule flexibility, employee involvement, workplace harassment, and having necessary information and equipment. The fifth EQ type resembles an accumulation of all poor EQ attributes: it is characterized by low wages, with irregular shifts, little opportunity for advancement, low schedule control, and poor relations. This job type conforms well to the concept of precarious employment (Benach et al., 2014; Julià et al., 2017), and is thusly labeled *'precarious'*. *Precarious* jobs represent 13 percent of wage earners and 11 percent of the total workforce. The sixth EQ type resembles highly non-standardized employment, but with substantial schedule flexibility, and higher levels of involvement in decision-making and opportunity for advancement. This employment type is therefore labeled *'optimistic precarious'*. Similar to like the *precarious* EQ type, this group represents 13 percent of wage earners and 11 percent of the total workforce.

Within self-employed workers, the two identified employment types are similar across several dimensions of EQ (Table 4). Not surprisingly, both consist primarily of workers who report working within non-permanent employment arrangement. These EQ types also have similarly high probabilities of irregular shifts, low union representation, and high availability of necessary information and equipment. Further, both clusters have very high scores on opportunity to develop and control over their schedule, and relatively low probability of experiencing harassment. However, these two groups are very different across wages, hours, and employee involvement. One cluster, similar to the portfolio type, has very high income, with long and excessive work hours, and high involvement in decision-making. These jobs, although non-permanent, resemble a highly skilled, flexible, and independent workforce, and are labeled *'skilled contractor'*. This group represents 40 percent of self-employed and 8 percent of the total workforce. The final cluster is characterized by low income, low hours, and low employee involvement. These jobs seem to be the least stable of all of the EQ categories—having the highest proportion of non-permanent arrangements and irregular shifts—suggesting workers in this group are engaged in short-term or time-defined jobs. The final group is therefore labeled *'job-to-job'*. This employment type represents 60 percent of self-employed and 5 percent of the total workforce.

4.4. Social and labor market-related correlates of employment quality

The identified EQ types are related to social, family, and labor-market related characteristics via multinomial logistic regression, with results showing substantial social segmentation of EQ within the U.S. labor market (Tables 5-10). See also unadjusted estimates of the proportion of all covariates within each EQ type, provided for descriptive purposes in Tables A2 and A3.

EQ is associated with all five sociodemographic measures. Multivariate analysis is shown in Tables 5 and 6; univariate analyses provided similar results (not shown), suggesting that social sorting of workers into different EQ types occurs independently across multiple sociodemographic characteristics. Compared to those in *SER-like* jobs, workers in the *portfolio* category are disproportionately older, non-Black men with high education levels. Men are also over-represented in *inflexible skilled* and *dead-end* groups, although these groups differ in terms of educational attainment—*inflexible skilled* workers have comparatively more than the SER-like group, while *dead-end* workers have similar levels. The *dead-end* group also contains more foreign born workers. The *precarious* cluster is markedly younger and lower educated, as well as having more women and American Indian/Alaskan Native workers. The *optimistic precarious* seems to have a somewhat bimodal age distribution, with less middle-aged workers, as well as more workers with less than high school education. Compared to the *job-to-job* category within the self-employed sample, *skilled contractors* are disproportionately older White men with somewhat higher education.

We find several family-level measures are correlated with EQ in both wage earners and self-employed, controlling for sociodemographic characteristics (Tables 7 and 8). Family income is strongly associated with EQ classes. Compared to the *SER-like* group, *portfolio* and *inflexible skilled* EQ types have higher family income, while *precarious* and *optimistic precarious* groups are associated with lower family income. Members of the *portfolio* EQ type also have higher odds of having a working spouse and lower odds of having divorced or never married. In contrast, *precarious* and *optimistic precarious* groups are less likely to be married or have a working spouse. In the self-employed sample, *skilled contractors* show a pattern similar to *portfolio* wage earners: they have higher family income and are more likely to

be married with working spouses compared to those in the *job-to-job* group. The measure of urban-suburban-rural residence was not associated with EQ in either working population.

We also find evidence that EQ is correlated to several labor market-related variables after adjustment for sociodemographic indicators (Tables 9 and 10). In terms of occupation, a general pattern emerges in which *portfolio* employment is more common in management and business occupations, while *precarious* and *optimistic precarious* groups are more common in service occupations. Both *precarious* and *dead-end* EQ types are more common in production and transportation-related occupations, while *inflexible skilled* workers are over-represented in military occupations. Analysis of industry shows a similar overall pattern. There is a strong association between *portfolio* jobs and professional, technical, and financial sectors. Meanwhile, *precarious* and *optimistic precarious* groups are more common in service and retail sectors. *Dead-end* employment is more prevalent in transportation and manufacturing settings, while *inflexible skilled* employment is more common within resource extraction industries. Another pattern emerges with size of worksite: *dead-end* jobs tend to occur within larger workplaces, while *optimistic precarious* employment is associated with small worksites. We also find that those engaged in *SER-like* employment were much less likely to have a second job, compared to all other EQ types. Interestingly, we find that *dead-end* jobs have the highest levels of job tenure, while, unsurprisingly, *precarious* and *optimistic precarious* have the lowest levels. Differences in labor market-related variables were less clear among the self-employed, although s*killed contractors* have much higher job tenure and are less likely to work in service occupations, compared to *job-to-job* workers.

5. DISCUSSION

In this analysis, we investigate the character and quality of employment arrangements in the modern U.S. labor market. Our empirical typology of EQ indicates the existence of eight distinct forms of employment in the U.S. labor market, including one resembling the historical conception of the SER model, as well as several others that represent various constellations of favorable and adverse employment features. These

EQ types are unevenly distributed across society, in terms of who works these jobs and where they are found in the labor market.

By following the approach of Van Aerden et al. (2014, 2016, 2017), we are able to make some methodological and substantive comparisons to their analyses of the European labor market. From a methodological perspective, our findings lend support to the validity and value of the overall approach. Importantly, using another data source and different proxy indicators of EQ, we likewise found that EQ features cluster together into interpretable employment types, and that these EQ types are correlated with sociodemographic and labor market-related indicators. It is notable, for instance, that we also find EQ types that resemble the *SER-like*, *portfolio*, and *precarious* groups identified in the E.U. A thorough examination of our respective analyses reveal some minor variations, however. The *SER-like* EQ type in our sample has lower income levels, lower levels of employee representation (likely reflecting lower overall unionization in the U.S.), as well as lower rates of harassment within the workplace, compared to the E.U. studies. Further, we find that more women are engaged in *SER-like* employment in the U.S., whereas the opposite was found in the E.U. data. Nevertheless, both analyses found roughly 30 percent of wage-earners are engaged in *SER-like* employment arrangements, and the overall similarity in character provides some support for the SER concept as a useful conceptual benchmark across national contexts. Similarly, some minor differences exist between the *precarious* and *portfolio* EQ types seen in the U.S. vs. E.U. analyses (e.g., U.S. portfolio workers have more control over their schedules). However, these groups largely overlap in both datasets, and provide conceptual bookends for high and low road versions of non-standard employment.

Yet our analysis suggests a different overall patterning of EQ in the U.S. compared to Europe. For example, the *dead-end* cluster identified in our sample has some similarities to the 'instrumental' EQ type in the Van Aerden studies, including permanent contracts, low schedule control, and low employee involvement in decision-making. However, *dead-end* jobs, despite having higher income than the U.S. *SER-like* type, have significantly more hours and an overall worse pattern of scores across relational EQ measures, compared to the instrumental group found in the E.U. They also experience the highest levels

of harassment, have the lowest opportunity to develop, and report not having enough information and equipment to get their work done—all of which point to very low commitment from employers. Surprisingly, the *dead-end* group has relatively high levels of tenure, as well as high levels of union representation. Thus, these workers appear to be positioned within the core workforce of an organization, but perhaps with few opportunities to move elsewhere (Kalleberg, 2003). The *inflexible skilled* EQ type in our analysis resembles somewhat a group labeled 'precarious intensive' by Van Aerden et al.; however, *inflexible skilled* employment has comparatively higher wages, more employee involvement, and longer, more irregular working hours with less schedule control. The *optimistic precarious* cluster, which our model estimates as approximately one in every six wage earners in the U.S., was not found in the E.U analyses. This type represents a highly non-standard form of employment from a contractual perspective (i.e., non-permanent contract, low wages, low hours); however, they report rather favorable power relations, with high levels of control and involvement, as well as optimism in terms of their opportunity to develop abilities. Thus, workers in this group may be engaged in these jobs voluntarily, consistent with the notion that aspects of so-called non-standard employment may be beneficial to some workers (and, perhaps, our inclusion of the label of 'precarious' is inappropriate for this group). Indeed, in our prior epidemiologic analysis of EQ in the U.S. we found that the physical and mental health of the *optimistic precarious* group was no different than the *SER-like* EQ type (Peckham et al., 2019). This aligns with warnings from scholars against the valorization of the SER model as the highest quality employment, or the conditioning of social protections on such a model (e.g., see Vosko 2008). Indeed, there are many reasons why an individual might prefer a job that deviates from the SER-like model; for example, circumstances such as care responsibilities or disability status could make it difficult to work permanent jobs or full-time hours. However, we believe that our findings support the idealized conception SER as a useful point of departure by which to understand the heterogeneity of modern employment arrangements.

Several important limitations of our analysis should be noted. From an analytical perspective, we are limited by the cross-sectional nature of our data. As a result, our intention is that the presented covariate analysis be interpreted as primarily descriptive. While there is strong theoretical rationale that

sociodemographic characteristics are antecedent of one's employment situation, the direction of causality is more ambiguous in relationships between EQ and family- and labor market-related covariates. We are additionally limited by a relatively small sample size in each survey wave, in relation to the complexity of our latent class model. This hindered our ability to investigate measurement invariance across time. However, based on the overall pattern of results from the measurement invariance testing, we are confident that a pooled-data approach is appropriate. Another data-related issue is the fact that our typology is based on secondary data. While we attempted to identify appropriate proxy indicators, these measures were not intended specifically to capture the EQ construct. Additionally, the GSS QWL module lacks information on some important dimensions of EQ. In particular, there is no objective information on whether workers receive employer-provided fringe benefits, which is particularly important in the U.S. context. More measures related to workers' ability to exercise rights, opportunity to enhance skills, and worker-employer power relations would also strengthen the comprehensiveness of an empirical EQ typology. However, overall, this dataset is a significant strength of this analysis: while there is an overall paucity of individual-level data on EQ characteristics, the GSS survey represents one of the richest sources of information on EQ characteristics among U.S. workers.

Despite these limitations, our study makes several important contributions to ongoing research to understand the nature of contemporary employment relations. First, our findings align with recent studies that have identified substantial heterogeneity in the structure and distribution of employment conditions (Doerflinger et al., 2019; Lukac et al., 2019; Van Aerden et al., 2014; Yoon & Chung, 2016). Anchoring our analysis within a broad view of the SER concept, we find evidence that the 'de-standardization' of employment has likely occurred along several different paths. In our view, the EQ framework provides advantage over narrow conceptualizations of employment and job quality that have focused on non-permanent contracts or wage levels. In particular, our typology shows the importance of relational dimensions of employment, which are much less considered in quantitative analyses. It is illustrative, for example, to consider that *dead-end* employment looks similar to *SER-like* employment across wages, hours, and contract status—and would likely be categorized together within analyses using such metrics.

But, in fact, our results suggest that these are two very different forms of employment, diverging substantially in regard to opportunities to develop skills and proxy indicators of collective and interpersonal power relations. This example also highlights the benefit of a typological measurement approach, which allows for identification of more complex combinations of employment compared to approaches using dichotomous or gradational measures. Taken together, our typology reveals limitations associated with binary conceptions of standard vs. non-standard employment, or insider-outsider dichotomies envisioned within dual labor market theories.

A second contribution is our focus on the U.S. context. To our knowledge, we are the first to apply typological measurement to a nuanced, multidimensional conceptualization of employment in the U.S. A recent study by Cho (2019) used the U.S. GSS dataset and LCA to examine patterns of precarious employment; however, this study used primarily subjective indicators of employment precariousness, such as perceived risk of job loss or fairness of wages. Cho found four patterns of precarious employment experience, which were associated with different sociodemographic profiles and health statuses (Cho, 2019). In contrast to Cho, we have theorized the subjective experiences of precariousness as being on the causal pathway between actual conditions of the employment relationship and workers' health (Peckham et al., 2019). Thus, while the Cho study supports the importance of employment relations as a determinant of health, as well as the value of typological measurement approaches, it is limited with respect to our primary goal of characterizing patterns of existing employment conditions in the modern U.S. labor market. Our approach allowed for a fairly rigorous comparison to prior E.U. studies, showing that, indeed, patterns of employment differ in the U.S. context.

A third major contribution is our inclusion the self-employed in our analysis. These workers make up approximately 10% of the U.S. workforce (S. F. Hipple & Hammond, 2016) and 15% of the European labor market (Eurostat, 2018), yet have largely been excluded from analyses mentioned herein. We find that self-employment in the U.S. can take two different forms, as measured using the EQ framework. The *skilled contractor* and *job-to-job* EQ types differ primarily along dimensions of wages, hours, and involvement in decision-making; however, based on LCA model output, other EQ indicators

do not seem to possess much predictive power to help distinguish between-group differences. For instance, response patterns for both *skilled contractor* and *job-to-job* EQ types were similar to the self-employed sample averages across the following indicators: work shift, opportunity to develop, adequate information, union representation, schedule control, and workplace harassment. On the other hand, the overall self-employed sample differed substantially on these measures compared to wage earners—especially having much higher probability of development opportunity, schedule control, and irregular shifts. It is likely that these survey items are picking up different information across the two workforces—our rationale for modeling these groups separately. Further, it is reasonable to question whether the EQ framework is optimal for characterizing self-employment in the first place. On this point, Pichault and McKeown (2019) have recently argued that a multidimensional conceptualization of autonomy is most appropriate to study this workforce. They have applied their framework to cluster analysis of self-employed workers in the E.U., finding four types that varied across measures of voluntariness, economic dependence on certain clients, and control over work content and conditions (Florin & Pichault, 2020). Self-employment can also entail being a small business owner with employees, which is not captured in the EQ framework but has significant implications for labor experiences. A crude analysis of our data suggests that *skilled contractors* have on average 5 employees, while *job-to-job* have on average 1 employee (with a median of 1 and 0, respectively; data not shown) suggesting some difference across these groups. Taken together, our results show heterogeneity within the self-employed population, and highlight the need for further attention to understanding their labor conditions.

To conclude, our analyses suggest much more substantial segmentation of the U.S. labor market than can be captured by simplistic notions of standard vs. non-standard employment, or dualist labor market theory. Importantly, divisions in labor market experiences are driven by both contractual and relational features of employment. Improving our understanding of ongoing labor market trends affecting employment relations will require contending with the complex and heterogeneous nature of modern employment.

TABLES AND FIGURES

Table 1. Comparison of model fit indices in LCA modeling of wage-earning and self-employed working populations.

Classes	Log likelihood	Parameters	AIC	BIC	VLMR-LRT	Entropy
Wage earner sample						
1	-49517	19	99072	99200	--	--
2	-48525	39	97129	97393	0.00	0.53
3	-47969	59	96056	96455	0.00	0.58
4	-47765	79	95687	96222	0.00	0.56
5	-47635	99	95467	**96137**	**0.00**	0.55
6	-47553	119	95343	96148	0.78	0.55
7	-47489	139	95256	96196	0.79	0.57
8	-47443	159	**95204**	96279	0.76	0.58
Self-employed sample						
1	-7028	19	14094	14186	--	--
2	-6849	39	13776	**13966**	**0.00**	0.63
3	-6786	59	13690	13978	0.76	0.69
4	-6746	79	13649	14035	0.84	0.73
5	-6711	99	13621	14104	0.83	0.64
6	-6678	119	**13593**	14175	0.77	0.72

Notes: AIC: Akaike Information Criteria. BIC: Bayesian Information Criteria. VLMR-LRT: Vuong-Lo-Mendell-Rubin likelihood ratio test (p-value shown). Bolding denotes number of classes recommended by each fit indices.

Table 2. Comparison of model fit indices to evaluate measurement invariance of EQ latent structure across survey wave.

Model	Log likelihood	Parameters	AIC	BIC
Wage earner sample (6-class model)				
Complete homogeneity	-47553	119	95343	**96148**
Structural homogeneity	-47529	139	95336	96276
Partial homogeneity	-47468	183	**95302**	96539
Heterogeneity	[-47280]	403	[95366]	[98091]
Self-employed sample (2-class model)				
Complete homogeneity	-6849	39	**13776**	**13966**
Structural homogeneity	-6848	43	13781	13991
Partial homogeneity	-6824	87	13822	14247
Heterogeneity	-6793	131	13848	14488

Notes: AIC: Akaike Information Criteria. BIC: Bayesian Information Criteria. Bolding denotes model recommended by each fit indices. Bracketed values are from the best fitting, but not replicated model; included only for qualitative interpretation.

Table 3. Conditional item response probabilities across EQ types identified in wage earners.

EQ indicator	Response category	Sample proportion	SER	Portfolio	Inflexible skilled	Dead-end	Precarious	Optimistic precarious
	Class proportion		0.28	0.17	0.15	0.14	0.13	0.13
Employment contract								
	Reg/permanent	0.891	0.939	0.953	0.887	0.943	0.855	0.690
	Non-permanent	0.109	0.061	0.047	0.113	0.057	0.145	0.310
Income								
	Lowest income quartile	0.274	0.170	0.026	0.115	0.074	0.797	0.779
	2nd/3rd income quartile	0.530	0.718	0.427	0.599	0.785	0.203	0.189
	Highest income quartile	0.196	0.112	0.547	0.286	0.141	0.000	0.033
Mandatory days of extra work hours								
	None	0.798	0.851	0.849	0.572	0.682	0.846	0.965
	1-10 days	0.139	0.149	0.090	0.220	0.188	0.133	0.035
	11+ days	0.063	0.000	0.061	0.208	0.130	0.021	0.000
Working hours								
	<24 hrs	0.104	0.014	0.012	0.039	0.027	0.201	0.478
	25-36 hrs	0.135	0.104	0.034	0.060	0.029	0.327	0.347
	37-48	0.503	0.847	0.443	0.231	0.624	0.426	0.107
	>48 hrs	0.258	0.035	0.511	0.671	0.319	0.046	0.067
Working times regularity								
	Day shift	0.732	0.855	0.941	0.612	0.710	0.533	0.562
	Afternoon/night shift	0.123	0.080	0.000	0.119	0.161	0.291	0.169
	Split/irregular/rotating	0.145	0.065	0.059	0.270	0.129	0.176	0.269
Opportunity to develop abilities								
	Very true, opportunity	0.352	0.357	0.582	0.544	0.040	0.139	0.370
	Somewhat true, opp	0.443	0.552	0.382	0.420	0.376	0.380	0.453
	Not true, opportunity	0.205	0.091	0.036	0.036	0.584	0.482	0.176
Have adequate training, info, equipment								
	Often/sometimes have	0.869	0.955	0.925	0.907	0.562	0.804	0.967
	Rarely/never have	0.131	0.045	0.075	0.093	0.438	0.196	0.033
Union representation								
	Union member	0.147	0.139	0.042	0.277	0.272	0.098	0.053
	Not union member	0.853	0.861	0.958	0.723	0.728	0.902	0.947
Control over schedule								
	High control	0.322	0.305	0.726	0.131	0.143	0.068	0.509
	Medium control	0.377	0.456	0.265	0.411	0.338	0.332	0.401
	Low control	0.301	0.239	0.009	0.458	0.518	0.600	0.090
Employee involvement								
	Often involved	0.388	0.382	0.630	0.575	0.168	0.170	0.323
	Sometimes involved	0.390	0.479	0.313	0.319	0.400	0.335	0.427
	Rarely/never involved	0.222	0.139	0.057	0.106	0.432	0.495	0.250
Workplace harassment/threats								
	Yes harassment/threat	0.111	0.080	0.041	0.168	0.208	0.170	0.036
	No harassment/threat	0.889	0.920	0.959	0.832	0.792	0.830	0.964

Source: Authors' compilation based on General Social Survey (years 2002, 2006, 2010, 2014, 2018).

Table 4. Conditional response probabilities across EQ types identified in self-employed.

EQ indicator	Response category	Sample proportion	Job-to-job	Skilled contractor
	Class proportion		0.60	0.40
Employment contract				
	Reg/permanent	0.182	0.099	0.307
	Non-permanent	0.818	0.901	0.693
Income				
	Lowest income quartile	0.328	0.530	0.050
	2nd/3rd income quartile	0.355	0.350	0.362
	Highest income quartile	0.317	0.120	0.589
Mandatory days of extra work hours				
	None	0.765	0.871	0.607
	1-10 days	0.154	0.114	0.215
	11+ days	0.080	0.015	0.179
Working hours				
	<24 hrs	0.209	0.348	0.000
	25-36 hrs	0.171	0.240	0.066
	37-48	0.260	0.250	0.275
	>48 hrs	0.361	0.162	0.659
Working times regularity				
	Day shift	0.637	0.585	0.715
	Afternoon/night shift	0.032	0.054	0.000
	Split/irregular/rotating	0.331	0.361	0.285
Opportunity to develop abilities				
	Very true, opportunity	0.674	0.592	0.795
	Somewhat true, opp	0.241	0.265	0.205
	Not true, opportunity	0.085	0.142	0.000
Have adequate training, info, equipment				
	Often/sometimes have	0.937	0.911	0.974
	Rarely/never have	0.063	0.089	0.026
Union representation				
	Union member	0.030	0.029	0.031
	Not union member	0.970	0.971	0.969
Control over schedule				
	High control	0.629	0.672	0.565
	Medium control	0.270	0.237	0.320
	Low control	0.101	0.091	0.115
Employee involvement				
	Often involved	0.439	0.320	0.617
	Sometimes involved	0.256	0.264	0.245
	Rarely/never involved	0.304	0.416	0.138
Workplace harassment/threats				
	Yes harass/threat	0.074	0.074	0.075
	No harass/threat	0.926	0.926	0.925

Source: Authors' compilation based on General Social Survey (years 2002, 2006, 2010, 2014, 2018).

Table 5. Sociodemographic predictors of EQ class membership among wage earners.

	SER-like	Portfolio			Infexible Skilled			Dead End			Precarious			Optimistic Precarious		
	(base class)	AOR	95% CI	p	AOR	95% CI	p	AOR	95% CI	p	AOR	95% CI	p	AOR	95% CI	p
Age																
30 and under		(ref.)			(ref.)			(ref.)			(ref.)			(ref.)		
31-50		2.15	(1.29-3.58)	**	0.98	(0.67-1.45)		1.15	(0.72-1.82)		0.37	(0.26-0.54)	***	0.33	(0.22-0.49)	***
Over 50		2.72	(1.56-4.74)	***	0.68	(0.43-1.08)		1.34	(0.82-2.21)		0.22	(0.13-0.37)	***	0.81	(0.55-1.18)	
Sex																
Male		(ref.)			(ref.)			(ref.)			(ref.)			(ref.)		
Female		0.12	(0.08-0.18)	***	0.31	(0.22-0.43)	***	0.42	(0.30-0.58)	***	1.99	(1.35-2.93)	**	1.42	(0.99-2.04)	+
Race/ethnicity																
White		(ref.)			(ref.)			(ref.)			(ref.)			(ref.)		
Black		0.32	(0.16-0.64)	**	0.77	(0.51-1.15)		0.79	(0.52-1.22)		1.14	(0.75-1.74)		0.68	(0.43-1.06)	+
Hispanic		0.68	(0.32-1.43)		0.99	(0.57-1.74)		0.84	(0.45-1.59)		1.36	(0.83-2.24)		0.88	(0.52-1.49)	
Asian/Pacific Is.		1.29	(0.41-4.03)		1.12	(0.36-3.48)		0.29	(0.04-2.06)		1.70	(0.44-6.67)		1.05	(0.38-2.85)	
AI/AN		--			1.43	(0.29-6.92)		1.81	(0.47-6.95)		3.25	(1.11-9.53)	*	1.06	(0.21-5.29)	
Nativity																
Born in U.S.		(ref.)			(ref.)			(ref.)			(ref.)			(ref.)		
Foreign born		0.61	(0.30-1.23)		0.83	(0.44-1.55)		2.02	(1.07-3.81)	*	1.28	(0.75-2.17)		0.98	(0.56-1.71)	
Education																
Less than high school		0.08	(0.00-52.56)		1.17	(0.66-2.07)		0.78	(0.42-1.46)		2.29	(1.39-3.77)	**	2.26	(1.34-3.80)	**
High school		(ref.)			(ref.)			(ref.)			(ref.)			(ref.)		
Junior college		1.76	(0.92-3.36)	+	1.22	(0.74-2.01)		0.77	(0.45-1.31)		0.25	(0.10-0.65)	**	0.82	(0.49-1.36)	
Bachelor		6.06	(3.81-9.63)	***	1.30	(0.85-2.00)		0.95	(0.61-1.48)		0.20	(0.09-0.43)	***	0.71	(0.45-1.12)	
Graduate		14.05	(7.62-25.92)	***	3.81	(2.23-6.52)	***	1.51	(0.79-2.89)		--			0.62	(0.31-1.23)	

Notes: Results of multinomial logistic regression are reported as adjusted odds ratios (AOR), in which all variables are mutually adjusted (n = 6,367).
+ p-value < 0.1; * p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001. Source: General Social Survey

Table 6. Sociodemographic predictors of EQ class membership among the self-employed.

	Job-to-job (base class)	Skilled Contractor		
		AOR	95% CI	p
Age				
30 or under		(ref.)		
31-50		4.00	(1.23-12.99)	*
Over 50		4.38	(1.37-14.02)	*
Gender				
Man		(ref.)		
Woman		0.13	(0.07-0.23)	***
Race/ethnicity				
White		(ref.)		
Black		0.30	(0.09-0.98)	*
Hispanic		0.36	(0.13-1.01)	+
Asian/Pacific Is.		0.53	(0.11-2.58)	
AI/AN		0.69	(0.18-2.60)	
Nativity				
Born in U.S.		(ref.)		
Foreign born		0.81	(0.28-2.37)	
Education				
Less than high school		0.45	(0.18-1.10)	+
High school		(ref.)		
Junior college		1.02	(0.38-2.71)	
Bachelor		2.11	(1.16-3.84)	*
Graduate		1.32	(0.59-2.96)	

Notes: Results of multinomial logistic regression are reported as adjusted odds ratios (AOR), in which all variables are mutually adjusted (n = 977). AI/AN: American Indian/Alaskan Native. + p-value < 0.1; * p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001. Source: General Social Survey

Table 7. Family-level correlates of EQ class membership among wage earners.

SER-like	Portfolio			Inflexible Skilled			Dead End			Precarious			Optimistic Precarious		
(base class)	AOR	95% CI	p	AOR	95% CI	p	AOR	95% CI	p	AOR	95% CI	p	AOR	95% CI	p
Family income (n = 5,898)															
First quartile	--			0.43	(0.24-0.76)	**	0.60	(0.31-1.15)		5.67	(2.60-12.36)	***	2.91	(1.58-5.35)	**
Second quartile	0.03	(0.01-0.11)	***	0.40	(0.26-0.63)	***	0.96	(0.58-1.60)		1.03	(0.46-2.31)		0.70	(0.37-1.33)	
Third quartile	0.33	(0.20-0.53)	***	0.59	(0.38-0.92)	*	1.22	(0.73-2.03)		0.70	(0.28-1.76)		1.03	(0.56-1.90)	
Fourth quartile	(ref.)			(ref.)			(ref.)			(ref.)			(ref.)		
Working spouse (n = 6,360)															
No	(ref.)			(ref.)			(ref.)			(ref.)			(ref.)		
Yes	1.78	(1.23-2.58)	**	0.87	(0.62-1.22)		0.77	(0.55-1.09)		0.73	(0.51-1.05)	+	0.74	(0.52-1.03)	+
Marital status (n = 6,367)															
Married	(ref.)			(ref.)			(ref.)			(ref.)			(ref.)		
Divorced, widowed, separated	0.59	(0.36-0.98)	*	1.12	(0.76-1.65)		1.23	(0.84-1.80)		1.56	(1.01-2.39)	*	0.92	(0.61-1.38)	
Never married	0.38	(0.22-0.64)	***	0.85	(0.56-1.28)		1.12	(0.70-1.80)		1.86	(1.21-2.87)	**	1.66	(1.17-2.37)	**
Urban-Suburban-Rural (n = 6,367)															
Large/medium principal city	(ref.)			(ref.)			(ref.)			(ref.)			(ref.)		
Suburb of principal city	1.37	(0.88-2.12)		1.16	(0.78-1.72)		1.02	(0.69-1.51)		1.07	(0.70-1.64)		1.09	(0.74-1.60)	
Unincorporated city	1.34	(0.82-2.19)		1.37	(0.89-2.11)		0.97	(0.60-1.56)		1.22	(0.75-2.00)		1.33	(0.88-2.01)	
Towns, smaller areas, open country	1.05	(0.53-2.08)		1.52	(0.94-2.44)	+	0.87	(0.53-1.43)		1.43	(0.86-2.37)		0.84	(0.50-1.39)	

Notes: Results of multinomial logistic regression are reported as adjusted odds ratios (AOR); all AORs are adjusted for age, sex, race/ethnicity, nativity and education. Family income quartiles calculated using constant 1986 dollars. + p-value < 0.1; * p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001. Source: General Social Survey

Table 8. Family-level correlates of EQ class membership among the self-employed.

	Job-to-job (base class)	Skilled Contractor		
		AOR	95% CI	p
Family income (n = 872)				
First quartile		0.01	(0.00-0.06)	***
Second quartile		0.15	(0.07-0.35)	***
Third quartile		0.23	(0.10-0.51)	***
Fourth quartile		(ref.)		
Working spouse (n = 975)				
No		(ref.)		
Yes		2.35	(1.35-4.08)	**
Marital status (n = 977)				
Married		(ref.)		
Divorced, widowed, separated		0.54	(0.31-0.95)	*
Never married		0.20	(0.09-0.45)	***
Urban-Suburban-Rural (n = 977)				
Large/medium principal city		(ref.)		
Suburb of principal city		1.39	(0.76-2.53)	
Unincorporated city		2.11	(1.00-4.43)	*
Towns, smaller areas, open country		1.70	(0.76-3.83)	

Notes: Results of multinomial logistic regression are reported as adjusted odds ratios (AOR); all AORs are adjusted for age, gender, race/ethnicity, nativity and education. Family income quartiles calculated using constant 1986 dollars. + p-value < 0.1; * p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001. Source: General Social Survey

Table 9. Labor market-related correlates of EQ class membership among wage earners.

SER-like (base class)	Portfolio			Inflexible Skilled			Dead End			Precarious			Optimistic Precarious		
	AOR	95% CI	p	AOR	95% CI	p	AOR	95% CI	p	AOR	95% CI	p	AOR	95% CI	p
Occupation (n = 6,339)															
Sales and office occupations	(ref)			(ref)			(ref)			(ref)			(ref)		
Management, business, and financial operations	5.25	(3.05-9.03)	***	2.85	(1.41-5.78)	**	0.95	(0.52-1.72)		--			0.32	(0.12-0.82)	*
Professional and related	1.01	(0.59-1.73)		2.82	(1.58-5.04)	***	0.72	(0.42-1.23)		0.63	(0.31-1.25)		1.18	(0.72-1.95)	
Service occupations	0.23	(0.07-0.76)	*	4.58	(2.47-8.48)	***	1.13	(0.65-1.97)		3.89	(2.51-6.04)	***	3.33	(2.11-5.26)	***
Natural resources, construction, and maintenance	0.46	(0.21-1.01)	+	2.51	(1.30-4.85)	**	0.80	(0.45-1.44)		0.13	(0.02-0.91)	*	0.87	(0.45-1.71)	
Production, transportation, and material moving	0.61	(0.26-1.43)		5.13	(2.68-9.81)	***	2.16	(1.26-3.70)	**	2.19	(1.23-3.88)	**	1.47	(0.78-2.77)	
Military specific occupations	2.02	(0.12-34.79)		10.32	(0.94-113.87)	+	1.01	(0.04-23.18)		--			--		
Industry (n = 6,338)															
Education and health services	(ref)			(ref)			(ref)			(ref)			(ref)		
Agric/forestry/fishing/hunting & extraction/utilities	3.76	(1.02-13.85)	*	2.41	(1.11-5.24)	*	1.06	(0.33-3.38)		0.37	(0.09-1.55)		0.50	(0.14-1.78)	
Construction	3.84	(1.57-9.39)	**	0.87	(0.47-1.63)		0.87	(0.37-2.05)		0.14	(0.03-0.69)	*	0.86	(0.39-1.86)	
Manufacturing	9.14	(4.53-18.45)	***	1.48	(0.85-2.57)		2.63	(1.38-5.00)	**	1.20	(0.65-2.20)		0.27	(0.08-0.88)	*
Wholesale and retail trade	7.52	(3.72-15.22)	***	0.98	(0.54-1.79)		1.79	(0.92-3.46)	+	1.51	(0.86-2.62)		1.98	(1.16-3.38)	*
Transportation	3.27	(0.95-11.27)	+	2.01	(0.98-4.14)	+	4.17	(1.99-8.71)	***	0.74	(0.25-2.17)		1.26	(0.52-3.07)	
Information & Financial activities	9.30	(4.35-19.91)	***	0.75	(0.37-1.50)		1.65	(0.85-3.19)		0.21	(0.06-0.71)	*	0.88	(0.48-1.64)	
Professional and technical services	14.96	(6.22-35.95)	***	0.60	(0.17-2.06)		1.56	(0.62-3.95)		0.27	(0.06-1.31)		1.31	(0.57-3.00)	
Admin/support & leisure/hospitality & other services	2.94	(1.31-6.61)	**	1.46	(0.84-2.55)		0.97	(0.45-2.10)		2.30	(1.41-3.77)	**	2.39	(1.44-3.96)	**
Public administration & active military	1.91	(0.88-4.15)		1.53	(0.91-2.58)		1.45	(0.76-2.75)		0.08	(0.01-0.61)	*	0.31	(0.10-0.91)	*
Number of employees, worksite (n = 6,289)															
1-9	(ref)			(ref)			(ref)			(ref)			(ref)		
10-49	0.89	(0.49-1.63)		0.95	(0.56-1.61)		3.03	(1.51-6.09)	**	0.88	(0.53-1.48)		0.53	(0.36-0.79)	**
50-499	0.92	(0.53-1.60)		1.27	(0.79-2.02)		3.12	(1.61-6.05)	**	0.97	(0.61-1.56)		0.25	(0.16-0.38)	***
500+	1.80	(0.99-3.27)	+	1.26	(0.74-2.17)		4.96	(2.48-9.90)	***	0.69	(0.37-1.27)		0.14	(0.06-0.30)	***
Has second job (n = 6,330)															
No	(ref)			(ref)			(ref)			(ref)			(ref)		
Yes	2.39	(1.29-4.42)	**	5.03	(3.02-8.39)	***	3.09	(1.76-5.44)	***	2.74	(1.50-5.00)	**	3.00	(1.78-5.08)	***
Job tenure (n = 6,320)															
<1 year	(ref)			(ref)			(ref)			(ref)			(ref)		
1 - 5 years	1.00	(0.55-1.85)		0.98	(0.61-1.56)		1.20	(0.68-2.12)		0.31	(0.21-0.45)	***	0.53	(0.36-0.79)	**
6 - 10 years	1.44	(0.71-2.91)		1.18	(0.67-2.06)		2.19	(1.17-4.10)	*	0.18	(0.10-0.32)	***	0.42	(0.25-0.69)	**
11 - 19 years	1.24	(0.60-2.55)		1.20	(0.68-2.13)		1.76	(0.92-3.36)	+	0.06	(0.02-0.19)	***	0.17	(0.08-0.36)	***
20+ years	1.72	(0.79-3.75)		1.26	(0.63-2.52)		2.53	(1.22-5.26)	*	0.04	(0.01-0.29)	**	0.08	(0.03-0.22)	***

Notes: Results of multinomial logistic regression are reported as adjusted odds ratios (AOR); all AORs are adjusted for age, sex, race/ethnicity, nativity, and education.
+ p-value < 0.1; * p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001. Source: General Social Survey

Table 10. Labor market-related correlates of EQ class membership among the self-employed.

	Job-to-job	Skilled Contractor		
	(base class)	AOR	95% CI	p
Occupation				
Sales and office occupations		(ref.)		
Management, business, and financial operations		1.57	(0.67-3.70)	
Professional and related		0.47	(0.20-1.11)	+
Service occupations		0.14	(0.04-0.51)	**
Natural resources, construction, and maintenance		0.48	(0.19-1.22)	
Production, transportation, and material moving		0.82	(0.27-2.47)	
Military specific occupations		--		
Industry				
Education and health services		(ref.)		
Agric/forestry/fishing/hunting & extraction/utilities		1.49	(0.35-6.33)	
Construction		1.15	(0.34-3.88)	
Manufacturing		1.04	(0.30-3.65)	
Wholesale and retail trade		1.59	(0.43-5.90)	
Transportation		0.74	(0.12-4.64)	
Information & Financial activities		1.72	(0.48-6.09)	
Professional and technical services		0.67	(0.22-2.01)	
Admin/support & leisure/hospitality & other services		0.52	(0.17-1.59)	
Public administration & active military		--		
Number of employees, worksite				
1-9		(ref.)		
10-49		4.29	(1.92-9.59)	***
50-499		2.45	(0.90-6.67)	+
500+		2.06	(0.64-6.63)	
Has second job				
No		(ref.)		
Yes		0.62	(0.34-1.16)	
Job tenure				
<1 year		(ref.)		
1 - 5 years		3.19	(1.19-8.59)	*
6 - 10 years		6.91	(2.44-19.60)	***
11 - 19 years		14.72	(4.74-45.72)	***
20+ years		11.85	(4.14-33.98)	***

Notes: Results of multinomial logistic regression are reported as adjusted odds ratios (AOR); all AORs are adjusted for age, gender, race/ethnicity, nativity and education. AI/AN: American Indian/Alaskan Native. + p-value < 0.1; * p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001. Source: General Social Survey

Table A1. Descriptive statistics for weighted sample.

	Self-employed	Wage earners	p
n	1023	6509	
Survey wave			
2002	243 (24)	1561 (24)	0.594
2006	243 (24)	1529 (23)	
2010	174 (17)	1030 (16)	
2014	183 (18)	1092 (17)	
2018	181 (18)	1297 (20)	
Age			
30 or under	113 (11)	1694 (26)	<0.001
31-50	419 (41)	3071 (47)	
Over 50	488 (48)	1721 (27)	
Gender			
Man	624 (61)	3082 (47)	<0.001
Woman	399 (39)	3427 (53)	
Race/ethnicity			
White	770 (75)	4450 (68)	<0.001
Black	69 (7)	932 (14)	
Hispanic	111 (11)	825 (13)	
Asian/Pacific Is.	59 (6)	221 (3)	
AI/AN	15 (1)	82 (1)	
Nativity			
Born in U.S.	862 (84)	5683 (87)	0.031
Foreign born	161 (16)	826 (13)	
Education			
Less than high school	105 (10)	573 (9)	0.018
High school	462 (45)	3331 (51)	
Junior college	91 (9)	612 (9)	
Bachelor	231 (23)	1296 (20)	
Graduate	134 (13)	698 (11)	
Family income			
First quartile	185 (20)	1345 (23)	<0.001
Second quartile	173 (19)	1438 (24)	
Third quartile	182 (20)	1542 (26)	
Fourth quartile	372 (41)	1599 (27)	
Working spouse			
No	478 (47)	2550 (39)	<0.001
Yes	544 (53)	3948 (61)	
Marital status			
Married	664 (65)	3468 (53)	<0.001
Divorced, widowed, separated	207 (20)	1160 (18)	
Never married	152 (15)	1879 (29)	

Table A1 (continued). Descriptive statistics for weighted sample.

	Self-employed	Wage earners	p
Urban-Suburban-Rural			
Large/medium principal city	294 (29)	2035 (31)	0.494
Suburb of principal city	352 (34)	2217 (34)	
Unincorporated city	231 (23)	1378 (21)	
Towns, smaller areas, open country	146 (14)	879 (14)	
Occupation			
Management, business, and financial operations	211 (21)	870 (13)	<0.001
Professional and related	211 (21)	1446 (22)	
Service occupations	193 (19)	1187 (18)	
Sales and office occupations	156 (15)	1568 (24)	
Natural resources, construction, and maintenance	161 (16)	550 (8)	
Production, transportation, and material moving	86 (8)	805 (12)	
Military specific occupations	0 (0)	49 (1)	
Industry			
Agric/forestry/fishing/hunting & extraction/utilities	45 (4)	153 (2)	<0.001
Construction	161 (16)	345 (5)	
Manufacturing	50 (5)	761 (12)	
Wholesale and retail trade	89 (9)	874 (13)	
Transportation	45 (4)	319 (5)	
Information & Financial activities	102 (10)	615 (10)	
Professional and technical services	135 (13)	306 (5)	
Admin/support & leisure/hospitality & other services	265 (26)	1053 (16)	
Education and health services	117 (12)	1618 (25)	
Public administration & active military	5 (0)	430 (7)	
Number of employees, worksite			
1-9	822 (82)	1201 (19)	<0.001
10-49	109 (11)	1624 (25)	
50-499	51 (5)	2307 (36)	
500+	18 (2)	1284 (20)	
Has second job			
Yes	182 (18)	1062 (16)	0.281
No	828 (82)	5407 (84)	
Job tenure			
<1 year	156 (16)	1560 (24)	<0.001
1 - 5 years	276 (28)	2388 (37)	
6 - 10 years	155 (16)	1056 (16)	
11 - 19 years	176 (18)	849 (13)	
20+ years	238 (24)	605 (9)	

Table A2. Mean probabilities of EQ membership across covariates, wage earners.

Variable	SER	Portfolio	Inflexible Skilled	Dead-end	Precarious	Optimistic precarious
Age						
30 and under	0.266	0.113	0.149	0.122	0.187	0.163
31-50	0.288	0.185	0.169	0.155	0.111	0.092
Over 50	0.274	0.187	0.135	0.146	0.111	0.147
Sex						
Male	0.255	0.211	0.190	0.155	0.097	0.092
Female	0.299	0.131	0.125	0.135	0.157	0.151
Race/ethnicity						
White	0.274	0.190	0.158	0.143	0.112	0.122
Black	0.299	0.109	0.150	0.156	0.163	0.123
Hispanic	0.276	0.121	0.146	0.144	0.181	0.133
Asian/Pacific Is.	0.285	0.218	0.147	0.117	0.102	0.131
AI/AN	0.268	0.054	0.159	0.175	0.217	0.127
Nativity						
Born in U.S.	0.279	0.171	0.157	0.143	0.126	0.124
Foreign born	0.276	0.150	0.140	0.155	0.158	0.121
Education						
Less than high school	0.240	0.063	0.120	0.140	0.246	0.191
High school	0.278	0.117	0.147	0.159	0.160	0.138
Junior college	0.313	0.164	0.156	0.149	0.099	0.118
Bachelor	0.296	0.254	0.162	0.129	0.071	0.089
Graduate	0.248	0.326	0.205	0.108	0.035	0.078
Family income						
First quartile	0.243	0.045	0.106	0.115	0.275	0.216
Second quartile	0.336	0.108	0.157	0.196	0.110	0.094
Third quartile	0.295	0.204	0.178	0.161	0.074	0.087
Fourth quartile	0.236	0.345	0.199	0.106	0.040	0.073
Working spouse						
Yes	0.291	0.217	0.154	0.129	0.098	0.110
No	0.272	0.143	0.156	0.153	0.145	0.131
Marital status						
Married	0.284	0.213	0.160	0.133	0.098	0.111
Divorced, widowed, separated	0.275	0.148	0.149	0.166	0.141	0.121
Never married	0.273	0.116	0.153	0.145	0.168	0.145

Table A2 (continued). Mean probabilities of EQ membership across covariates, wage earners.

Variable	SER	Portfolio	Inflexible Skilled	Dead-end	Precarious	Optimistic precarious
Urban-Suburban-Rural						
Large/medium principal city	0.278	0.156	0.152	0.152	0.134	0.128
Suburb of principal city	0.278	0.186	0.151	0.144	0.121	0.120
Unincorporated city	0.274	0.179	0.166	0.135	0.120	0.126
Towns, smaller areas, open country	0.286	0.141	0.157	0.143	0.153	0.120
Occupation						
Management, business, and financial operations	0.278	0.372	0.152	0.114	0.033	0.051
Professional and related	0.302	0.211	0.187	0.122	0.070	0.108
Service occupations	0.231	0.064	0.137	0.122	0.239	0.207
Sales and office occupations	0.309	0.141	0.106	0.151	0.155	0.138
Natural resources, construction, and maintenance	0.299	0.152	0.195	0.161	0.087	0.106
Production, transportation, and material moving	0.234	0.087	0.184	0.222	0.169	0.104
Military specific occupations	0.256	0.233	0.307	0.156	0.026	0.022
Industry						
Agric/forestry/fishing/hunting & extraction/utilities	0.261	0.164	0.245	0.154	0.080	0.095
Construction	0.312	0.178	0.188	0.120	0.082	0.121
Manufacturing	0.270	0.207	0.161	0.194	0.117	0.051
Wholesale and retail trade	0.244	0.139	0.125	0.139	0.189	0.164
Transportation	0.233	0.112	0.191	0.248	0.117	0.098
Information & Financial activities	0.315	0.250	0.132	0.135	0.069	0.098
Professional and technical services	0.276	0.333	0.123	0.111	0.061	0.096
Admin/support & leisure/hospitality & other services	0.242	0.108	0.127	0.104	0.219	0.199
Education and health services	0.309	0.137	0.164	0.132	0.123	0.137
Public administration & active military	0.301	0.212	0.211	0.178	0.053	0.046
Number of employees, worksite						
1-9	0.257	0.153	0.134	0.086	0.151	0.219
10-49	0.288	0.149	0.135	0.138	0.144	0.145
50-499	0.279	0.164	0.174	0.161	0.128	0.094
500+	0.289	0.214	0.165	0.174	0.091	0.066
Has second job						
Yes	0.222	0.175	0.210	0.151	0.117	0.126
No	0.289	0.167	0.145	0.143	0.132	0.124
Job tenure						
<1 year	0.238	0.117	0.127	0.110	0.220	0.188
1 - 5 years	0.281	0.160	0.157	0.138	0.130	0.133
6 - 10 years	0.290	0.195	0.162	0.162	0.092	0.100
11 - 19 years	0.313	0.197	0.181	0.170	0.073	0.065
20+ years	0.296	0.241	0.169	0.189	0.050	0.055

Table A3. Mean probabilities of class membership across identified EQ types, self-employed.

Variable	Job-to-job	Skilled Contractor
Age		
30 and under	0.756	0.244
31-50	0.612	0.388
Over 50	0.576	0.424
Sex	1.000	0.000
Male	0.512	0.488
Female	0.753	0.247
Race/ethnicity		
White	0.569	0.431
Black	0.752	0.248
Hispanic	0.759	0.241
Asian/Pacific Is.	0.695	0.305
AI/AN	0.758	0.242
Nativity		
Born in U.S.	0.592	0.408
Foreign born	0.726	0.274
Education		
Less than high school	0.782	0.218
High school	0.630	0.370
Junior college	0.620	0.380
Bachelor	0.527	0.473
Graduate	0.539	0.461
Family income		
First quartile	0.830	0.170
Second quartile	0.684	0.316
Third quartile	0.581	0.419
Fourth quartile	0.410	0.590
Working spouse		
Yes	0.581	0.419
No	0.629	0.371
Marital status		
Married	0.571	0.429
Divorced, widowed, separated	0.624	0.376
Never married	0.713	0.287

Table A3 (continued). Mean probabilities of class membership across identified EQ types, self-employed.

Variable	Job-to-job	Skilled Contractor
Urban-Suburban-Rural		
Large/medium principal city	0.653	0.347
Suburb of principal city	0.608	0.392
Unincorporated city	0.563	0.437
Towns, smaller areas, open country	0.598	0.402
Occupation		
Management, business, and financial operations	0.473	0.527
Professional and related	0.615	0.385
Service occupations	0.814	0.186
Sales and office occupations	0.530	0.470
Natural resources, construction, and maintenance	0.599	0.401
Production, transportation, and material moving	0.621	0.379
Military specific occupations		
Industry		
Agric/forestry/fishing/hunting & extraction/utilities	0.481	0.519
Construction	0.506	0.494
Manufacturing	0.592	0.408
Wholesale and retail trade	0.536	0.464
Transportation	0.699	0.301
Information & Financial activities	0.490	0.510
Professional and technical services	0.579	0.421
Admin/support & leisure/hospitality & other services	0.739	0.261
Education and health services	0.655	0.345
Public administration & active military	0.586	0.415
Number of employees, worksite		
1-9	0.636	0.364
10-49	0.442	0.558
50-499	0.513	0.487
500+	0.588	0.412
Has second job		
Yes	0.654	0.346
No	0.600	0.400
Job tenure		
<1 year	0.796	0.204
1 - 5 years	0.664	0.336
6 - 10 years	0.590	0.410
11 - 19 years	0.531	0.469
20+ years	0.498	0.502

Chapter 4. Evaluating Employment Quality as a Determinant of Health in a Changing Labor Market

Published as:
Peckham, Trevor, Fujishiro, Kaori, Hajat, Anjum, Flahert, Brian, and Seixas, Noah S. 2019 "Evaluating Employment Quality as a Determinant of Health in a Changing Labor Market." RSF: The Russell Sage Foundation Journal of the Social Sciences. Volume 5, Issue 4. David R. Howell and Arne Kalleberg, eds.

ABSTRACT

The shifting nature of employment in recent decades, toward more flexible and competitive employment practices, has not been adequately examined from a public health perspective. To do so, traditional models of work and health research need to be expanded from a focus on work tasks or physical and social environments to include the relational and contractual aspects of employment that also impact health. Using data from the General Social Survey, we examine the association of three health outcomes with different types of employment in the contemporary U.S. labor market, as measured by a multidimensional construct of 'employment quality' (EQ) derived from latent class analysis. We find that EQ is associated with self-rated health, mental health, and occupational injury. Further, we explore three proposed mediating mechanisms of the EQ-health relationship (material deprivation, employment-related stressors, and occupational risk factors), finding each to be supported by these data.

1. INTRODUCTION

Rapid technological innovation, globalization processes, economic recessions, and demographic changes over the past several decades have caused a number of adaptive changes in the labor market, including the fundamental transformation of the nature and organization of work (Bosch, 2004; Kalleberg, 2009). Most notable is the shift away from maintaining a stable workforce toward more flexible and economically competitive employment practices (Benach et al., 2014; Bosch, 2004; Kalleberg, 2009; Weil, 2014). Consequently**,** there has been a decline in the number of workers who are in permanent, full-time,

regularly-scheduled work, with secure wages and benefits; and concurrently, a rise in non-standard arrangements (Howard, 2016; Kalleberg, 2000). In addition to the growth of atypical forms of employment, other dimensions of work also became de-standardized, including working hours, opportunities for advancement, and worker-employer relations (Scott-Marshall & Tompa, 2011). These changes have far-reaching consequences for the labor market experiences of millions of Americans; however, they have not been adequately examined from a public health perspective and compel the need for a new understanding of the elements of jobs that contribute to poor health (Peckham et al., 2017; Scott-Marshall & Tompa, 2011; Tompa et al., 2007). This paucity of research reflects the typical exclusion of occupation as a primary social determinant of health (Ahonen et al., 2018), as well as lack of measures that adequately capture employment conditions. This study offers an initial exploration of health consequences of different types of employment in the contemporary U.S. labor market, as measured by a multidimensional construct of employment quality. Further, we explore potential mechanisms by which EQ affects health.

We begin by clarifying important terms for interdisciplinary audiences. Although often used interchangeably, *job*, *work*, and *employment* have specific and distinct meanings in this paper. *Employment* refers to the contractual relationship between the employer and employee, and this is the central focus of our study. *Work* refers to what the worker does, and *work quality* concerns the nature of tasks and the physical and social environment in which the work occurs. *Jobs* are a broader term capturing the combination of work and employment.

1.1. Jobs and health: Shifting focus from work quality to employment quality

The shifting nature of employment arrangements and labor experiences has challenged the adequacy of traditional approaches to investigating the relationship between work and health. The vast majority of occupational health studies have focused on work quality. Traditional occupational health research has focused on physical hazards, such as exposure to chemical agents or dangerous and physically demanding tasks or environments. This line of research has made tremendous contributions to general public health;

for example, the International Agency for Research on Cancer, an agency within the World Health Organization, routinely evaluates occupational exposure as a basis for their human carcinogen designation. As economic activity in developed economies has moved away from industrial production and into service occupations, more attention has been directed at the psychological and social environment in the workplace. Since the early 1980s, job stress research has flourished, built upon the fundamental premise that if the resources the worker brings to the workplace are adequate for the demands in the workplace, then the health of the worker will be protected and enhanced; however, if the workplace demands overwhelm the worker's resources, his/her health will be compromised (Karasek, 1979). Large bodies of literature have provided convincing evidence that support this premise (Daniels et al., 2007; Siegrist et al., 2007). Both lines of occupational health research—one focusing on physical, chemical, and biological hazards and the other on psychological and social work environment—assume that health risks arise from *work* tasks and environments, and thus have paid little attention to *employment* conditions.

In the E.U. over the last several decades there has been significant policy interest in improving the quality of jobs (Lisbon European Council, 2000). This has driven empirical and theoretical research to identify high vs. low quality jobs. While no ultimate consensus exists as to how to measure job quality, researchers agree that there should be a conceptual distinction between *work* quality (i.e., the nature of tasks and work environment) and *employment* quality (i.e., relational and contractual aspects of the employer-employee relationship) (Holman & McClelland, 2011; Muñoz de Bustillo et al., 2009). Although workers experience both work quality and employment quality at the same time, by distinguishing the two, researchers can build upon the large body of literature on work quality and health, while also clarifying the relationship between work quality and employment quality that may influence health. The distinction therefore will help identify policy directions for protecting the health of working people.

1.2. Employment quality as a multidimensional construct

To better understand health consequences of employment quality (EQ), we first need to recognize that the quality of employment is a multidimensional construct characterized by various conditions of the employer-employee relations. Several scholars have proposed ways to conceptualize EQ as a multidimensional construct (Holman & McClelland, 2011; Muñoz de Bustillo et al., 2009). In this study, we build on a number of recent E.U. studies that have conceptualized EQ with the following seven dimensions: (1) employment stability; (2) material rewards; (3) workers' rights and social protections; (4) standardized working time arrangements; (5) training and employability opportunities; (6) collective organization; and (7) interpersonal power relations (Julià et al., 2017; Van Aerden et al., 2014). These dimensions were drawn from critical review of the employment quality literature with specific focus on implications for worker well-being (Van Aerden et al., 2014), and thus together they capture various contractual arrangements and employment practices that employees experience.

A second important consideration is that jobs represent packages or configurations of different work and employment features, and that health implications stem from particular patterns in these features. One way to operationalize this is a typological approach, which identifies patterns of employment characteristics that holistically represent worker's experience. Using the Standard Employment Relationship (SER; i.e., permanent, full-time, regularly-scheduled work with secure wages and benefits) as a reference point, we can characterize the experience of EQ with differences in the pattern of employment conditions across the seven EQ dimensions. For example, some jobs may have short-term contract, low pay, and insufficient hours; other jobs may have excessive work hours, high pay, and good benefits (Van Aerden et al., 2014). While this is still a new approach, two European studies have reported significant association between EQ types and some general health indicators (Van Aerden et al., 2016, 2017).

The typological approach complements the more traditional variable-based approach, which focuses on individual aspects of EQ (e.g., employment stability, work schedule, pay) separately and identifies their independent associations with health while assuming other aspects to be constant. Studies

using the variable-based approach have linked non-standard employment—usually measured as perceived job insecurity or non-permanent contract—to a variety of health outcomes, including increased injury rates and injury severity, musculoskeletal symptoms, and poor physical and mental health (Benach et al., 2014; Kim et al., 2012; Quinlan, Mayhew, & Bohle, 2001; Silverstein, Welp, Nelson, & Kalat, 1998). Poor health has been also associated with long working hours (O'Reilly & Rosato, 2013; Virtanen et al., 2012), irregular and asocial work schedules (Jamal, 2004; Martens et al., 1999), and mismatched preferences regarding working times (Wooden et al., 2009). While they all suggest components of EQ have potential health implications, being in disparate literatures and only addressing single aspects of EQ at a time, these findings have not formed a coherent approach for investigating health implications of the broader concept of EQ. Further, because poor employment conditions (e.g., instability, non-day shift, low pay) tend to cluster in the same job, the variable-based approach is limited in its ability to illuminate health implications of poor EQ for workers, who experience jobs as a package.

1.3. Employment Quality and Health

A theoretical underpinning for EQ's health consequences is the fundamental cause theory of health (Link & Phelan, 1995). It posits that money, knowledge, power, prestige, and social connections are personal resources that enable individuals to accumulate health advantages over time; hence the unequal access and distribution of these personal resources are fundamental causes of health inequalities. Most studies that apply this theory have used education as the proxy for the personal resources [e.g., (Masters et al., 2015)]. Recently, Ahonen et al. (2018) argued that jobs, with their complexity in providing both health-enhancing and damaging contexts throughout the adult life, influence the access and distribution of personal resources and thus are a crucial component in the application of fundamental cause theory. According to this theory, EQ may impact health by affecting individuals' access to money, knowledge, power, prestige and social connections, which in turn influence their ability to accumulate health advantages over time. In the context of EQ we operationalize these personal resources with three specific

pathways that lead from EQ to health: material deprivation, stressors related to employment conditions, and occupational risk factors (Julià et al., 2017; Tompa et al., 2007).

The first pathway, material deprivation, involves whether or not the employment condition provides a worker sufficient income as well as non-wage material benefits (e.g., health insurance, paid sick leave) to acquire necessities and health-enhancing goods. The association between income and health is well documented (Fritzell et al., 2004). The mechanism is not only through access to necessities and goods, but also though psychosocial distress associated with deprivation such as low self-esteem (Gardner et al., 2004); poor satisfaction with jobs (Faragher et al., 2005; Leigh & De Vogli, 2016) and life in general (Cheung & Lucas, 2015); and difficulties in long-term life planning (Bosmans et al., 2016; Julià et al., 2017; Tompa et al., 2007).

The second pathway is through employment-related stressors such as job insecurity and earning unfairness. If the employment contract is short term or hours fluctuate unexpectedly, workers will experience anxiety about keeping the job (job insecurity) and less control over their professional and personal lives, which may hinder career development, create powerlessness, and negatively impact family and other personal relationships. These effects are all associated with poor health (Clarke et al., 2007; W. Lewchuk et al., 2008). Moreover, if two workers perform the same work tasks side by side but are paid differently because of their different employment conditions (e.g., a SER secretary and a clerical worker sent from a temp agency), the sense of unfairness arises, which is also associated with poor health (Elovainio et al., 2010).

Finally, EQ may impact health through differential exposures to occupational risk factors. Even though work tasks are similar, workers under different employment conditions may be exposed to occupational hazards differently. SER workers, to whom the employer is committed long term, may receive thorough training, have opportunities to develop skills to perform tasks safely, and be able to changes work processes so that they are safe. The employers are likely to be motivated to keep SER jobs safer because SER employee turnover is expensive. For non-SER workers (e.g., short-term, substitute, subcontractors), employers may not invest many resources in their safety. Because of the power relations

represented in employment conditions, some non-SER workers may be reluctant to refuse hazardous tasks (Gunnar Aronsson, 1999; Foley, 2017; M Quinlan et al., 2001; Tompa et al., 2007). Beside occupational safety, job strain (a combination of high job demands and low control, Karasek, 1979) and workplace social support are robust predictors of health (de Lange et al., 2003; Peggy A. Thoits, 2011). Employment conditions may influence the workers' experience of both. Non-SER workers who get paid by the amount produced may have higher job demands than SER workers receiving hourly wages or salaries. Short-term contracts may not allow non-SER workers to form supportive connections in the workplace. All three mechanism are conceptually plausible, but to date little systematic investigation has been done as to their importance in the relationship between EQ and health.

1.4. The current study

Using data from the General Social Survey (2002-14), we examine the association of EQ and three health indicators (i.e., self-rated health, mental health, and occupational injury) and explore three proposed mediating mechanisms (i.e., material deprivation, employment-related stressors, and occupational risk factors). Self-rated health is an indicator of broad health status (Idler & Benyamini, 1997) and its significant association with EQ was reported previously in E.U. data (Van Aerden et al., 2016, 2017). Mental health—also associated with EQ (Van Aerden et al., 2016, 2017)—and occupational injury are more specific and contrasting health indicators. For mental health, material deprivation and employment-related stressors would be more salient mediating mechanisms, whereas traditional occupational risk factors would be more salient for occupational injury. Because our data are self-reported and cross-sectional, it is important to have contrasting health indicators so as not to capture completely spurious associations. Further, while the proposed mediating mechanisms are not competing hypotheses—rather, most likely all mechanisms are in effect simultaneously—the most salient mechanism may differ by the type of health consequence (e.g., acute vs. chronic) and by specific EQ features that distinguish a given employment condition from SER (e.g., material rewards, employment stability, power relations). In this

study, we investigate the linkages between EQ and health, as well as explore plausible mechanisms deserving of future investigation in this emerging field.

2. DATA AND METHODS

2.1. Data

This study uses data from the General Social Survey (GSS). The GSS is a nationally representative, repeated cross-sectional survey of non-institutionalized American adults conducted via face-to-face personal interviews by the National Opinion Research Center (T. W. Smith et al., 2006). In 2002, 2006, 2010, and 2014, the GSS included a module on the Quality of Work Life (QWL), which assessed an assortment of employment conditions among employed GSS respondents. This module was developed in collaboration with the National Institute for Occupational Safety and Health (NIOSH) and with advice from a panel of experts in organizational behavior, occupational safety and health, and human resource management. A total of 5,961 respondents, pooled across the four survey years, completed the QWL module and indicated that they were currently employed (either in full- or part-time work, or temporarily not working due to strike, vacation, or temporary illness). From this sample, exclusion criteria were applied at two separate stages of our analysis: first, prior to latent class analysis to determine EQ categories, and, second, prior to regression analyses with health outcomes (see below). All analyses are adjusted for survey sampling probabilities that account for number of adults in the household and non-response. Year-specific response rates for the GSS were between 70.1% and 71.4%.

2.2. Construction of an employment quality typology

The primary independent variable, a typology of EQ, was constructed by latent class analysis (LCA). The LCA procedure identifies mutually exclusive and exhaustive EQ types based on patterns of EQ indicator responses. In the GSS, we identified 11 indicators of EQ conditions that represent the seven dimensions of EQ described in the introduction (see appendix table S1). The conceptualization and choice of EQ indicators is based on an established framework (Julià et al., 2017), and indicators we used from the GSS

are similar to prior studies of EQ in Europe (Van Aerden et al., 2014, 2015, 2016, 2017). LCA modeling in this study was conducted using the mixture modeling function with maximum likelihood (ML) estimation with sample weights provided by the GSS in Mplus (Version 8) (L. K. Muthén & Muthén, 2010). Missing values were modeled with ML estimation assuming missing at random (Little & Rubin, 2014).

In constructing EQ categories, we evaluate wage earning and self-employed worker populations separately: these employment arrangements are fundamentally different such that we expect the meaning of some EQ indicators to be dissimilar across the two groups (e.g., mandatory overtime could be self-imposed for self-employed workers). Self-employment status was determined using the item, "Are you self-employed or do you work for someone else?" Respondents with no information on self-employment were excluded (n=5). We further excluded respondents without information for at least two EQ indicators (n=23), retaining as many respondents as possible that contributed EQ items for the LCA. The final sample included in LCA modeling was 5,933 workers (n=5,125 for wage earners, n=808 for the self-employed).

Analyzing the wage earning and self-employed groups separately, we increased the number of classes stepwise and then selected the best LCA models through a two-step procedure that includes assessment of formal fit indices and a substantive interpretation of EQ types. Three model-fit indices, Bayesian Information Criteria (BIC), Akaike Information Criteria (AIC), and Vuong-Lo-Mendell-Rubin likelihood ratio test (VLMR-LRT), indicate that the optimal solution within the wage earner sample was between four and seven EQ categories (see appendix table S2). After taking into account the conceptual meaning of each measurement model by examining conditional response probabilities—that is, the within-class distributions of each response category—we chose a six-class model as the most meaningful (see appendix table S3). In the self-employed sample, both fit indices and substantive interpretation indicated the two-category solution was best (see appendix tables S2 and S4). Therefore, based on a combination of model fit and interpretation, eight EQ categories are identified as the most stable and meaningful solutions, with six employment types within wage earners and two within self-employed

workers. Further, an evaluation of LCA output show a clear pattern of non-random distribution of category-specific item response probabilities. This suggests that each of the included indicators possess predictive power for determining membership into the EQ types (Flaherty, 2002)

We labeled the eight EQ types based on the probability of endorsing particular responses that distinguish one EQ type from another (see appendix tables S3 and S4). Thus, these labels are meant to reflect the characteristic employment conditions that together create the workers' experience of employment in each of the EQ types (see table 1). In addition to the *SER-like* type, the *Portfolio* and *Precarious* job types identified in the GSS are similar to those seen in prior studies of the E.U. labor market, and thus these specific labels are adopted herein (Van Aerden et al., 2017).

2.3. Health indicators

Given the multitude of potential manifestations of poor health that are associated with low quality employment (Benach et al., 2014; Kim et al., 2012), and our expectation that the health consequences and mechanisms of EQ may vary depending on the patterns of employment conditions one is exposed to, we explore the relationship between EQ and three broad indicators of health. First, we examine self-rated health (SRH), measured by the standard question: "In general, would you say your health is excellent, very good, good, fair or poor? (fair/poor = 1, good/very good/excellent = 0)" The SRH measure has strong predictive validity of mortality and morbidity (DeSalvo et al., 2006; Idler & Benyamini, 1997; Singh-Manoux et al., 2007). Second, we assess frequent mental distress (FMD), measured using the general mental health item from the Centers for Disease Control and Prevention (CDC) four-item health-related quality of life index (HRQOL-4): "Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?" FMD is defined as ≥14 mentally unhealthy days, and is commonly used as a proxy for poor mental health in population health surveillance (Brown et al., 2003; Centers for Disease Control and Prevention, 1998, 2000, 2004). Lastly, we examine work-related injury. The number of injuries a respondent has experienced at work are assessed with the following question: "In the past 12 months, how

many times have you been injured on the job?" The injury measure includes a count of injuries from zero to six and seven or more.

2.4. Measures of sociodemographic characteristics

We adjust health outcomes models for five sociodemographic characteristics. Demographic variables included are sex (male, female), race/ethnicity (non-Hispanic white, non-Hispanic African American, Hispanic, other), nativity (born in U.S., born outside of U.S.), and age. Age is trichotomized into three groups corresponding with three meaningful periods in a working career: lift-off (<30 years), a mid-career period (30–50 years), and the end-of-career period (>51 years) (Christophe Vanroelen et al., 2010). Educational attainment is included as less than high school, high school, associate degree, bachelor's degree, and graduate degree. In this study, these variables are hypothesized to confound the EQ-health association: each predict labor market position and are associated with physical and mental health status.

2.5. Measures of Potential Mediating Factors

We use the rich information on employment conditions available within the QWL to examine potential mediating mechanisms in the EQ-health association. To examine the first pathway, material deprivation, we use inadequate income, "Do you feel that the income from your job alone is enough to meet your family's usual monthly expenses and bills" (no = 1, yes = 0) and inadequate fringe benefits, **"**My fringe benefits are good" (not too/not at all true = 1, very/somewhat true = 0). Second, we assess two indicators of an employment-related stressors pathway: job insecurity and earnings unfairness. Perceived job security is measured as degree of agreement with the statement, "The job security is good" (not too/not at all true = 1, very/somewhat true = 0). Unfairness of earnings is measured with the question "How fair is what you earn on your job in comparison to others doing the same type of work you do" (much less than deserved = 1, somewhat less/about as much/somewhat more/much more = 0). This is a distinct construct from inadequate income introduced above, although the two may be correlated, because the earning fairness is asked as social comparison whereas inadequate income was asked as a comparison with one's

own needs. The third pathway, traditional occupational risk factors, is represented with three variables: job strain, high physical exposure, and low social support. Job strain was constructed from three items on job control ('learn new things', 'variety', 'allows own decisions') and three items on job demands ('work fast', 'enough time', 'no excessive work') all from the Job Content Questionnaire, specifically designed for job strain (Karasek et al., 1998). Each set of items were summed up, split at the sample median score, and made into a quadrant: low strain jobs (low demand and high control), high strain jobs (high demand and low control), active jobs (high demand and high control), and passive jobs (low demand and low control) (Karasek et al., 1998). A dichotomized measure of high physical exposures combines two items asking if a respondent's job regularly requires forceful hand movements or awkward positions and repeated lifting, pushing, pulling, or bending (both present = 1, one or zero present = 0). The third occupational risk factor mediator is low levels of social support, which is commonly studied alongside job strain as a factor that moderate negative impacts of job strain (de Lange et al., 2003). This measure is constructed by combining four items: two measures of coworker support (e.g., "The people I work with take a personal interest in me") and two measures of supervisor support (e.g., "My supervisor is helpful to me in getting the job done"). The social support variable is dichotomized such that 'high support' is coded as a minimum average response of "somewhat true" or better, and is otherwise coded as 'low support'.

2.6. Statistical analysis

In the GSS sample of wage earners and self-employed workers, there is relatively little missing data in each variable included in regression analyses: only earnings unfairness (3.1 percent) and workplace social support (5.6 percent) variables had more than 2 percent missing. Because we did not have a theoretical basis for imputing these values from available GSS data, respondents who did not provide information on earnings fairness or social support were excluded from the analysis. Those who had missing data on other variables (i.e., in order of most-to-least missing data [all <2%]: job strain, benefits adequacy, job security, income adequacy, FMD, physical hazards exposure, occupational injury, SRH, and age) were also excluded. Due to the large number of variables and a high degree of non-overlapping missingness, the

exclusion steps reduced the total weighted sample by 9.5 percent (n = 5,480). The final sample characteristics are presented in table 2. Respondents removed from the analysis were older, more likely to be born outside of the U.S., and reported less FMD than the analysis sample (see table S5). The proportion of removed respondents also varied by survey year; in addition to general concerns of secular trends, this provided further rationale for adjusting all regression models for year to account for potential survey effects.

To examine the relationship between EQ and health, as well as potential mediators of this relationship, we use Poisson regression with a robust error variance. The robust Poisson approach provides efficient and reliable estimates of a ratio measure of effect when the outcome measure is common and odds ratios overestimate risk (Coutinho et al., 2008; Zou, 2004). Model parameters are exponentiated to the ratio scale for presentation. For binary outcomes (SRH and FMD), the results of the robust Poisson are interpreted as prevalence ratios (PR), while for count data (injuries in last year) coefficients represent rate ratios (RR). We conducted all regression analyses in r (Version 1.1.423) using the 'glm2' package (Marschner, 2011); all data are included in the models with GSS survey sample weights, and robust 95% confidence intervals are calculated from Huber-White standard error estimates determined by the 'sandwich' r package (Zeileis, 2004).

The EQ typology is introduced into the analyses as each respondent's estimated probability of membership into the eight job types. Estimates from the wage earner and self-employed LCA models are combined so that each respondent is assigned eight scores between 0 and 1, which add to 1 (self-employed workers have zero probability of membership in the six EQ types identified in wage earners, and vice versa). This approach reduces classification errors compared to modal assignment (classification into a single, most-likely class), as the latent class probabilities inherently include information regarding the uncertainty of classifying individuals to a specific category (Hagenaars & McCutcheon, 2002).

Evaluating each health indicator separately, we build a sequence of regression models: a basic model with EQ and survey year only, a model additionally controlled for demographics (age, sex, race/ethnicity, and nativity), and a model that additionally controls for education. The *SER-like* job type is

used as the reference category for all analyses. Thus, the effect estimates describe the ratio of outcome occurrence with 100% probability of belonging to a particular EQ type compared with the outcome occurrence with 100% probability of belonging to the *SER-like* job type (Van Aerden et al., 2016, 2017).

To examine the three mediating mechanisms, we followed the mediation test principles recommended by Baron and Kenny (1986). That is, we first establish the association between EQ and all of the mediating variable (having examined the EQ-health association in our primary analysis), and then continue our nested regression analyses: a model with each of the three sets of mediating variables, and a model with all mediation variables. Log-likelihood ratio tests are conducted to assess the overall significance of EQ as well as model improvements as we include additional variables. Evidence for mediation is identified when EQ coefficients have a smaller magnitude or less statistically significant relationship with the health outcomes when mediator variables were introduced as compared to the regression equation in which mediator variables were not introduced.

3. RESULTS

3.1. Association between EQ and three health indicators

EQ and the three health indicators were significantly associated in the basic model (i.e., adjusted for survey year only), and additional adjustments for age, sex, race/ethnicity, nativity, and education did not substantively affect the associations (see appendix tables S6-S8 for results). The associations of EQ with self-rated health (SRH), frequent mental health (FMD), and work injury, adjusted for these demographic characteristics, are presented as model 1 in tables 3, 4, and 5, respectively. Compared with *SER-like* jobs, *Portfolio* job holders were less likely to report poor SRH. *Inflexible skilled* job holders reported worse FMD and more work injuries. *Dead-end* and *Precarious* job holders were more likely to report poor SRH, poor FMD, and more injuries. In contrast, *Optimistic precarious* job holders were not different from SER in any of the health indicators. The two types of self-employed jobs did not differ from *SER-like* in SRH, but respondents in both *Skilled contractor* and *Job-to-job* types reported more injuries, and those from the *Job-to-job* type also reported worse mental health.

3.2. Association between EQ and proposed mediating variables

Before presenting mediation results, we first examine the associations of EQ types and proposed mediating variables (see table 6). All these variables are coded in the direction of health compromising. *Portfolio* job holders had lower levels of material deprivation and traditional occupational hazards than *SER-like* job holders, and did not differ significantly on employment-related stressors. *Self-employed Skilled contractors* had a similar profile as *Portfolio* but more similar to *SER-like* in fringe benefits and social support. One difference is the higher exposure to physical hazards among *Skilled contractors* than the *SER-like* type. *Inflexible skilled* job holders are similar to *Skilled contractors*, but they are more likely to perceive unfairness in earnings compared with SER. *Dead-end, Precarious,* and *Job-to-job* types are similar in that they have higher levels of material deprivation, employment-related stressors, and occupational risk factors compared to *SER-like* jobs. *Optimistic precarious* jobs are distinct from any other EQ types in that despite high levels of material deprivation and job insecurity, they are similar to *SER-like* job holders in terms of fair earning and occupational risk factors. Taken together, the different patterns of associations between EQ types and mediating variables generally suggest health-protecting features in *Portfolio* and *Skilled contractor* jobs; health-damaging features in *Dead-end, Precarious, Job-to-job, and Optimistic precarious* jobs; and a complex combination of each for *Inflexible skilled* jobs.

3.3. Exploration of potential mediating mechanisms

The results of regression models that include the mediating variables are presented in tables 3 through 5. When included in the EQ-SRH models, the material deprivation variables are associated with higher likelihood of reporting poor SRH, with inadequate fringe benefits having a more robust association (see table 3, model 2). Inclusion of material deprivation variables resulted in slightly attenuated associations in some EQ types. In particular, our results suggest that *Dead-end* and *Precarious* jobs' higher likelihood of reporting poor SRH, as well as *Portfolio* jobs' lower likelihood, may be explained by different levels of material deprivation experienced by those job holders. Employment-related stressors were strongly

associated with poor SRH (model 3). With inclusion of these mediators, associations for *Dead-end* and *Precarious* jobs were attenuated. Traditional occupational risk factors were also strongly associated with poor SRH (model 4), and when these were included, associations for *Dead-end* and *Precarious* jobs were again attenuated. This suggests that both employment-related stressors and occupational risk factors may also explain the significant associations of EQ with SRH in *Dead-end* and *Precarious* job types. Finally, model 5, with all mediating variables included, shows large attenuation of all EQ associations. The association between EQ as a whole and SRH is also slightly diminished (i.e., the p-value for the log-likelihood ratio test for EQ changed from <0.001 to 0.049). Some mediators also show diminished associations with poor SRH, which indicates they are likely correlated with each other. Models with mediator variables are all significantly better in explaining the outcome variance than model 1.

Results for poor mental health (FMD) are shown in table 4, models 2 through 5. The material deprivation model (model 2) shows some attenuation in EQ coefficients from Model 1, with the most pronounced attenuation in the *Precarious* type. In the employment-related stressor model (model 3) and particularly the occupational risk factor model (model 4), we see attenuation of EQ coefficients for *Inflexible skilled, Dead-end,* and *Precarious* types. Notably, *Precarious* and *Job-to-job* types consistently show higher likelihood of reporting poor mental health when individual sets of mediators are included. However, when all mediators are included in the model (model 5), all coefficients for EQ types reduced their magnitude from model 1, and EQ as a whole is no longer significantly associated with FMD (p=0.285). Together with the observation that the mediators had strong and significant associations with FMD in expected directions in all models, model 5 finding suggests that these mediating variables may play an important role in the EQ-mental health association.

Table 5, models 2 through 5 present potential mediation in the EQ association with occupational injuries. In general, EQ's association with occupational injuries did not change as much as it did with other outcomes when mediator variables were included in the model. Also the mediator variables are not as strongly associated with this outcome, aside from physical hazards exposure and low social support (components of occupational risk factors). The most striking difference from model 1 can be seen in

model 4, in which traditional occupational risk factors were included as mediators. The coefficients for *Inflexible skilled, Dead-end,* and *Precarious* jobs—the highest likelihoods of reporting occupational injuries in model 1—diminished drastically in model 4, and more modest attenuation was seen for *Skilled Contractors* and *Job-to-job*. When all mediators were included (model 5), EQ's association with occupational injury was similar to what we saw in model 4. *Inflexible skilled* jobs and *Dead-end* jobs constantly had significantly higher likelihoods of reporting injuries compared with SER-like jobs, suggesting some other mechanisms are in effect.

4. DISCUSSION

In this study we examined the association between EQ and three indicators of health: general health, mental health, and occupational injury. Overall, we found significant associations between some EQ types and each of the three health indicators when compared with *SER-like* jobs after adjusting for sociodemographic characteristics. This study is part of a growing trend within occupational health research to expand its framework to consider the relational and contractual aspects of employment that affect health. A primary strength of this analysis is that EQ is measured using a multidimensional, typological approach, such that the EQ-health associations we found reflect health implications of employment as a package, rather than each aspect of employment. Another contribution of this study is an initial exploration of three possible mediating mechanisms between EQ and health, with these data generally supporting their plausibility.

4.1 EQ types and health

The eight EQ types in our study had distinct associations with health. As expected, *Dead-end* and *Precarious* job holders had consistently higher likelihoods of reporting poor general and mental health as well as occupational injury. These EQ types are characterized by an accumulation of several unfavorable employment conditions, including high workplace harassment and low opportunity to develop, control over schedule, and employee involvement (see table S3). Also, *Dead-end* and *Precarious* job holders

were similar in their experience of three mediating mechanisms: high levels of material deprivation, employment-related stressors, and occupational risk factors. Yet these two job types differed across several dimensions of EQ, including indicators of stability, material rewards, working time arrangements, and collective organization. To protect the health of workers in these EQ types, we need to investigate more purposefully the specific combination of employment conditions and work quality they experience as a package.

Likewise, *Inflexible skilled* job holders and *Job-to-job* workers also had worse mental health and injury experience compared to *SER-like* job holders. The two, however, represent clearly distinct combinations of EQ conditions: *Inflexible skilled* jobs resemble stable, relatively well-paid employment but with excessive and inflexible hours; *Job-to-job* workers experience a highly non-standard employment arrangement with low pay and relatively low hours. They also starkly differ in their experience of the mediating mechanisms: *Inflexible skilled* workers reported similar profile with *SER-like* workers except for higher physical hazards and unfair earnings; *Job-to-job* workers reported all unfavorable experiences except for job strain. These differences, both in EQ characteristics and proposed mediating mechanisms, suggest that their poor health is a manifestation of distinct combinations of employment and working conditions that may warrant different approaches for intervention.

Contrary to Van Aerden et al. 2016, which reported high health risks for Portfolio jobs from E.U. data, in our data *Portfolio* jobs were generally not different from SER in terms of health. The U.S. *Portfolio* jobs we identified are similar to the European *Portfolio* jobs—characterized by generally the most favorable employment conditions—with one exception: the U.S. *Portfolio* job holders did not suffer from mandatory extra days of work, whereas a defining feature of the E.U. *Portfolio* jobs was uncompensated exceptional working times (Van Aerden et al., 2016). *Portfolio* job holders in our study reported higher sense of material resource adequacy, fairness in their earnings and security in their jobs, and lower levels of occupational hazard exposures than *SER-like*. In European contexts, these relationships may be different.

Somewhat unexpectedly, *Optimistic precarious* job holders did not differ from *SER-like* job holders on any of the three health indicators. This EQ type is characterized as very de-standardized: that is, having the lowest hours, very low income, and highest probabilities of both irregular hours and non-permanent arrangements within wage earners. Likewise, these job holders report higher levels of material resource inadequacy and job insecurity. Yet, these jobs also have an overall profile that includes several favorable EQ conditions, including relatively high schedule control, development opportunity, and employee involvement in decision-making, suggesting the possibility that these workers are opting in to these types of jobs. Indeed, despite low pay and feelings of inadequate income, their sense of earnings unfairness is not different from *SER-like* job holders. This would generally comport with a recent study of Italian workers that found that workers in non-standard employment arrangements are a heterogeneous group, and that voluntariness into these jobs was relevant to health status (Pirani, 2017). Our finding of similar health to *SER-like* jobs suggests these workers may have other sources of health-protecting resources.

The two classes identified among the self-employed are quite different from each other. *Skilled contractors* resemble a highly paid, independent workforce, similar to *Portfolio* job holders but engaged in jobs with time-specific contracts. *Job-to-job* workers have low pay and hours, with little involvement, and generally seem to have the weakest attachment to the labor market—although the extent to which this is by choice is uncertain, as they also possess flexibility and development opportunities. In occupational safety and health studies, self-employment has been understudied (Stephan & Roesler, 2010), and if it is addressed, the heterogeneity among the self-employed has been neglected. Our findings indicate that there may be important differences among working people who self-identify as "self-employed." Our study finds *Job-to-job* workers to report poor mental health and yet the proposed mediators do not seem to explain the relationship. Because our sample sizes for the self-employed workers were limited (n = ~800), these intriguing results need additional exploration with specific focus on self-employment.

4.2. The value of a multidimensional, typological approach and policy implications

In conceptualizing EQ as a multidimensional construct, we believe that we are better able to capture key dimensions of workers' employment experience that impact health and well-being. This approach also has potential to inform policy makers to enhance worker health through improved job quality. It is important to highlight that researchers in sociology, economics, and public health have struggled to conceptualize and measure EQ. Some researchers have focused too narrowly, especially on single dimensions such as employment arrangement or wages; others have attempted to include more nuance in their conception of poor/low quality jobs, only to find these conceptions quickly become too difficult to use in empirical analysis of actual working populations. A widely studied such concept is precarious employment, which can be defined generally as an accumulation of many unfavorable employment features (Julià et al., 2017). Deeply rooted in the tradition of sociological and labor relations literatures (Arnold & Bongiovi, 2013; Kalleberg & Hewison, 2013), the concept of precarious employment has been applied across many different analytical levels (e.g. precarious employment, precarious work, precarious workers as a social class) and tends to have different meanings in different contexts (Burchell et al., 2014; Campbell & Price, 2016). The development of specific scales to measure precarity is an active area of research (Wayne Lewchuk et al., 2014; Vives et al., 2015); however, even these approaches assess employment conditions using an aggregate scale ranging from low to high rather than as something more dynamic. The LCA approach we used allows for conceiving of jobs as packages of employment features, and thus facilitates the conceptualization that health consequences of EQ will depend on specific patterns of features to which one is exposed.

The advantage of a typological approach, compared to dimensional approaches (i.e., focusing on aspects of EQ separately), is its emphasis on the structure and distribution of simultaneously occurring employment conditions (Bergman & Magnusson, 1997). In other words, a typological approach can identify *profiles of risks* for various segments of the labor force, which can be useful for policy makers to develop comprehensive interventions (Vanroelen et al., 2010). Dimensional approaches investigate specific features of employment conditions while assuming all other aspects are constant. Thus, while

potentially useful in identifying risk factors, resulting findings would suggest policy makers to effect narrowly-focused interventions. Such interventions may improve job quality for some but may have no impact on others—or possibly even produce worse conditions for others. For example, based on research showing correlation between long work hours and poor health, one might propose limiting working hours to improve health. However, to cover the excess hours previously worked by permanent full-time employees, employers may create part-time jobs with unpredictable and inadequate hours. A typological approach would encourage policy makers to address unpredictable and inadequate hours, as well as inadequate pay, as a package. We believe that our approach is meaningful because it addresses a general picture of current U.S. labor market practice and the holistic experiences of American workers engaged in different types of employment.

Importantly, the quality of one's employment is modifiable through both policy levers and employer-driven workplace modifications. Overall, our findings suggest that if EQ conditions could be modified to resemble more closely the standard model of employment, many workers may experience better health. One example of an ambitious policy agenda can be found in the E.U.'s attempt to secure "more and better jobs" (Lisbon European Council, 2000). As our exploration of mediating mechanisms suggests, the health-enhancing process may be through adequate material resources, fair earnings and job security, and lower exposures to occupational risk factors. If they are indeed mediating the EQ-health relationship, then changing these conditions may also help protect the health of working people. More generally, workplace policies can effectively redistribute resources to reduce inequality (e.g. secure scheduling redistributes power from employers to workers) and can benefit all workers regardless of their personal resources or behaviors. While employment conditions have received less attention compared to other aspects of socioeconomic position, such as education and income, the modifiable nature of employment makes it a critical determinant of health deserving of further consideration in both research and policy realms. Further, by specifically delineating between concepts of *employment* quality vs. *work* quality, the EQ concept can be used to supplement and complement policy efforts to improve job quality as a whole.

4.3. Limitations of this study and future research directions

A major limitation of this study is its reliance on self-reported cross-sectional data. The cross-sectional nature of the GSS data means that reverse causation—i.e., poor health contributes to selection into jobs with poor employment conditions—cannot be ruled out as a possible explanation. In terms of self-reported measures, it would be ideal to obtain EQ indicators directly from employment records to overcome some of the inherent bias in self-reported data. Additionally, better (i.e., more objective) measures of health outcomes would eliminate some of the bias found in these metrics. In particular, we found stronger mediation in associations between EQ and poor mental health, which may be inflated because these are especially sensitive to the person's mental state at the time of data collection (e.g., a worker in a poor mental health state may be more likely to perceive their EQ conditions as negative or poor compared to another worker in a better state of mental health) (Conway & Lance, 2010). Another limitation in this study is unmeasured confounding. For instance, unobserved factors such as early-life health, social support outside of the job, or local economic and policy contexts may confound the EQ-health association, potentially biasing effect estimates. However, the different patterns of associations across different health indicators give us some confidence that the observed associations are not artificial.

Another data-related limitation is the exclusion of a sizable portion (9.5%) of the overall GSS QWL sample in our regression analyses due to missing information. The majority of missingness occurred in covariates associated with our hypothesized mediation mechanisms; therefore, it is possible (but not likely, we think) that if missing information on these variables is associated with other confounding characteristics, this could bias our results. As a crude sensitivity analysis, we repeated all regression models excluding only those with missing data required for the specific model; these exclusions showed no effect on our findings.

As for measure of EQ typology, EQ indicators included here are limited to those available within GSS data; in particular, detailed information on non-wage benefits, workers' rights, and employability opportunities are lacking. Yet the GSS QWL module is among the richest individual-level data pertinent

to EQ characteristics and health, and allows for an initial exploration of this construct in the U.S. Further, we do not believe that having more indicators related to certain EQ dimensions is a problem for our LCA-based approach. This is primarily because each indicator represents a distinct aspect of the EQ construct. For instance, number of hours worked, when one works, and how much schedule flexibility one has each represent different facets of working time arrangements and power dynamics. Indeed, we find little evidence that EQ indicators are strongly correlated with each other, based on several statistical tests we conducted for association of categorical variables. In other words, rather than risking 'over-weighting' certain EQ dimensions, our LCA approach is able to identify heterogeneity within the diverse range of employment configurations seen among U.S. workers. Nevertheless, there is a distinct need for improved surveys to better characterize both EQ and the health consequences of different occupational settings. The National Academy of Science recently called for improved surveillance of work-related exposures and health, including methods to include workers in non-standard employment arrangements and other under-represented working groups (National Academies of Sciences, Engineering, 2018).

It is also important to note that the mediation analysis we present is exploratory. Here we attempt to lay out our conceptual understanding of how EQ impacts health, which has been rarely explored in the public health literature. In our study, EQ was associated with all of the variables representing proposed mediating mechanisms. When the mediators were included in the models, most of them had significant associations with the outcome variable in expected directions, and most EQ-health associations were attenuated. This supports that the hypothesized mediating processes linking EQ and health are plausible, and each mediation mechanism suggests a potential avenue for intervention. However, before concrete recommendations can be formed, more rigorous investigation with stronger study design must be pursued. Although we posit that there is a strong conceptual rationale that EQ is antecedent to the evaluated mediators (e.g., job insecurity, workplace social support, etc., would arise from one's current job, rather than contributing to selection into that job), the GSS data do not provide definitive empirical support for the mechanisms hypothesized. Thus, these results should be seen as suggestive evidence that the

mechanisms proposed are useful. As this area of research continues to develop, we anticipate more suitable longitudinal data will become available for investigating the mediation questions of interest.

Despite these limitations, to our knowledge, this is the first study to rigorously evaluate a multidimensional construct of EQ to examine associations with employee health in the U.S. context. Although some studies have started to report multidimensional EQ and health relationships, they have been mostly restricted to Europe. The generalizability of European research to the U.S. context may be limited because of vast differences between the respective labor laws and regulation as well as social safety nets. These differences are reflected in the common finding that social class-based health disparities in Europe are less severe relative to those in the U.S. (Avendano, Glymour, Banks, & Mackenbach, 2009; Mauricio Avendano & Kawachi, 2014). Fundamental causes theory suggests that the process of accumulating health advantages based on personal resources (i.e., money, knowledge, power, prestige, and social ties) is firmly embedded in the dynamics of a given society (Masters et al., 2015). Because employment quality is likely to be an important part of this process, for EQ research to be useful in making changes, it must be embedded in the national context.

5. CONCLUSION

The changing labor market has created new forms of employment that health researchers are not yet well-equipped to investigate. Yet a long history of occupational health research makes us suspect certain combinations of employment features may contribute both to poor health of workers and to widening health inequalities in the society. It is therefore important to develop a conceptual framework and effective tools for investigating EQ from a public health perspective. This study is part of the emerging effort in this direction. Being exploratory in nature, this study generates many future research questions, some of which have been discussed above. Additional directions include replicating the EQ typology using different sources of US data; exploring antecedents (especially socially determined characteristics) for workers to go into certain EQ types; and investigating at a macro-level changes in EQ over time especially in relation to economic tides and population health in general. We argue that EQ be recognized

as a social determinant of health because of its complex and wide-reaching impacts on personal resources and chances for accumulating health advantages. We also argue that because of its complexity, EQ is better captured with a typological approach, as we did in this study, rather than in a variable-based approach of investigating single aspects separately. This approach can illuminate the clustering of disadvantages on the same segment of population, and potentially leads to policy-level solutions.

TABLES AND FIGURES

Table 1. Characteristics of employment quality types identified in the U.S.

Wage-earner types		Proportion of overall workforce
SER-like	**Most similar to the Standard Employment Relationship (SER).** These jobs have a very high probability of permanent, regular arrangement, full-time hours, adequate wages, working during the day shift, and have adequate information/equipment to complete work. Further, they have low probability of negative EQ conditions, such as excessive work hours, workplace harassment, or a lack of opportunity to develop.	22.2
Portfolio	**Very high stability, pay, schedule control, opportunity, and strong power relations, but with long hours.** Compared to all other typologies, these jobs have the highest probability of a permanent arrangement, high income, schedule control, employee involvement, and development opportunity, and low probabilities of experiencing harassment. These jobs also have a high probability of long work hours.	14.9
Inflexible skilled	**Highly paid and involved class of workers, but with long and excessive work hours and little control over schedule.** These jobs have high probability of high wages, opportunity to develop, union representation, and involvement in decision-making, but also high probability of irregular shifts, low schedule control, workplace harassment, long and mandatory extra working hours.	15.3
Dead-end	**Stable, standard, full-time working arrangements with adequate wages, but with low opportunity and poor interpersonal and collective power relations.** These jobs are mostly permanent, regular arrangements with middle-to-high wages, but with long and excessive work hours. However, these jobs are distinguished by having very low levels of development opportunity, schedule control, and employee involvement. They lack adequate information/equipment to perform job, and experience high workplace harassment. Counterintuitively, these jobs also have the highest union representation.	12.0
Precarious	**Non-standard working arrangements, low wages, lack of opportunity, and poor interpersonal and collective power relations.** Compared to other wage-earner job types, these jobs have a high probability of non-permanent working arrangements, low wages, non-full-time hours, and irregular shifts. Further, these jobs have low development opportunity, schedule control, union representation, and employee involvement, and experience high workplace harassment.	11.5
Optimistic precarious	**Non-standard arrangements with low wages, but opportunity to develop and strong interpersonal power relations**. These jobs are mostly similar to precarious job type, but distinguishing features are low probability of full-time hours and high levels of schedule control, employee involvement, and development opportunity. They also have lower experience of harassment at work.	10.5

Self-employed types

Skilled contractor	**High wages, opportunity to develop, and strong interpersonal power relations, but with non-standard working arrangements and long and excessive hours.** These jobs are mostly non-permanent arrangements with long and excessive hours, and relatively high probability of irregular work times. These jobs also have high levels of schedule control, decision-making involvement, and development opportunity, accompanied by low levels of workplace harassment.	5.3
Job-to-job	**Highly non-standardized working arrangements with low income, but with opportunity to develop and strong interpersonal power relations.** These jobs are predominately non-permanent arrangements, with low income, few hours, and low union representation. The jobs also have high schedule control and opportunity to develop, and low harassment experience.	8.3

Notes: See tables S3 and S4 for additional information on EQ types. Source: General Social Survey

Table 2. Characteristics of sample used in regression analysis (weighted).

Characteristic	Level	Frequency (percent)
n		5480
Survey year	2002	1659 (30)
	2006	1579 (29)
	2010	1075 (20)
	2014	1166 (21)
Sociodemographic characteristics		
Age	<=30	1342 (24)
	31-50	2621 (48)
	>51	1518 (28)
Sex	Male	2695 (49)
	Female	2785 (51)
Race/Ethnicity	White	3889 (71)
	Black	728 (13)
	Other	233 (4)
	Hispanic	630 (11)
Nativity	U.S. born	4811 (88)
	Non-U.S. born	669 (12)
Highest degree	Less than HS	491 (9)
	High school	2824 (52)
	Junior college	516 (9)
	Bachelor	1083 (20)
	Graduate	566 (10)
Health indicators		
Self-reported health (SRH)	Good SRH	4755 (87)
	Poor SRH	725 (13)
Frequent mental distress (FMD)	Absent	4924 (90)
	FMD	556 (10)
Work-related injuries in past year	0	4882 (89)
	1	382 (7)
	2	99 (2)
	3 or more	116 (2)

Source: General Social Survey

Table 4. Regression analysis of assocation of EQ and frequent mental distress (FMD), and inclusion of potential mediators.

	Model 1		Model 2		Model 3		Model 4		Model 5	
Independent variable	Estimate (95% CI)		Estimate (95% CI)		Estimate (95% CI)		Estimate (95% CI)		Estimate (95% CI)	
EQ typology (ref. =SER-like)		<0.001[a]		<0.001[a]		0.003[a]		0.022[a]		0.285[a]
Portfolio	1.03 (0.60-1.75)		1.12 (0.66-1.91)		0.98 (0.57-1.66)		0.94 (0.55-1.60)		0.94 (0.55-1.61)	
Inflexible skilled	1.87 (1.20-2.91)	**	1.90 (1.22-2.94)	**	1.73 (1.12-2.67)	*	1.44 (0.92-2.26)		1.41 (0.91-2.20)	
Dead-end	2.76 (1.78-4.28)	***	2.45 (1.57-3.81)	***	1.95 (1.26-3.03)	**	1.46 (0.92-2.32)		1.28 (0.80-2.02)	
Precarious	2.59 (1.66-4.03)	***	2.06 (1.30-3.27)	**	1.91 (1.23-2.98)	**	1.83 (1.18-2.86)	**	1.45 (0.92-2.29)	
Optimistic precarious	1.58 (0.97-2.58)		1.35 (0.82-2.24)		1.48 (0.90-2.42)		1.68 (1.03-2.74)	*	1.49 (0.91-2.46)	
Skilled contractor	1.60 (0.79-3.25)		1.75 (0.86-3.56)		1.57 (0.78-3.17)		1.37 (0.70-2.68)		1.46 (0.75-2.87)	
Job-to-Job	1.87 (1.16-3.03)	*	1.65 (1.01-2.68)	*	1.61 (1.03-2.53)	*	1.65 (1.04-2.64)	*	1.44 (0.91-2.27)	
Material Deprivation										
Inadequate income			1.39 (1.13-1.7)	**					1.26 (1.03-1.55)	*
Inadequate fringe benefits			1.35 (1.1-1.65)	**					1.09 (0.88-1.35)	
Employment-related stressors										
Unfair earning					1.70 (1.38-2.10)	***			1.42 (1.15-1.76)	**
Job insecurity					1.74 (1.42-2.15)	***			1.44 (1.16-1.80)	**
Traditional occupational risk factors										
Job strain (ref.=low strain)								<0.001[a]		<0.001[a]
Active jobs							1.95 (1.50-2.52)	***	1.82 (1.41-2.36)	***
Passive jobs							1.11 (0.85-1.45)		1.09 (0.84-1.42)	
High strain jobs							1.63 (1.20-2.22)	**	1.53 (1.13-2.08)	**
High physical exposures							1.26 (1.04-1.53)	*	1.22 (1.00-1.47)	*
Lack of workplace social suport							1.68 (1.37-2.06)	***	1.42 (1.14-1.78)	**
AIC[b]	3531.5		3510.5		3476.2		3457.5		3429.2	
Log Likelihood Ratio Test comparing each model with Model 1, χ2(df), p-value			χ^2=25.05, *df*=2, *p* <0.001		χ^2=59.31, *df*=2, *p* <0.001		χ^2=84.05, *df*=5, *p* <0.001		χ^2=120.3, *df*=9, *p* <0.001	

Notes: Prevalence ratios and 95% confidence intervals are shown All models are adjusted for age, gender, race, nativity, education, and survey year. [a] *p* -value for the log likelihood ratio test. [b] Akaike Information Criteria.* p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001. Source: General Social Survey

Table 5. Regression analysis of assocation of EQ and workplace injuries, and inclusion of potential mediators.

	Model 1		Model 2		Model 3		Model 4		Model 5	
Independent variable	Estimate (95% CI)		Estimate (95% CI)		Estimate (95% CI)		Estimate (95% CI)		Estimate (95% CI)	
EQ typology (ref. =SER-like)		<0.001[a]		<0.001[a]		<0.001[a]		<0.001[a]		<0.001[a]
Portfolio	0.85 (0.42-1.71)		0.90 (0.45-1.81)		0.82 (0.41-1.66)		0.95 (0.47-1.90)		0.97 (0.48-1.94)	
Inflexible skilled	3.61 (2.04-6.39)	***	3.66 (2.07-6.48)	***	3.41 (1.92-6.05)	***	2.64 (1.46-4.79)	**	2.61 (1.43-4.79)	**
Dead-end	3.93 (2.21-7.00)	***	3.58 (2.02-6.34)	***	3.29 (1.77-6.11)	***	2.34 (1.31-4.18)	**	2.19 (1.20-3.99)	*
Precarious	2.30 (1.25-4.25)	**	1.91 (1.02-3.57)	*	1.95 (1.06-3.57)	*	1.55 (0.85-2.83)		1.34 (0.73-2.46)	
Optimistic precarious	0.97 (0.46-2.05)		0.87 (0.40-1.86)		0.95 (0.45-2.00)		1.06 (0.51-2.19)		0.99 (0.47-2.09)	
Skilled contractor	2.26 (1.03-4.96)	*	2.41 (1.11-5.24)	*	2.22 (1.02-4.83)	*	1.79 (0.82-3.91)		1.87 (0.86-4.04)	
Job-to-Job	2.12 (1.05-4.25)	*	1.93 (0.96-3.88)		1.98 (1.00-3.90)	*	1.70 (0.86-3.38)		1.60 (0.82-3.16)	
Material Deprivation										
Inadequate income			1.28 (0.97-1.68)						1.17 (0.89-1.55)	
Inadequate fringe benefits			1.29 (1.00-1.66)	*					1.10 (0.83-1.45)	
Employment-related stressors										
Unfair earning					1.70 (1.28-2.25)	***			1.36 (1.01-1.81)	*
Job insecurity					1.12 (0.8-1.56)				0.96 (0.67-1.39)	
Traditional occupational risk factors										
Job strain (ref.=low strain)								<0.001[a]		<0.001[a]
Active jobs							1.28 (0.90-1.83)		1.23 (0.87-1.75)	
Passive jobs							0.87 (0.64-1.18)		0.87 (0.64-1.18)	
High strain jobs							1.25 (0.85-1.84)		1.23 (0.84-1.82)	
High physical exposures							3.23 (2.35-4.43)	***	3.14 (2.29-4.30)	***
Lack of workplace social suport							1.43 (1.10-1.86)	**	1.35 (1.02-1.79)	*
AIC[b]	6663.4		6633.1		6614		6290.9		6269.7	
Log Likelihood Ratio Test comparing each model with Model 1, $\chi 2$(df), p-value			χ^2=34.34, *df*=2, *p* <0.001		χ^2=53.46, *df*=2, *p* <0.001		χ^2=382.5, *df*=5, *p* <0.001		χ^2=411.7, *df*=9, *p* <0.001	

Notes: Rate ratios and 95% confidence intervals are shown All models are adjusted for age, gender, race, nativity, education, and survey year. [a] *p* -value for the log likelihood ratio test. [b] Akaike Information Criteria.* p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001. Source: General Social Survey

Table 6. Relative comparison of prevalence of EQ-health mediators within each employment category compared to SER-like jobs.

	Material deprivation		Employment-related stressors		Occupational risk factors		
	Inadequate fringe benefits	Inadequate income	Job insecurity	Unfairness of earnings	High strain jobs[a]	High physical exposures	Low social support
EQ typology (ref. = SER-like)							
Portfolio	Lower	Lower	n.s.	n.s.	Lower	Lower	Lower
Inflexible skilled	n.s.	Lower	n.s.	Higher	n.s.	Higher	n.s.
Dead-end	Higher	n.s.	Higher	Higher	Higher	Higher	Higher
Precarious	Higher	Higher	Higher	Higher	Higher	Higher	Higher
Optimistic precarious	Higher	Higher	Higher	n.s.	n.s.	n.s.	n.s.
Skilled contractor	n.s.	Lower	n.s.	n.s.	Lower	Higher	n.s.
Job-to-job	Higher	Higher	Higher	Higher	n.s.	Higher	Higher

Notes: Lower/Higher: statistically significant difference (p-value<0.05) compared to *SER-like* jobs in Poisson regression with mediator as dependent variable (adjusted for survey year). n.s.: not statistically different from *SER-like* jobs. [a] While the job strain measure contains four categories, only a dichotomous measure of high strain or not is tested for association with EQ. Source: General Social Survey

APPENDIX

Table A1. Operationalization of indicators of employment quality within General Social Survey.

Dimensions	Indicators	Operationalization
[1] Employment stability	[1] Employment contract/arrangement	[1] Two categories: 1) regular, permanent employment; 2) non-permanent arrangement (independent contractor/freelancer; working under a contractor; employment on an on-call basis, or paid by temporary agency)
[2] Material Rewards	[2] Income level	[2] Year-specific sample quartiles, three categories: lowest, second or third, and highest quartile
[3] Workers' rights & social protection	[3] Mandatory extra days of work	[3] Three categories: 1) zero; 2) between 1 and 10; and 3) >11 days of required extra work hours
[4] Working time arrangements	[4a] Long working hours	[4a] Four categories: 1) <24 hours; 2) 25-36 hours; 3) 37-48 hours; and 4) >48 hours
	[4b] Working times regularity	[4b] Three categories: 1) day shift; 2) afternoon or night shift; and 3) split, irregular, on-call, or rotating shifts
[5] Employability opportunities	[5] Opportunity to develop abilities	[5] Dichotomous item indicating if worker has an opportunity to develop their own special abilities: yes (‘very true’, ‘somewhat true’) and no (‘not too true’, ‘not at all true’)
[6] Collective organization	[6a] Have adequate training, equipment, information	[6a] Combines two items asking if workers 1) have enough help and equipment, and 2) enough information to get job done. Dichotomized to yes (‘often’ or ‘sometimes’ responses for both of these items) and no (responses of ‘rarely’ or ‘never’ on at least one)
	[6b] Union representation	[6b] Dichotomous item indicating union membership: yes and no
[7] Interpersonal power relations	[7a] Employee involvement	[7a] Three categories: respondent is 1) ‘often’; 2) ‘sometimes’; and 3) ‘rarely’ or ‘never’ able to make decision on the job that affect them
	[7b] Control over schedule	[7b] Combines two items asking ability of workers to change starting/finishing times and to take off work for personal/family reasons. Three categories: 1) ‘high control'; 2) ‘medium control'; and 3) ‘low control'
	[7c] Subjected to harassment/abuse	[7d] Combines two items indicating having been 1) sexually harassed or 2) threatened or harassed in any other way by anyone while at their job: yes ('yes' to either item) and no

Source: Authors' compilation based on General Social Survey (Smith et al. 2013).

Table A2. Comparison of model fit indices in LCA modeling of wage-earning and self-employed working populations to identify EQ.

# of classes	Log likelihood	AIC	BIC	VLMR-LRT
Wage-earner sample				
2	-39972	80023	80278	0.000
3	-39498	79114	79500	0.000
4	-39326	78810	79327	0.000
5	-39201	78600	**79248**	**0.002**
6	-39125	78488	79267	0.689
7	-39068	**78413**	79322	0.760
Self-employed sample				
2	-5748	11574	**11757**	**0.000**
3	-5692	11501	11778	0.828
4	-5654	11465	11836	0.761
5	-5617	11432	11897	0.761
6	-5588	11415	11973	0.764
7	-5564	**11406**	12059	0.760

Source: Authors' compilation based on General Social Survey (Smith et al. 2013).

Notes: AIC: Akaike Information Criteria. BIC: Bayesian Information Criteria. VLMR-LRT: Vuong-Lo-Mendell-Rubin likelihood ratio test. Bolding denotes lowest number of classes recommended by each fit indices.

Table A3. Distribution of conditional response probabilities across EQ types identified in wage-earner population

EQ indicator	Response category	Sample proportion	SER-like	Porfolio	Inflexible skilled	Dead-end	Precarious	Optimistic precarious
	Class proportion		0.257	0.139	0.134	0.172	0.121	0.177
Employment arrangement								
	Reg/permanent	0.894	0.933	0.950	0.900	0.941	0.864	0.706
	Non-permanent	0.106	0.067	0.050	0.100	0.059	0.136	0.294
Income								
	Lowest income quartile	0.275	0.164	0.037	0.119	0.078	0.823	0.769
	2nd/3rd income quartile	0.533	0.729	0.438	0.598	0.800	0.177	0.198
	Highest income quartile	0.193	0.107	0.525	0.282	0.123	0.000	0.033
Mandatory extra days of work								
	None	0.801	0.865	0.846	0.585	0.710	0.849	0.966
	1-10 days	0.137	0.135	0.091	0.227	0.173	0.135	0.034
	11+ days	0.062	0.000	0.062	0.188	0.117	0.017	0.000
Working hours								
	<24 hrs	0.103	0.010	0.014	0.034	0.029	0.200	0.504
	25-36 hrs	0.132	0.083	0.044	0.066	0.031	0.324	0.362
	37-48	0.506	0.907	0.418	0.257	0.634	0.440	0.071
	>48 hrs	0.258	0.000	0.524	0.644	0.305	0.035	0.063
Working times regularity								
	Day shift	0.734	0.877	0.924	0.620	0.715	0.530	0.572
	Afternoon/night shift	0.121	0.070	0.001	0.124	0.159	0.289	0.167
	Split/irregular/rotating	0.145	0.053	0.075	0.255	0.126	0.181	0.261
Opportunity to develop abilities								
	Very true, opportunity	0.359	0.356	0.602	0.524	0.047	0.151	0.359
	Somewhat true, opp	0.434	0.541	0.358	0.447	0.336	0.378	0.471
	Not true, opportunity	0.207	0.103	0.040	0.029	0.617	0.471	0.170
Have adequate training, info, equipment								
	Often/sometimes have	0.868	0.950	0.925	0.904	0.563	0.820	0.961
	Rarely/never have	0.132	0.050	0.075	0.096	0.437	0.180	0.039
Union representation								
	Union member	0.147	0.136	0.031	0.268	0.291	0.088	0.045
	Not union member	0.853	0.864	0.969	0.732	0.709	0.912	0.955
Control over schedule								
	High control	0.322	0.317	0.739	0.119	0.142	0.066	0.522
	Medium control	0.377	0.457	0.261	0.420	0.331	0.345	0.396
	Low control	0.301	0.226	0.000	0.461	0.527	0.589	0.082
Employee involvement								
	Often involved	0.397	0.400	0.639	0.554	0.175	0.165	0.324
	Sometimes involved	0.385	0.453	0.315	0.363	0.364	0.355	0.434
	Rarely/never involved	0.218	0.147	0.046	0.083	0.461	0.481	0.243
Workplace harassment/threats								
	Yes harass/threat	0.114	0.077	0.048	0.165	0.221	0.159	0.041
	No harass/threat	0.886	0.923	0.952	0.835	0.779	0.841	0.959

Source: Authors' compilation based on General Social Survey (Smith et al. 2013).

Table A4. Distribution of conditional response probabilities across EQ types identified in self-employed

EQ indicator	Response category	Sample proportion	Skilled Contractor	Job-to-job
	Class proportion		0.338	0.612
Employment arrangement				
	Reg/permanent	0.177	0.301	0.098
	Non-permanent	0.823	0.699	0.902
Income				
	Lowest income quartile	0.329	0.045	0.520
	2nd/3rd income quartile	0.357	0.359	0.355
	Highest income quartile	0.314	0.596	0.124
Mandatory extra days of work				
	None	0.771	0.596	0.883
	1-10 days	0.142	0.203	0.103
	11+ days	0.087	0.201	0.014
Working hours				
	<24 hrs	0.213	0.004	0.346
	25-36 hrs	0.160	0.052	0.229
	37-48	0.263	0.275	0.255
	>48 hrs	0.364	0.669	0.170
Working times regularity				
	Day shift	0.634	0.707	0.588
	Afternoon/night shift	0.026	0.000	0.042
	Split/irregular/rotating	0.340	0.293	0.370
Opportunity to develop abilities				
	Very true, opportunity	0.675	0.799	0.595
	Somewhat true, opp	0.233	0.201	0.254
	Not true, opportunity	0.092	0.000	0.151
Have adequate training, info, equipment				
	Often/sometimes have	0.934	0.968	0.912
	Rarely/never have	0.066	0.032	0.088
Union representation				
	Union member	0.030	0.026	0.033
	Not union member	0.970	0.974	0.967
Control over schedule				
	High control	0.629	0.563	0.671
	Medium control	0.270	0.321	0.238
	Low control	0.101	0.116	0.091
Employee involvement				
	Often involved	0.448	0.634	0.328
	Sometimes involved	0.254	0.242	0.262
	Rarely/never involved	0.298	0.123	0.410
Workplace harassment/threats				
	Yes harass/threat	0.072	0.074	0.070
	No harass/threat	0.928	0.926	0.930

Source: Authors' compilation based on General Social Survey (Smith et al. 2013).

Table A5. Comparing the sample used in regression analysis with excluded respondents (weighted).

		Analysis Sample	Excluded[a]	
Characteristic	**Level**	**Frequency (percent)**	**Frequency (percent)**	p-value[b]
n		5480	575	
Year	2002	1659 (30)	144 (25)	0.025
	2006	1579 (29)	193 (34)	
	2010	1075 (20)	129 (22)	
	2014	1166 (21)	109 (19)	
Sociodemographic characteristics				
Age	<=30	1342 (24)	107 (19)	<0.001
	31-50	2621 (48)	226 (40)	
	>51	1518 (28)	226 (40)	
Sex	Male	2695 (49)	286 (50)	0.802
	Female	2785 (51)	289 (50)	
Race/Ethnicity	White	3889 (71)	405 (70)	0.231
	Black	728 (13)	67 (12)	
	Other	233 (4)	37 (6)	
	Hispanic	630 (11)	66 (11)	
Nativity	U.S. born	4811 (88)	467 (81)	<0.001
	Non-U.S. born	669 (12)	108 (19)	
Highest degree	Less than HS	491 (9)	53 (9)	0.159
	High school	2824 (52)	270 (47)	
	Junior college	516 (9)	61 (11)	
	Bachelor	1083 (20)	112 (20)	
	Graduate	566 (10)	79 (14)	
Health indicators				
Self-reported health (SRH)	Good SRH	4755 (87)	467 (85)	0.399
	Poor SRH	725 (13)	81 (15)	
Frequent mental distress (FMD)	Absent	4924 (90)	485 (93)	0.026
	FMD	556 (10)	35 (7)	
Work-related injuries in past year	0	4882 (89)	494 (92)	0.142
	1	382 (7)	21 (4)	
	2	99 (2)	8 (2)	
	3 or more	116 (2)	10 (2)	

Source: Authors' compilation based on General Social Survey (Smith et al. 2013).

Notes: [a] Excluded from regression analyses due to missing covariate information. [b] Chi-square test: difference between variable responses in final sample vs. excluded respondents.

Table A6. Association between employment quality type and self-rated health (prevalence ratios).

	Basic Model		Demographics		Demographics & Education	
	Estimate (95% CI)		Estimate (95% CI)		Estimate (95% CI)	
EQ typology (ref. = SER-like jobs)						
Portfolio	0.50 (0.32-0.79)	**	0.49 (0.31-0.78)	**	0.62 (0.39-0.97)	*
Inflexible skilled	0.70 (0.47-1.05)		0.71 (0.48-1.06)		0.75 (0.50-1.12)	
Dead-end	1.87 (1.33-2.64)	***	1.83 (1.30-2.58)	***	1.84 (1.31-2.57)	***
Precarious	1.83 (1.28-2.61)	***	1.97 (1.39-2.81)	***	1.65 (1.15-2.37)	**
Optimistic precarious	1.33 (0.91-1.92)		1.39 (0.96-2.00)		1.31 (0.90-1.89)	
Skilled contractor	1.12 (0.64-1.96)		1.01 (0.58-1.79)		1.13 (0.64-1.98)	
Job-to-job	1.12 (0.75-1.67)		1.06 (0.70-1.59)		1.03 (0.69-1.54)	
Age (ref. = <30)						
31-50			1.35 (1.09-1.66)	**	1.35 (1.10-1.66)	**
>51			1.67 (1.34-2.09)	***	1.64 (1.32-2.05)	***
Female (ref. = male)			0.93 (0.79-1.09)		0.99 (0.84-1.16)	
Race/ethnicity (ref. = White)						
Black			1.21 (0.98-1.50)		1.12 (0.90-1.40)	
Other			1.29 (0.88-1.89)		1.38 (0.95-2.00)	
Hispanic			1.23 (0.93-1.62)		1.06 (0.79-1.42)	
Nativity (ref. = Born in U.S.)			1.05 (0.79-1.38)		1.03 (0.78-1.37)	
Education (ref. = less than HS)						
High school					0.62 (0.50-0.77)	***
Junior college					0.53 (0.38-0.73)	***
Bachelors					0.38 (0.28-0.52)	***
Graduate school					0.37 (0.26-0.54)	***
Intercept	0.11 (0.08-0.14)	***	0.08 (0.06-0.11)	***	0.13 (0.09-0.19)	***
AIC	4313.4		4297.2		4252	
Log-likelihood ratio test comparing each model with the previous one			χ^2=30.16, *df*=7, *p*<0.001		χ^2=53.20, *df*=4, *p*<0.001	

Source: Authors' compilation based on General Social Survey (Smith et al. 2013).
Notes: All models are adjusted for survey year. * p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001.

Table A7. Association between employment quality type and frequent mental distress (prevalence ratios).

	Basic Model		Demographics		Demographics & Education	
	Estimate (95% CI)		Estimate (95% CI)		Estimate (95% CI)	
EQ typology (ref. SER-like jobs)						
Portfolio	0.76 (0.45-1.29)		0.81 (0.48-1.38)		1.03 (0.60-1.75)	
Inflexible skilled	1.70 (1.09-2.65)	*	1.75 (1.12-2.73)	*	1.87 (1.20-2.91)	**
Dead-end	2.65 (1.69-4.15)	***	2.77 (1.78-4.33)	***	2.76 (1.78-4.28)	***
Precarious	3.39 (2.21-5.19)	***	3.11 (2.03-4.77)	***	2.59 (1.66-4.03)	***
Optimistic precarious	1.81 (1.11-2.96)	*	1.70 (1.05-2.77)	*	1.58 (0.97-2.58)	
Skilled contractor	1.24 (0.61-2.53)		1.44 (0.7-2.95)		1.60 (0.79-3.25)	
Job-to-job	1.84 (1.14-2.97)	*	1.91 (1.18-3.09)	**	1.87 (1.16-3.03)	*
Age (ref. = <30)						
31-50			0.77 (0.62-0.96)	*	0.79 (0.64-0.97)	*
>51			0.69 (0.53-0.89)	**	0.68 (0.53-0.89)	**
Female (ref. = male)			1.25 (1.03-1.51)	*	1.34 (1.11-1.63)	**
Race/ethnicity (ref. = White)						
Black			0.70 (0.53-0.93)	*	0.65 (0.49-0.85)	**
Other			0.97 (0.59-1.59)		1.02 (0.63-1.64)	
Hispanic			1.13 (0.85-1.52)		1.01 (0.74-1.36)	
Nativity (ref. = Born in U.S.)			0.74 (0.52-1.04)		0.74 (0.52-1.05)	
Education (ref. = less than HS)						
High school					0.76 (0.57-1.01)	
Junior college					0.44 (0.27-0.72)	**
Bachelors					0.41 (0.28-0.60)	***
Graduate school					0.37 (0.23-0.62)	***
Intercept	0.07 (0.05-0.1)	***	0.08 (0.06-0.12)	***	0.12 (0.07-0.19)	***
AIC	3584.9		3570.3		3531.5	
Log-likelihood ratio test comparing each model with the previous one			χ^2=28.54, *df*=7, *p*<0.001		χ^2=46.80, *df*=4, *p*<0.001	

Source: Authors' compilation based on General Social Survey (Smith et al. 2013).
Notes: All models are adjusted for survey year. * p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001.

Table A8. Association between employment quality type and occupational injury (incident rate ratios).

	Basic Model		Demographics		Demographics & Education	
	Estimate (95% CI)		Estimate (95% CI)		Estimate (95% CI)	
EQ typology (ref. = SER-like jobs)						
Portfolio	0.72 (0.36-1.43)		0.65 (0.33-1.30)		0.85 (0.42-1.71)	
Inflexible skilled	3.86 (2.22-6.70)	***	3.39 (1.91-6.01)	***	3.61 (2.04-6.39)	***
Dead-end	4.19 (2.35-7.47)	***	4.01 (2.25-7.16)	***	3.93 (2.21-7.00)	***
Precarious	3.06 (1.69-5.52)	***	2.73 (1.49-4.98)	**	2.30 (1.25-4.25)	**
Optimistic precarious	1.1 0(0.52-2.35)		1.05 (0.50-2.22)		0.97 (0.46-2.05)	
Skilled contractor	2.08 (0.96-4.52)		2.04 (0.93-4.46)		2.26 (1.03-4.96)	*
Job-to-job	2.13 (1.06-4.28)	*	2.17 (1.08-4.37)	*	2.12 (1.05-4.25)	*
Age (ref. = <30)						
31-50			0.67 (0.52-0.87)	**	0.68 (0.53-0.88)	**
>51			0.48 (0.34-0.68)	***	0.49 (0.34-0.70)	***
Female (ref. = male)			0.70 (0.55-0.90)	**	0.76 (0.59-0.97)	*
Race/ethnicity (ref. = White)						
Black			0.61 (0.44-0.84)	**	0.55 (0.39-0.76)	***
Other			1.00 (0.5-1.99)		1.10 (0.57-2.15)	
Hispanic			1.03 (0.70-1.51)		0.90 (0.61-1.33)	
Nativity (ref. = Born in U.S.)			0.99 (0.65-1.51)		1.01 (0.66-1.56)	
Education (ref. = less than HS)						
High school					0.75 (0.53-1.04)	
Junior college					0.64 (0.39-1.04)	
Bachelors					0.40 (0.24-0.68)	***
Graduate school					0.28 (0.15-0.51)	***
Intercept	0.1 (0.07-0.15)	***	0.18 (0.11-0.31)	***	0.26 (0.15-0.46)	***
AIC	6893		6760.7		6663.4	
Log-likelihood ratio test comparing each model with the previous one			χ^2=146.3, *df*=7, *p*<0.001		χ^2=105.20, *df*=4, *p*<0.001	

Source: Authors' compilation based on General Social Survey (Smith et al. 2013).
Notes: All models are adjusted for survey year. * p-value < 0.05; ** p-value < 0.01; *** p-value < 0.001.

Chapter 5. Do different patterns of employment quality contribute to gender health inequities in the U.S.? A counterfactual analysis

1. INTRODUCTION

The changing structure and character of employment relations in industrialized economies has increasingly gained attention within public and occupational health research (Benach et al., 2014; Bodin et al., 2019; Howard, 2016; Peckham et al., 2017; Schulte et al., 2019). A primary concern relates to the widespread shift away from the so-called Standard Employment Relationship (SER; i.e., permanent, full-time, and adequately compensated employment) and toward employment practices that emphasize firms' ability to exercise flexibility with respect to its labor force. Such practices often result in a diminishing of commitments and rewards—and an increased shouldering of risk—flowing from employers to workers. For many, this has meant increased insecurity and decreased power across multiple dimensions of the employment relationship. Compared to the last several generations, workers today are more likely to experience non-permanent contractual arrangements; volatile and asocial work schedules; stagnant wages and decreased access to fringe benefits; less opportunity to develop socially-valued skills; and generally more imbalanced employer-worker power dynamics, including the lack of collective bargaining or other involvement in workplace decision-making (Benach et al., 2014; Kalleberg, 2011; Kalleberg & Vallas, 2017). These labor market experiences, which are proximally structured by the terms and conditions of employment, are associated with a variety of adverse physical and mental health outcomes in working populations (Benach et al., 2014; Kim et al., 2012).

Interrelated to these employment trends, has been significant changes in the demographics of the workforce, with one of the most important being the dramatic rise of women engaged in paid labor (Fullerton, 1999; U.S. Bureau of Labor Statistics, 2020). With the ostensible shift toward more egalitarian gender roles in contemporary societies, including degradation of the male-breadwinner model of family organization, the conditions of paid employment have become more important determinants of women's

health (Artazcoz et al., 2007). However, women continue to face multiple layers of disadvantage within the labor market, which are rooted in gendered inequalities in power and persistent, stark divisions in paid and unpaid labor (Bird & Rieker, 2008; Sen & Östlin, 2008). As such, women may be disproportionately impacted by low quality and precarious employment conditions (Artazcoz et al., 2001; Campos-Serna et al., 2013; Menéndez et al., 2007). Further, women continue to exhibit a gender-health 'paradox', in which they systematically report higher levels of morbidities and worse health-related quality of life (Fryback et al., 2007; Malmusi et al., 2012), but live longer (Barford et al., 2006), compared to men. In this study, we examine the quality of employment as a proximal mechanism of gender health inequities.

1.1. Employment quality and health

An important development in occupational health research has been a growing attention to how the terms and conditions of worker-employer relationships affect health. It is useful to make a conceptual distinction between these *employment* conditions and more oft-studied *working* conditions (Benach & Muntaner, 2011; Campos-Serna et al., 2013; Puig-Barrachina et al., 2014; Van Aerden et al., 2016). Working conditions, which have been the focus of the vast majority of work and health research to date, describe the character of specific job tasks (e.g., whether work is monotonous) and the physical and psychosocial environmental settings in which work is performed (e.g., presence of chemical hazards, pressure to complete tasks rapidly). Notably, health research on working conditions has traditionally been conducted with men's work in mind (Artazcoz et al., 2007; Messing et al., 2003). In contrast, employment conditions represent the formal and informal arrangements between workers and employers that determine both contractual (e.g., wages, hours) and relational (e.g., participation in decision-making, power dynamics) components of one's job (Peckham et al., 2019; Van Aerden et al., 2014). While early research on employment conditions and health focused principally on the phenomena of employment instability—examining measures such as perceived fear of job loss or non-permanent contracts—an important advancement in this area has been the understanding that multiple aspects of employment affect workers' health (Scott-Marshall, 2010; Tompa et al., 2007; Vives et al., 2010).

In this study, we use the construct of employment quality (EQ) to capture the many health-relevant dimensions of employment relationships. The EQ concept consists of seven conceptual dimensions: [1] *employment stability* concerns whether the expectation of employment is ongoing, as opposed to time-fixed or project-dependent; [2] *material rewards* include labor income and employer-provided fringe benefits; [3] *workers' rights and social protections* refers to labor protections provided to workers and the extent to which they are upheld in the workplace; [4] *working time arrangements* regard the timing, regularity, and quantity of working hours; [5] *training and employability opportunities* relate to whether a worker is able to develop skills/abilities; [6] *collective organization* includes whether employees have union representation and open lines of communication with management; and [7] *interpersonal power relations* applies to relations between workers, co-workers, and superiors, including worker voice in decisions at the workplace (Julià et al., 2017; Van Aerden et al., 2014). The EQ concept originated as a subcategory within the larger field of job quality (Holman & McClelland, 2011; Muñoz de Bustillo et al., 2009), but has specifically developed within public health research alongside recent multidimensional conceptualizations of precarious employment: the EQ and precarious employment constructs overlap significantly in terms of underlying theory (Julià et al. 2017), and have been operationalized in similar ways within health studies (Kreshpaj et al. 2020).

There are three primary pathways through which EQ is hypothesized to affect worker health (Julià et al., 2017; Peckham et al., 2019). First, poor EQ can lead directly to increased psychological stress, including feelings of insecurity, powerlessness, unfairness, or lack of agency within both work and non-work life domains (Bosmans et al., 2016, 2017; Clarke et al., 2007; W. Lewchuk et al., 2008). Second, workers experiencing low EQ may also have a higher likelihood of exposures to hazardous physical and psychosocial working conditions. These workers may be placed into less desirable and more dangerous jobs; receive less or worse-quality training, support, and equipment to complete their work safely; and have less ability to exercise rights, such as refusing dangerous work or taking leave (Aronsson, 1999; Foley, 2017; Quinlan et al., 2001). A third pathway involves material deprivation from inadequate or unstable income, as well as lack of access to non-wage benefits such as paid leave or health

insurance. This insufficient remuneration inhibits both acquisition of health-enhancing necessities in the present, as well as longer-term life planning (Bosmans et al., 2016; Wayne Lewchuk et al., 2015; Premji, 2018; Tompa et al., 2007).

A complexity in the study of multidimensional EQ and health arises due to the fact that contemporary employment arrangements are heterogeneous in terms of their configuration across the various components of EQ. In other words, there are many ways in which employment relationships can depart from the idealized SER concept (Van Aerden et al., 2014). Further, as documented within industrial relations and labor segmentation literatures, beneficial and adverse EQ features tend to cluster together within different jobs, firms, and occupations, as a result of employers applying different high and low road strategies to lower costs, shield themselves from liability, and improve productivity (Hudson, 2007; Kalleberg, 2003; Vanroelen, 2019). From an individual perspective, workers' likely experience employment as a package of various good and bad EQ elements, suggesting that health research should try to account for the reality of heterogeneous patterns of employment (Peckham et al., 2019; Van Aerden et al., 2016).

1.2. Gender, employment quality, and health

The quality and character of employment differs across gender (Artazcoz et al., 2007; Campos-Serna et al., 2013; Menéndez et al., 2007). In nearly all societies, women are selected into a limited range of occupations seen as women's jobs (e.g., healthcare, childcare) (Charles and Bradley 2009). Women also tend to occupy jobs at lower levels of the decision-making hierarchy within occupations, firms, and worksites (Artazcoz et al., 2007; Eurofound, 2013b). While the roots of the gendered division of paid labor have strong historical bases and are multifactorial, several interrelated social mechanisms are well described. Women experience gender-based discrimination that puts them at a disadvantage, for example, in terms of hiring, wages, and promotional opportunities (Blau & Devaro, 2007; Roscigno et al., 2007). Additionally, despite participating in the labor market at similar levels to men, women today still shoulder a greater burden of household tasks and responsibilities (Bird & Fremont, 1991; Borrell et al., 2004;

Moreno-Colom & Colom, 2017). Among other impacts, the unequal distribution of unpaid labor limits women's bargaining power and agency when seeking employment, as they may experience comparatively higher pressure to balance multiple roles associated with professional and familial domains.

As a result, women generally work in jobs with lower EQ compared to men. There is extensive evidence that occupations in which women are overrepresented are paid less, even after adjusting for required skills or levels of education (Levanon et al., 2009; Shaw et al., 2016). Women are also decidedly more likely to work in jobs with temporary contracts and part-time hours (Campos-Serna et al., 2013; Hipple, 2001; Puig-Barrachina et al., 2014), which are less likely to have fringe benefits and prospects for advancement. Other studies have found that women are less likely to have access to learning opportunities (Matthews et al., 1998), control over their work schedules (Golden, 2008), be involved in workplace decision-making (Puig-Barrachina et al., 2014), and face higher levels of workplace harassment (Harnois & Bastos, 2018; Okechukwu et al., 2014; Pavalko et al., 2003)—all of which can be indications of poor worker-employer relations.

In addition to a disproportionate burden of low EQ, there is also some indication that EQ produces differential health effects in women and men. Asymmetrical social expectations related to household responsibilities and caregiving may make it more difficult for women to balance work and family spheres (Artazcoz et al., 2001; Campos-Serna et al., 2013; Menéndez et al., 2007; Pirani & Salvini, 2015). For instance, women are often shouldered with a 'second shift' of unpaid labor in addition to their formal employment (Wharton, 1994), which could adversely affect both physical and mental health (Artazcoz et al., 2007; Borrell et al., 2004). This double duty can also constrain women's choice concerning health behaviors, such as exercise, diet, and sleep (Rieker & Read, 2017; Winkler et al., 2020). Several studies have found that women in various forms of non-standard employment arrangements (e.g., temporary, part-time) report higher levels of poor general and mental health compared to men (Callea et al., 2012; Kim et al., 2008; Pirani & Salvini, 2015). Likewise, Vives et al. (2013) found women suffer worse mental health when examining a multidimensional measure of precarious employment (Vives et al., 2013). On the other hand, such arrangements may provide additional flexibility

to accommodate obligations from both work and family domains. We therefore might expect a health advantage of some non-standard employment types for certain women coping with an unequal burden of unpaid labor. Further, some evidence suggests that cultural expectations may actually produce worse health among men engaged in non-standard forms of employment. For instance, men may be more likely to consider stable employment as their normative societal role, and experience stigmatization or threats to their masculinity when engaged in jobs that deviate from full-time, permanent employment (Vandello et al., 2013). Relatedly, some evidence suggests that perceived job insecurity, which is associated with non-standard forms of employment, is more dangerous for men's health (Kim & von dem Knesebeck, 2015).

1.3. The current study

Here we examine the potential contribution of EQ to gender health inequities among a representative sample of U.S. employees in the General Social Survey (2002-2018). This is achieved by conducting an exploratory mediation analysis in which we hypothesize EQ as a mechanism that helps explain the relationship between gender and health status. We use a counterfactually-based analytic framework; this approach examines the possibility that both unequal exposure or differential effects may contribute to a mediation effect. Further, EQ is measured using a typological approach—in this case, latent class analysis—which better accounts for the substantial heterogeneity in the types and configurations of contemporary employment relationships, and is more theoretically-grounded in terms of how workers actually experience employment (i.e., as a package of simultaneously occurring features) (Peckham et al., 2019; Van Aerden et al., 2014). Given the wide-ranging influences of EQ on health, we examine two broad indicators of general and mental health. Self-rated health is considered a good indicator of mortality and morbidity (DeSalvo et al., 2006; Idler & Benyamini, 1997), and has been previously associated with different patterns of EQ in the E.U. (Van Aerden et al., 2016, 2017) and U.S. (Peckham et al., 2019). Mental health has also been associated with EQ (Peckham et al., 2019; Van Aerden et al., 2016, 2017), and may operate in different ways across gender and specific patterns of EQ, compared to the general health indicator.

2. METHODS

2.1 Data

This study uses five waves of data (2002, 2006, 2010, 2014, and 2018) from the General Social Survey (GSS). The GSS is a nationally representative, repeated cross-sectional survey of American adults administered primarily via in-person interview (Smith et al., 2019). In the selected years, the GSS incorporated a module on the Quality of Work Life (QWL), which was developed in collaboration with the National Institute for Occupational Safety and Health (NIOSH) to evaluate a wide assortment of employment and working conditions. Our population of interest in this study is wage earners; our initial pooled sample consisted of 6,421 respondents that indicated that they (1) were currently employed, and (2) did not identify as self-employed. Additional respondents were excluded at two subsequent analysis steps: first, prior to latent class analysis (LCA) to construct the EQ categories, and, second, prior to mediation analyses (see below). Sampling probabilities provided in the GSS are applied to all analyses to adjust for differential probabilities of selection and non-response.

2.2. Health measures

Self-rated health (SRH) is measured by the question: “In general, would you say your health is excellent, very good, good, fair or poor?” The SRH measure is included as a dichotomous variable, distinguishing fair/poor (“poor”) and good/very good/excellent (“good”) health. Dichotomizing SRH has been shown to increase reliability and reduce measurement error, especially among respondents from marginalized sociodemographic groups (Zajacova & Dowd, 2011). Frequent mental distress (FMD) is measured using the following item from the Centers for Disease Control and Prevention (CDC) health-related quality of life index (HRQOL) instrument: “Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?” (Centers for Disease Control and Prevention, 1998, 2004). FMD is included as a dichotomous measure, with presence defined as 14 or more mentally unhealthy days.

2.3. Construction of employment quality measure

The EQ variable is constructed with LCA, a typological measurement approach that identifies unobserved (i.e., latent) subgroups within a population based on patterns of responses to a set of observed indicators related to the studied phenomena (in this case, EQ). We operationalize the EQ construct using 11 proxy indicators of EQ available in the GSS, which represent each of the seven conceptual dimensions described above (Table 1). These indicators are similar to those used in several prior investigations of EQ and health in the European Union (De Moortel et al., 2014; Eurofound, 2013a; Van Aerden et al., 2015, 2016, 2017). Respondents that did not have information on at least two EQ indicators were excluded; over 97% of respondents had information for at least nine of eleven EQ indicators. The final sample included in the LCA model was 6,389 (i.e., 23 or 0.3% participants excluded). LCA modeling was conducted using the mixture modeling function in Mplus (Version 8) (Muthén & Muthén, 2010).

Based on a combination of model fit and substantive interpretation, we identified six distinct EQ types among wage earners in the U.S. Each group is assigned a label corresponding to the character of the employer-employee relationship, and thus workers' experience within each employment category. The identified EQ types are described briefly; for more information about the LCA modeling procedure, detailed information on the character of each EQ type, and analysis of sociodemographic correlates of EQ, see Chapter 3 herein. See also Peckham et al. (2019) for an analysis of associations between EQ types and health outcomes.

(1) ***SER-like*** employment (28% of workers) is most similar to an idealized conception of the SER described in the literature (e.g., Bosch 2004). This category consists of generally favorable EQ features, including a permanent arrangement, full-time hours, adequate wages, working during the day shift, and having adequate information/equipment to complete work. They also have moderate levels of schedule control and development opportunity. Workers in this group are unlikely to experience excessive work hours or workplace harassment.

(2) ***Portfolio*** employment (17% of workers) is a highly privileged EQ category. These jobs have permanent arrangements, standard day shifts, and low levels of harassment; however, they are distinguished by having the highest income, employee involvement, development opportunity, and degree of schedule control of all of the EQ types. On the other hand, they work long hours. In prior analyses, we have shown that this group is disproportionately represented by older, White men with high education, and generally report better general and mental health than other EQ types.

(3) ***Inflexible skilled*** employment (15% of workers) includes several beneficial EQ features, including high wages, opportunity to develop abilities, union representation, and involvement in decision-making; however, these jobs are also characterized by a high probability of irregular shifts, low schedule control, workplace harassment, long hours, and mandatory extra work. *Inflexible skilled* workers are more likely to be men with higher education, and were found to report higher levels of FMD, compared to those in *SER-like* employment.

(4) ***Dead-end*** employment (14% of workers) consists of permanent arrangements with adequate wages and high union representation; however, these workers generally experience poor worker-employer relations. This group has the lowest levels of opportunity to develop and are most likely to report inadequate information, equipment, and training to perform their work. They also lack control over their schedule or involvement in decision-making, and experience high workplace harassment. *Dead-end* workers are more likely to be men and foreign-born, compared to SER-like jobs, and report worse general and mental health.

(5) ***Precarious*** employment (13% of workers) resembles an accumulation of poor EQ features. From a contractual perspective, these jobs have a high probability of non-permanent working arrangements, low wages, non-full-time hours, and irregular shifts. From a relational perspective, this group has very low development opportunity, schedule control, union representation, and employee involvement, as well as experiencing high workplace harassment. Workers in this category are more likely to be younger, women, have low education, and report poor health status.

(6) ***Optimistic precarious*** employment (13% of workers) is similar to the *Precarious* EQ type in terms of contractual features; however, they experience high levels of development opportunity, schedule control, and employee involvement, as well as having a lower probability of encountering harassment at work. Workers in this category tend to have lower levels of education, and report general and mental health at similar levels to the *SER-like* group.

2.4. Gender and other covariates

In the GSS, the variable 'sex' is recorded as male or female primarily by interviewers' observation. While sex and gender are distinct concepts, and neither is fully represented by a dichotomy, we argue that the concept of gender is more relevant to this form of data collection (i.e., based on appearance). Further, we hypothesize that social processes and structural factors that create differential experiences and outcomes—related to health, employment, and other life domains—across women and men are fundamentally grounded in normative gender rules and culturally-enforced standards (Krieger, 2003; Sen & Östlin, 2008). For these reasons we emphasize the concept of gender in this study, and assume that ascertainment of sex in the GSS is concordant with actual gender status among study respondents. Several additional demographic variables are included as hypothesized confounders of the EQ-health relationship: race/ethnicity (non-Hispanic white, non-Hispanic African American, Hispanic, Asian/Pacific Islander, American Indian/Alaskan Native), nativity (born in U.S., born outside of U.S.), and age (<30 years, 30–50 years, >51 years). Survey wave is included in all models to account for potential year effects.

2.5. Analytic approach

2.5.1. Counterfactual mediation framework

Our primary analysis is to examine if EQ plays a mediating role in the gender-health relationship (Figure 1); that is, we seek to identify whether the probability of reporting poor SRH or FMD within each gender is influenced by the distribution of membership within discrete categories defined by our LCA-based EQ variable. To conduct our exploratory mediation analysis, we used a counterfactually-based causal effect

decomposition. Briefly, this involves examining if expected outcomes change under conditions in which exposure (in this case, gender) and mediator (in this case, probability of membership within a specific EQ category) variables are manipulated to represent relevant counterfactual scenarios (see VanderWeele, 2015). The total effect of gender on health can be decomposed into two main components: the pure natural direct effect (PNDE) and the total natural indirect effect (TNIE). In this study, the PNDE (also called the natural direct effect) is the expected difference in health between women and men while the distribution of EQ membership is kept at the levels observed among men (i.e., exposure is manipulated while mediator levels are held constant). In other words, the PNDE represents the gender-health disparity if all participants experienced the levels of EQ observed among men, and is interpreted as the effect of gender on health not mediated by EQ. The TNIE (also called the natural indirect effect) is the expected difference in health among women if they experienced EQ at levels observed in men compared to levels of EQ actually observed among women. The TNIE—where the exposure is held constant and the mediator is manipulated—is interpreted as the effect of gender on health mediated by EQ. Both the PNDE and TNIE represent counterfactual scenarios that are impossible within any individual, but are possible to estimate at the sample level. While decomposition of causal effects from socially-defined characteristics has been met with some hesitancy within epidemiology, it is important to emphasize that in this study we interpret the indirect effect as a disparity reduction that may be possible through intervention on the EQ variable (e.g., making EQ more equitable across gender). Likewise, we interpret the identified direct effect as a disparity residual that would remain after such an intervention. As described by Vanderweele and Robinson (2014), this interpretation requires weaker identifying assumptions than if causal effects are assigned to gender, rather than only stipulated for the mediating variable

Important for our purposes, a counterfactual mediation framework can accommodate non-continuous variables (e.g., nominal mediator) and non-linear effects (e.g., exposure-mediator interaction). Mediation modeling with a nominal mediator has rarely been approached within the epidemiologic literature, and, to our knowledge, such analyses cannot be easily conducted with many popular statistical packages. However, nominal mediators can be implemented within Mplus using mixture modeling

(Mclarnon & O'neill, 2018; B. Muthén, 2011). In this study, this involves the joint estimation of two separate regressions. First, the influence of gender on EQ is modeled by multinomial logistic regression, with EQ as the dependent variable. Second, the health outcome is related to gender (reference: men) and EQ (reference: SER-like) using logistic regression. The logistic regression is specified to allow for gender-health estimates within each level of the EQ variable (i.e., interaction). This is important, as noted above, because individuals may have differential health experience within various employment circumstances depending on gender. Additionally, from a statistical perspective, if exposure-mediator interaction is present but is not estimated, this could bias the indirect effect (Preacher et al., 2007). The role of interaction in contributing to an indirect effect can be characterized by further decomposing the TNIE into two separate components: the pure natural indirect effect (PNIE) and the mediated interactive effect (INT_{med}) (Bauer & Scheim, 2019; Vanderweele, 2013). The PNIE is estimated as the change in expected health status among men if they experienced the distribution of EQ observed in women compared to their actual observed distribution of EQ (i.e., similar to the TNIE, except focused on manipulating the mediator among men only). The PNIE is interpreted as the portion of the total indirect effect (i.e., TNIE) due to mediation only. The mediated interactive effect is calculated as the difference between TNIE and PNIE, and is equivalent to the product of (1) an additive interaction between gender and EQ on the health outcome and (2) the average effect of gender on EQ; this is interpreted as the portion of the indirect effect due to interaction.

2.5.2 Correction for classification error within latent class EQ variable

An additional methodologic issue concerns the choice of how to model relations among the LCA-derived EQ variable and auxiliary variables not included in the LCA model (i.e., gender, health outcomes, and other covariates). The fundamental complication is two-fold. On the one hand, the simple classify-analyze approach—in which individuals are first placed into discrete classes based on their highest model-estimated membership probabilities (i.e., modal assignment), and then classes are examined in relation to covariates—is known to produce downward-biased estimates (Bolck et al., 2004; Vermunt, 2010). On the

other hand, joint estimation of the LCA variable and its association with auxiliary variables can potentially affect latent class formation, compromising interpretability. To address this, we use the three-step approach developed by Vermunt (2010), which accounts for model classification error within regression analyses while maintaining the character of the identified latent variable (Asparouhov & Muthén, 2014; Mclarnon & O'neill, 2018). The first step is estimation of the unconditional LCA model. Second, individuals are assigned to their modal class based on the unconditional LCA. In the third step, the LCA model is reestimated incorporating parameters which act as weights that account for classification error associated with each class, as estimated in the unconditional model. Once class membership probabilities are fixed such that classification uncertainty is accounted for, associations to external variables can be estimated. This approach is considered among current best practices for modeling relations between LCA-derived variables and auxiliary covariates or outcomes (Mclarnon & O'neill, 2018; Nylund-Gibson et al., 2019; Nylund-Gibson & Choi, 2018).

2.5.3. Analysis sample and output

Prior to regression analyses, 22 participants that did not provide information on age were excluded. Additionally, 32 participants did not report SRH, and 71 did not report FMD; these individuals contribute information related to estimation of the associations between gender and EQ class membership probabilities, but not regression coefficients predicting health outcomes. Total, direct, and indirect effect estimates derived from counterfactual analyses are presented as probability differences. We used bias-corrected bootstrapping (n = 10,000) to construct 95% confidence intervals for all estimates, as is often recommended for examining indirect effects (e.g., Preacher & Selig, 2012). Evidence for a mediating effect of EQ will be determined if any of the TNIE, PNIE, or INT_{med} measures are non-zero on the additive probability scale. Odds ratios for relevant measures are also provided for descriptive purposes. For further description of the mediation models, we also present model-predicted probabilities of EQ membership across gender, and gender/class-specific probabilities of reporting poor health outcomes. These values can supplement information provided in the indirect effects estimates, which are interpreted

at the level of the entire EQ variable (i.e., what is the change in expected outcome when the distribution of all six EQ types is manipulated?), and allow for further examination of relations between gender and health within different patterns of EQ.

3. RESULTS

Sample characteristics are presented in Table 2 by gender. Men and women differed in terms of race/ethnicity, nativity status, and education levels, but not by the trichotomized age variable. There are clear differences in the distribution of EQ across gender, based on modal assignment into most likely class. Based on crude prevalence, there is no gender difference in reporting of poor SRH; however, women appear to report slightly higher levels of FMD, compared to men (11% vs. 9%, respectively). The distribution of individual EQ indicators is presented by gender in Table S1. Women reported lower levels of income; overall and required extra hours worked; opportunity to develop; union representation; and schedule control, as well as higher levels of workplace harassment. Women were also slightly more likely than men to be in a regular, permanent arrangement, and no gender difference was seen in decision-making involvement.

Results from mediation analyses are presented in Table 3. The total effect of gender on SRH is not significant, with the women-men probability difference (PD) estimated as -0.003 (95% CI: -0.021, 0.015). However, results from the counterfactual analysis are consistent with EQ having a significant mediation role for the gender-SRH relationship, as indicated by the non-zero TNIE (PD = 0.015; 95% CI: 0.005, 0.028). As explained above, a statistically significant TNIE suggests that differential exposure to EQ across gender, combined with any differential effects exacerbated by this unequal distribution of EQ, contributes to differences in poor SRH between women and men. In this case, we estimate that the probability of reporting poor SRH among women is 1.5 percentage points higher than if they experienced the same EQ as men, which corresponds to a 1.22-fold higher odds of poor SRH due to EQ. Further decomposition of the TNIE suggests that the indirect effect is primarily due to differential exposure of women to various EQ types, rather than a presence of interactive effects: the PNIE is statistically

significant (PD = 0.023; 95% CI: 0.010, 0.038), while the mediated interaction is not. Additionally, a non-zero negative PNDE (PD = -0.018; 95% CI: -0.036, -0.001) suggests that women would report lower levels of poor SRH compared to men if the entire working population experienced the distribution of EQ observed in men. Thus, the results from the SRH model resemble what MacKinnon et al. (2007) label 'inconsistent mediation', in which the direct and indirect effects have opposite signs. The combination of the PNDE and TNIE having similar magnitudes but opposite signs is consistent with a non-significant total effect.

In the mediation model examining FMD (Table 3), we found a significant total gender effect: women reported 3.9 percentage points higher FMD than men (95% CI: 0.009, 0.069). As with SRH, we find evidence of a significant indirect gender-FMD effect that operates through EQ (TNIE: PD = 0.026; 95% CI: 0.006, 0.046). Our model suggests that women report FMD at a probability that is 2.6 percentage points higher than if they experienced same distribution of EQ as men; this corresponds to a 1.21-fold higher odds of FMD among women due to EQ. However, unlike SRH, the EQ-attributed indirect effect on FMD is primarily due to mediated interaction (PD = 0.029; 95% CI: 0.004, 0.055). This suggests that gender differences in EQ-health associations, exacerbated by an unequal distribution of EQ, are driving the mediating effect of EQ on FMD.

Further detail regarding the direct and indirect effects can be gleaned by examining model-predicted probabilities for reporting poor SRH or FMD within each EQ types, as well as EQ membership probabilities, by gender (Table 4). As expected, these results show gender as a strong predictor of EQ. In particular, women are significantly less likely to be members of the *Portfolio*, *Inflexible skilled*, or *Dead-end* EQ categories. As we have previously shown (Peckham et al., 2019), the risk of poor SRH or FMD varies across EQ type, which, combined with an unequal distribution of EQ, seems to produce differential health statuses among women and men. The mediation models find only weak evidence that EQ differentially affects women and men's health. Just one EQ-gender interaction was found to be statistically significant: women engaged in jobs resembling the *Optimistic precarious* EQ type report better SRH compared to men in the same type of employment. However, the overall pattern of the EQ

distribution is configured such that women are heavily selected into jobs in which they report higher levels of FMD (e.g., the *Precarious* EQ type), and are kept out of jobs in which they fare better (e.g., the *Portfolio* type). This is consistent with the finding that interaction is an important component of the mediating effect of EQ on FMD, despite the individual interaction coefficients being non-significant.

4. DISCUSSION

In this study, we performed exploratory mediation analysis to investigate whether different patterns of EQ contribute to gender inequities in two broad indicators of general and mental health among U.S. workers. While both genders reported similar overall levels of poor SRH, our analysis suggests that this apparent equality is concealing the fact that the unequal distribution of EQ increases women's probability of reporting of poor SRH. In fact, our model suggests that working women would actually report comparatively better SRH if EQ was distributed to the entire population as is currently observed among working men. Our analysis of FMD also indicates an important role of EQ. Women in our sample reported higher levels of FMD compared to men, and this was mostly explained by the unequal distribution of EQ, combined with a heterogeneity in effect within each EQ type, across gender. Overall, these results are consistent with EQ as a plausible proximal mechanism between gender and health, which may contribute to observed gender health inequities among working populations.

Our results generally align with numerous studies that have focused on individual components of the overall gender-EQ-health pathway. Namely, there is extensive evidence that women are disproportionately exposed to poor EQ features (e.g., Puig-Barrachina et al. 2014), while an emerging evidence base is finding that various individual or multidimensional measures of poor EQ (and similarly conceptualized constructs of insecure, flexible, and precarious employment) adversely affect workers' health (see Benach et al., 2014). Such findings infer a mediation relationship in which EQ may differentially impact women's health. However, given the complex linkages between gender, employment, and health, it is important to formally examine the plausibility of this relationship. Several analyses have identified inequalities in employment status (e.g., whether engaged in paid employment,

full vs. part-time) as important variables in explaining gender inequities in SRH—often more important than education or income (Chun et al., 2008; Hosseinpoor et al., 2012; Ross & Bird, 1994). To our knowledge, however, this is the first such study to examine the contribution of a multidimensional measure of employment.

More specifically, we find that EQ is distributed in a manner consistent with gender inequalities related to labor market bargaining power and the division of unpaid labor. Notably, over 75% of women are estimated to be engaged in employment resembling *Precarious*, *Optimistic precarious*, or *SER-like* categories, which represent the EQ types with the lowest number of hours worked. Less than half of men are expected in these categories. This is consistent with pervasive social expectations and societal gender roles in which women assume a larger proportion of household work and caregiving, hindering their ability to work full-time schedules (Artazcoz et al., 2007). Meanwhile, the men-dominated forms of employment, including *Portfolio*, *Inflexible skilled*, and *Dead-end* EQ types, are distinguished by the highest probabilities of working long (and mandatory extra) hours—aligning with dominant cultural expectations in which men act as the primary family breadwinner (Vandello et al., 2013). EQ types with longer hours also have higher income—a dynamic which, because men are unequally rewarded for laboring long hours, reinforces gender-wage inequalities (Goldin, 2014).

However, a strength of our analysis is the use of a multidimensional, typological measure of EQ. This approach conceptualizes jobs as constellations of many different health-relevant employment features, and allows for a more nuanced examination of gendered experiences in employment than can be accomplished by focusing on one EQ feature at a time. Using this lens, it is notable that women are particularly less likely to be engaged in the *Portfolio* EQ type. *Portfolio* employment, besides involving excessive work hours, represents the most privileged EQ type in terms of wages, decision-making authority, opportunity, schedule control, and other EQ features. The finding of very few women in this EQ type is consistent with the existence of a "glass ceiling" that acts as a barrier for women in obtaining positions of authority, power, and other prized employment-related benefits (Cotter et al., 2001). Thus,

while women are more likely to experience poor EQ, they are also actively prevented from achieving high EQ jobs in which they exhibit better health.

An additional observation detected by our typological measurement of EQ is the fact that there are multiple configurations of 'non-standard' employment, which will produce distinct employment experiences and have different associations with health. In particular, women make up the large majority of workers with *Precarious* and *Optimistic precarious* EQ types, which have the highest probabilities of non-permanent contracts, low wages, low hours, and irregular schedules. These two EQ types differ significantly, however, on relational dimensions of employment: whereas *Optimistic precarious* jobs offer a relatively high degree of schedule control, involvement in decisions, and opportunity to develop, *Precarious* employment offers none of these beneficial features. Further, workers in the latter EQ type experience significantly higher levels of workplace harassment. Therefore, in the face of inequitable caregiving and household responsibilities, some women may choose *Precarious optimistic* employment in an effort to better balance work and non-work life spheres—and thus enhance or protect their physical and mental health. Alternatively, the high proportion of working women being selected into *Precarious* employment may be a result of gender discrimination and other sources of disadvantage, rather than choice. This undermining of one's agency, as well as direct effects of poor EQ conditions, could explain the much higher levels of poor health among these workers. Overall, this finding is consistent with Pirani's (2017) finding that mental health among workers in temporary and part-time employment was heavily influenced by workers' choice to engage in such arrangements. Although studies using simple definitions of non-standard employment have found mixed results with respect to health associations (Pirani, 2017), future research should use multidimensional measures to capture heterogeneity among these forms of employment, including relational aspects of EQ.

We also found that women report comparatively better general health among those engaged in *Optimistic precarious* employment. As noted above, this EQ type may provide disproportionate benefit to women who are shouldering more non-work-related obligations and roles. Further, such a finding is generally consistent with evidence that men may be more vulnerable to feelings of insecurity associated

with non-standard employment (Mai et al., 2019). It is unclear, however, why this EQ type did not provide advantage to women with respect to reporting FMD. Perhaps *Optimistic precarious* employment provides particular benefit to women through pathways such as higher levels or economic independence or improved agency related to health behaviors, which may be more relevant to general health measures. If women are selected into this EQ type because they have a higher levels of unpaid labor responsibilities, this double duty may adversely affect mental health even while their more flexible employment provides some benefits to their general health. Taken as a whole, our results indicate more research is needed to elucidate the intricate relationship between gender, health, and the multiple dimensions of EQ.

It is important to emphasize that our intention with this exploratory analysis is to add to the theory base, and that we cannot make strong causal claims due to the cross-sectional nature of these data, which makes it impossible to reject the possibility that individuals with worse health are selected into worse EQ. Such concerns are amplified within the context of mediation analysis, where temporal ordering of the study variables is critical to estimate and interpret direct and indirect effects. Clearly gender is antecedent to employment and health; however, we further believe that there is a strong theoretical rationale for presuming employment conditions are an important influence on health status. There is a substantial literature documenting the link between job conditions and individuals' health. Moreover, several health studies specifically concerned with temporary or precarious contracts have found that the employment-to-health causal direction is likely more important than health selection effects (Pirani & Salvini, 2015; Quesnel-Vallee et al., 2010). Despite these data limitations, the GSS is one of the richest sources of information related to character of modern employment relationships, including both contractual and relational features. This allowed for what we believe is the first study to examine gender health inequities related to a detailed, theoretically-grounded measure of the employment relationship. Nevertheless, these findings will need to be replicated within data that allow for better causal inference.

5. CONCLUSION

Despite longer life expectancy, women continue to suffer worse physical and mental health compared to men. Elucidating the determinants of these health inequities will require a perspective that accounts for unequal relational power dynamics and asymmetrical burdens of family roles experienced by women. Such dynamics are highly relevant to the gendered experience of paid employment, in which women face myriad disadvantages and barriers. In this study, we found that an unequal distribution of beneficial and adverse employment circumstances helps explain observed inequities in health between women and men. Several future directions for research emerge from our results. Rather than focusing on individual employment conditions, we believe future analysis at the intersection of gender, employment, and health should consider the multiple health-relevant aspects of the employment relationship, as well as the reality that these aspects cluster together in particular ways within the modern labor market. Another important consideration, not addressed in this study, is the intersectional nature of gender with other axes of inequality. For instance, black women have been reported to experience more precarious work schedules compared to white women (Storer et al., 2019). We also did not account for social class or socioeconomic status. We expect individual levels of dis/advantage to be significant for both exposure and susceptibility to EQ—for instance, working women with more resources may be able to hire domestic workers to help with household activities (Borrell et al., 2004)—and will be important to incorporate into future studies. Overall, our findings position the character and quality of the employment relationship as a potential target for intervention to reduce gaps in health between women and men.

TABLES AND FIGURES

Table 1. Conceptual dimensions and proxy indicators used to operationalize employment quality within the U.S. General Social Survey.

Dimensions	Indicators	Operationalization
[1] Employment stability	[1] Employment contract/arrangement	[1] Two categories: 1) regular, permanent employment; 2) non-permanent arrangement (independent contractor/freelancer; working under a contractor; employment on an on-call basis, or paid by temporary agency)
[2] Material Rewards	[2] Income level	[2] Year-specific sample quartiles, three categories: 1) lowest, 2) second or third, and 3) highest quartile
[3] Workers' rights & social protection	[3] Mandatory extra days of work	[3] Three categories: 1) zero; 2) between 1 and 10; and 3) >11 days of required extra work hours
[4] Working time arrangements	[4a] Long working hours	[4a] Four categories: 1) <24 hours; 2) 25-36 hours; 3) 37-48 hours; and 4) >48 hours
	[4b] Working times regularity	[4b] Three categories: 1) day shift; 2) afternoon or night shift; and 3) split, irregular, on-call, or rotating shifts
[5] Employability opportunities	[5] Opportunity to develop abilities	[5] Dichotomous item indicating if worker has an opportunity to develop their own special abilities: 1) yes (‘very true’, ‘somewhat true’) and 2) no (‘not too true’, ‘not at all true’)
[6] Collective organization	[6a] Have adequate training, equipment, information	[6a] Combines two items asking if workers (a) have enough help and equipment, and (b) enough information to get job done. Dichotomized to 1) yes (‘often’ or ‘sometimes’ responses for both of these items) and 2) no (responses of ‘rarely’ or ‘never’ on at least one)
	[6b] Union representation	[6b] Dichotomous item indicating union membership: 1) yes and 2) no
[7] Interpersonal power relations	[7a] Employee involvement	[7a] Three categories: respondent is 1) ‘often’; 2) ‘sometimes’; and 3) ‘rarely’ or ‘never’ able to make decision on the job that affect them
	[7b] Control over schedule	[7b] Combines two items asking ability of workers to change starting/finishing times and to take off work for personal/family reasons. Three categories: 1) ‘high control'; 2) ‘medium control'; and 3) ‘low control'
	[7c] Subjected to harassment/abuse	[7c] Combines two items indicating having been (a) sexually harassed or (b) threatened or harassed in any other way by anyone while at their job. Dichotomized to: 1) yes ('yes' to either item) and 2) no

Notes: Conceptual framework for employment quality and choice of proxy indicators adapted from Van Aerden et al. (2014, 2016).

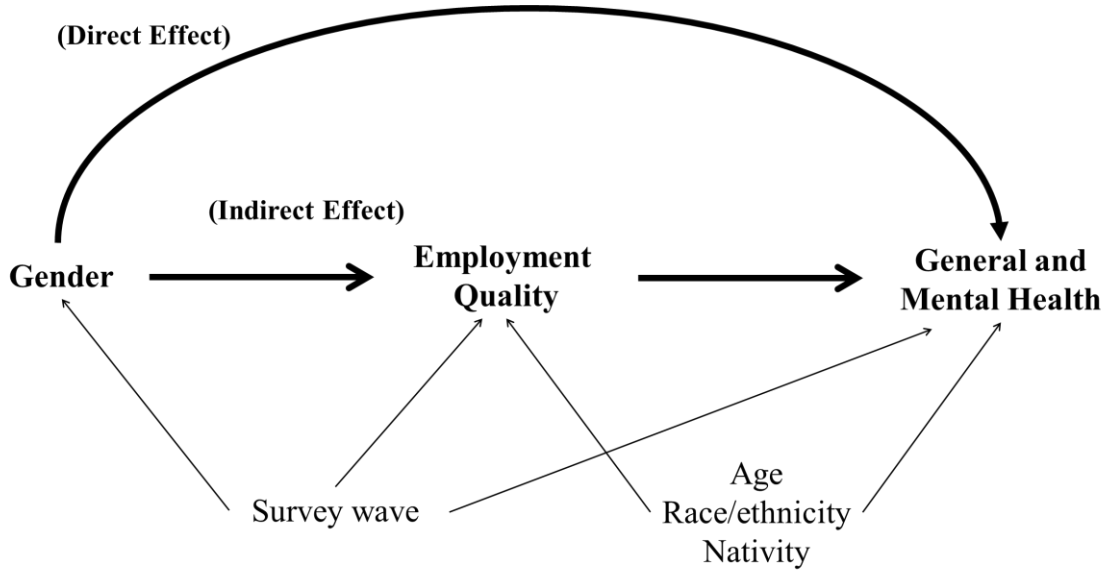

Figure 1. Schematic of exploratory mediation analysis model. The total effect of gender on health is decomposed into a direct effect and an indirect effect mediated through employment quality, adjusting for confounders.

Table 2. Characteristics of study sample from General Social Survey: Frequency (percent).

Measure	Level	Total N = 6367[a]	Women n = 3405	Men n = 2962	p-value[b]
Survey wave	2002	1542 (24)	803 (24)	739 (25)	0.536
	2006	1489 (23)	801 (24)	688 (23)	
	2010	1011 (16)	562 (17)	449 (15)	
	2014	1068 (17)	568 (17)	500 (17)	
	2018	1257 (20)	671 (20)	586 (20)	
Age	30 and under	1521 (24)	796 (23)	725 (24)	0.167
	31-50	3077 (48)	1630 (48)	1447 (49)	
	Over 50	1769 (28)	979 (29)	790 (27)	
Race/ethnicity	White	4339 (68)	2255 (66)	2084 (70)	<0.001
	Black	1004 (16)	624 (18)	380 (13)	
	Hispanic	747 (12)	380 (11)	367 (12)	
	Asian/Pacific Is.	202 (3)	103 (3)	99 (3)	
	AI/AN[c]	75 (1)	43 (1)	32 (1)	
Nativity	Born in U.S.	5629 (88)	3050 (90)	2579 (87)	0.002
	Foreign born	738 (12)	355 (10)	383 (13)	
Education	Less than high school	536 (8)	246 (7)	290 (10)	<0.001
	High school	3212 (50)	1686 (50)	1526 (52)	
	Junior college	604 (9)	374 (11)	230 (8)	
	Bachelor	1302 (20)	705 (21)	597 (20)	
	Graduate	713 (11)	394 (12)	319 (11)	
Employment quality type[d]	SER-like	2086 (33)	1231 (36)	855 (29)	<0.001
	Portfolio	1041 (16)	378 (11)	663 (22)	
	Inflexible Skilled	847 (13)	349 (10)	498 (17)	
	Dead-end	832 (13)	406 (12)	426 (14)	
	Precarious	768 (12)	515 (15)	253 (9)	
	Optimistic Precarious	793 (12)	526 (15)	267 (9)	
Self-rated Health	Good	5438 (85)	2896 (85)	2542 (86)	0.597
	Poor	897 (14)	490 (14)	407 (14)	
	Missing[e]	32 (1)	19 (1)	13 (0)	
Frequent mental distress	Absent	5646 (89)	2974 (87)	2672 (90)	0.002
	Present	650 (10)	388 (11)	262 (9)	
	Missing[e]	71 (1)	43 (1)	28 (1)	

Notes: [a] Subsequent to latent class analysis (LCA) modeling, 22 respondents missing information on age were removed from the analysis (13 women, 9 men). [b] Chi square test comparing women and men. [c] American Indian/Alaskan Native. [d] Based on assignment to most likely class from LCA model. [e] Respondents missing outcome data do not contribute information to estimation of mediation model coefficients involving outcome.

Table 3. Total, direct, and indirect effects of gender on health mediated through employment quality, based on counterfactual definitions.

	Self-rated health N = 6335				Frequent mental distress N = 6296			
	Probability difference	**(95% CI)**	**Odd ratio**	**(95% CI)**	**Probability difference**	**(95% CI)**	**Odd ratio**	**(95% CI)**
Total Effect	-0.003	(-0.021,0.015)	0.97	(0.78,1.19)	**0.039**	**(0.009,0.069)**	1.34	(1.07,1.67)
Pure Natural Direct Effect	**-0.018**	**(-0.036,-0.001)**	**0.79**	**(0.63,1.00)**	0.013	(-0.016,0.044)	1.11	(0.88,1.41)
Total Natural Indirect Effect	**0.015**	**(0.005,0.028)**	**1.22**	**(1.06,1.41)**	**0.026**	**(0.006,0.046)**	**1.21**	**(1.05,1.39)**
Pure Natural Indirect Effect	**0.023**	**(0.010,0.038)**			-0.003	(-0.024,0.019)		
Mediated interaction	-0.008	(-0.024,0.008)			**0.029**	**(0.004,0.055)**		

Notes: Positive probability differences for gender effects (reference category: men) indicate worse expected health among women, and vice versa. Models adjusted for age, race/ethnicity, nativity, and survey wave. Bolded estimates are statistically significant based on p-value < 0.05. 95% confidence intervals constructed with bias-corrected bootstrapping (n=10,000).

Table 4. Model-predicted probabilities of EQ distribution and reporting of adverse health status by gender and EQ type.

EQ type	Predicted EQ distribution[a]				Predicted poor SRH				Predicted FMD			
	Women		Men		Women		Men		Women		Men	
SER	0.285	(0.22,0.35)	0.201	(0.15,0.26)	0.073	(0.05,0.11)	0.076	(0.04,0.12)	0.107	(0.06,0.16)	0.044	(0.00,0.11)
Portfolio	**0.046**	**(0.03,0.08)**	**0.175**	**(0.11,0.25)**	0.014	(0.00,0.05)	0.030	(0.01,0.05)	0.081	(0.01,0.17)	0.094	(0.05,0.16)
Inflexible skilled	**0.116**	**(0.08,0.16)**	**0.233**	**(0.17,0.30)**	0.073	(0.03,0.14)	0.055	(0.03,0.09)	0.126	(0.05,0.23)	0.167	(0.11,0.24)
Dead-end	**0.080**	**(0.05,0.12)**	**0.136**	**(0.09,0.19)**	0.111	(0.07,0.18)	0.153	(0.11,0.22)	0.206	(0.12,0.31)	0.240	(0.15,0.34)
Precarious	0.215	(0.15,0.30)	0.106	(0.07,0.16)	0.160	(0.11,0.22)	0.149	(0.08,0.24)	0.329	(0.24,0.42)	0.219	(0.11,0.35)
Optimistic precarious	0.258	(0.19,0.33)	0.149	(0.11,0.20)	**0.078**	**(0.05,0.12)**	**0.176**	**(0.11,0.27)**	0.170	(0.10,0.25)	0.136	(0.05,0.24)

Notes: [a] Values shown are from self-rated health (SRH) mediation model, which are nearly identical to corresponding estimates in the frequent mental distress (FMD) model. Bolded estimates correspond to statistically significant gender coefficients in mediation models (i.e., gender predicting EQ membership, or EQ-gender interactions predicting health), based on p-value < 0.05. 95% confidence intervals constructed with bias-corrected bootstrapping (n=10,000).

Table S1. Employment quality indicators by gender: Frequency (percent).

EQ indicator	Response category	Total	Women	Men	p-value[a]
		N = 6367	n = 3405	n = 2962	
Employment arrangement	Regular/permanent	5606 (88)	3052 (90)	2554 (86)	<0.001
	Non-permanent	714 (11)	322 (9)	392 (13)	
	Missing	47 (1)	31 (1)	16 (1)	
Income	Lowest income quartile	1456 (23)	978 (29)	478 (16)	<0.001
	2nd/3rd income quartile	2928 (46)	1558 (46)	1370 (46)	
	Highest income quartile	1087 (17)	389 (11)	698 (24)	
	Missing	896 (14)	480 (14)	416 (14)	
Days of mandatory extra work hours	None	4915 (77)	2757 (81)	2158 (73)	<0.001
	1-10 days	897 (14)	424 (12)	473 (16)	
	11+ days	387 (6)	135 (4)	252 (9)	
	Missing	168 (3)	89 (3)	79 (3)	
Working hours	<24	646 (10)	429 (13)	217 (7)	<0.001
	25-36	834 (13)	599 (18)	235 (8)	
	37-48	3217 (51)	1738 (51)	1479 (50)	
	>48	1643 (26)	623 (18)	1020 (34)	
	Missing	27 (0)	16 (0)	11 (0)	
Working times regularity	Day shift	4658 (73)	2529 (74)	2129 (72)	0.017
	Afternoon/night shift	771 (12)	402 (12)	369 (12)	
	Split/irregular/rotating	895 (14)	445 (13)	450 (15)	
	Missing	43 (1)	29 (1)	14 (0)	
Opportunity to develop abilities	Very true	2217 (35)	1169 (34)	1048 (35)	0.003
	Somewhat true	2757 (43)	1431 (42)	1326 (45)	
	Not true	1336 (21)	771 (23)	565 (19)	
	Missing	57 (1)	34 (1)	23 (1)	
Have adequate training, info, equipment	Often/sometimes	5485 (86)	2915 (86)	2570 (87)	0.210
	Rarely/never	840 (13)	463 (14)	377 (13)	
	Missing	42 (1)	27 (1)	15 (1)	
Union representation	Union member	620 (10)	294 (9)	326 (11)	0.005
	Not union member	3627 (57)	1975 (58)	1652 (56)	
	Missing	2120 (33)	1136 (33)	984 (33)	
Control over schedule	High control	1615 (25)	822 (24)	793 (27)	0.017
	Medium control	1916 (30)	1018 (30)	898 (30)	
	Low control	1532 (24)	866 (25)	666 (22)	
	Missing	1304 (20)	699 (21)	605 (20)	
Employee involvement	Often involved	2483 (39)	1284 (38)	1199 (40)	0.071
	Sometimes involved	2434 (38)	1314 (39)	1120 (38)	
	Rarely/never involved	1407 (22)	780 (23)	627 (21)	
	Missing	43 (1)	27 (1)	16 (1)	
Workplace harassment/threats	Yes	753 (12)	463 (14)	290 (10)	<0.001
	No	5569 (87)	2914 (86)	2655 (90)	
	Missing	45 (1)	28 (1)	17 (1)	

Notes: [a] Chi square test comparing women and men.

Chapter 6. Conclusion

This dissertation explored the complex interrelationship between employment quality (EQ), health, and health inequities. It proceeded in several phases, beginning with the development of a novel conceptual model. This theoretical chapter attempted to expand the typical occupational health research paradigm to better account for many ways that work contributes to population health, and leads to differential health impacts across various working populations. Next was a series of three empirical studies to investigate the importance of EQ for health and health inequities. We first sought to identify patterns of EQ in the modern U.S. economy, and to characterize the distribution of EQ across sociodemographic groups and locations within the labor market. We then examined whether EQ is associated with workers' health, and explored potential mediating mechanisms of EQ-health associations. The final study directly assessed whether EQ contributed to inequities in health across gender.

1. Key findings

In Chapter 2 we develop a novel conceptual model that attempts to embed the work-health relationship within a broader social context than is normally considered within either occupational health or health inequities-related disciplines. We argue that researchers need to better account for the many ways in which work influences health beyond the physical, chemical, and psychosocial hazards that are typically emphasized—including the quality of the employment relationship, how work structures non-work life (e.g., determining one's income or schedule), and the contribution of work to one's status and social class. We then detail specific mechanisms by which workers may be differentially exposed to, or be differentially impacted by, adverse work characteristics. These mechanisms are largely social in nature, and not well addressed by typical approaches in occupational epidemiology that are focused primarily on identifying specific risk factors.

With the empirical studies in Chapters 3 through 5, we dive deeper into two themes emerging from the conceptual model. First is the need to integrate measures of the employment relationship into the epidemiology of work and health. Second is the need to examine the role of work in contributing to health inequities. In Chapter 3 we constructed an empirical typology of EQ which identified eight distinct forms of employment in the U.S. Consistent with theory and prior research, one EQ type resembled the historical conception of the Standard Employment Relationship (SER), while other EQ types were characterized by various other configurations of beneficial and unfavorable employment conditions. The findings exemplified the significant heterogeneity in the experience of modern employment, and the value of a multidimensional, typological measurement approach when studying the character of the employment relationship. For instance, several EQ types looked similar across certain contractual conditions (e.g., permanent contract, adequate wages), but diverged substantially across relational conditions (e.g., opportunity to develop, participation in decision-making). We also found that the eight EQ types were unequally distributed across sociodemographic groups and throughout the labor market. Gender and education were among the strongest social predictors of EQ, with men and the highly educated generally experiencing better EQ. There was also a notable trend of higher EQ within business and professional occupations and industrial sectors, whereas occupations and industries related to services and retail tended to have lower EQ.

In Chapter 4 we found that the EQ was significantly associated with three measures of health: self-reported health (SRH), frequent mental health (FMD), and occupational injury. Of note, two EQ types had consistently worse health across all measures compared to SER-like employment. These included the Precarious EQ type, which resembles an accumulation of all poor EQ attributes, and the Dead-end EQ type, which is similar to SER-like employment in terms of contractual features but reports much worse worker-employer relations—especially a lack of opportunity to develop. On the other hand, the Portfolio EQ type, which has long hours but otherwise very high EQ, had somewhat better health than the SER-like group. We also found support for three mechanisms linking EQ to health, including material deprivation (e.g., inadequate income), employment-related stressors (e.g., job insecurity), and

occupational risk factors (e.g., physical exposures). These mediators varied across the EQ types and helped explain the health associations; thus each mediation mechanism may represent a potential avenue for interventions to improve workers' health.

In Chapter 5 we found evidence that the unequal distribution of EQ across women and men played a significant role in observed gender differences in health. Extending findings from Chapter 3, we show that the distribution of EQ across gender is consistent with unequal power dynamics, gender-based discrimination, and the disproportionate burden of household responsibilities that disadvantage women's employment opportunities. With regards to general health, we found that if women in our sample experienced the same distribution of EQ as men, their prevalence of poor SRH would decrease by 1.5 (95% CI: 0.5 – 2.8) percentage points. EQ had a larger effect on gender differences of FMD: if women had the same EQ as men, they would report 2.6 (95% CI: 0.6 – 4.6) percentage points lower FMD. We also found some indication that women and men experience different health impacts of different EQ types. Overall, this study identified EQ as a potential target for intervention to reduce gender health inequities.

2. Policy implications

While discussion of research implications is included within individual chapters, the evidence and ideas in this dissertation also offer valuable insight into how to approach policy to improve worker health and reduce work-related health inequities. This is important to focus on because the typical approach to policy within occupational health is to regulate the types and levels of exposure to physical and chemical hazards in the workplace. While such policies have likely had a positive and substantial impact on reducing certain exposures and occupational diseases and injuries, the theoretical and empirical findings herein suggest that reducing work-related health inequities requires eliminating differential exposure to adverse (and beneficial) working conditions across social position. Through this lens, shortcomings of many existing health and safety policies become apparent. For instance, Siqueira et al. (2014) point out that U.S. labor standards often explicitly exclude marginalized workers from coverage, exacerbating health

inequities. For example, agricultural, tipped, and domestic workers—all working populations that tend to be disproportionately women, people of color, and immigrants—are not covered by certain labor protections afforded to other workers, including the right to organize unions, minimum wage or overtime protections, and safety standards (Siqueira et al., 2014). The growing number of contractor arrangements, including online platform "gig" workers, are also typically excluded from most or all labor protections afforded to those considered "employees" under existing legal definitions (Pinsof, 2016). Misclassification of employees as contractors has always been a relatively common tactic for employers to externalize risk and costs; however, this has gotten more contentious with the advent of new forms of gig work (Pinsof, 2016). Addressing these exclusions, as well as strategies such as targeted enforcement of industries, occupations, and firms with higher proportions of potentially vulnerable workers, could reduce differential exposure across social groups. However, this only applies to the narrow set of traditional work hazards addressed within existing regulations. Legislation to reduce other adverse working conditions, such as psychosocial job stressors or ergonomic hazards, has been largely unsuccessful.

In terms of command and control regulation of the workplace, the findings from this dissertation suggest that policy focused on improving employment quality may be more likely to contribute to a reduction in health inequities. EQ aspects of one's job are major determinants of non-work life, especially in terms of structuring access to health-enhancing goods (which, for most, largely depend on labor income) and ability to fulfil various social and familial obligations. Policies related to strengthening employment protections and providing workers with security and control over their employment circumstances can serve to shift the balance of power from employers toward employees. For example, secure scheduling standards—which require advanced notice of working times and compensates workers for canceled shifts, among other features—can empower workers by providing them with more predictability and agency over their time. Other policies, such as living wages or improved protections against harassment/discrimination, retaliation, and unlawful firings, could have similar influences on power dynamics in the workplace. Consequently, modifications to EQ may have a farther reach than

legislation more narrowly focused on physical work environments, with disproportionate benefit accruing to those in the most vulnerable labor market positions.

However, our findings also reveal the inadequacy of solely targeting proximal workplace determinants of health for interventions to reduce health inequities: such actions in isolation don't account for upstream socio-structural processes that distribute these conditions across populations, or address differential consequences borne by different groups therefrom. One relevant set of policies that could buffer against social stratification of the labor market is active labor market policies (AMLPs), which concern promoting labor market participation and connecting workers with jobs. Examples of AMLPs include training, job-search assistance, employment subsidies (e.g., payments to employers for hiring or worker for obtaining job), and supported employment (e.g., subsidies for employing workers with reduced work capacity). These types of programs could be targeted to enhance skills among traditionally marginalized workers or the unemployed—such as those with low education, those with a criminal record, or those facing closure of a long standing factory or industry—improving their opportunity to obtain jobs with adequate earnings and job conditions. There is some evidence that participation in ALMP-related programs improve mental health (Coutts et al., 2014). As with any policy, it would be important to monitor the distributional impacts of such programs to make sure that they are not exacerbating disparities. Another factor that seems to explain a substantial portion of labor market inequities (e.g., racial wage inequalities) is human capital resources (e.g., education and work experience) (Mandel & Semyonov, 2016; Storer et al., 2019). However, group-level differences in human capital endowments cannot be interpreted without acknowledging the reality of differential access to education, training, and other skill formation due to inequality generating mechanisms such as discrimination and opportunity hoarding (Tomaskovic-Devey et al., 2005). Consequently, rectifying the unjust distribution of human capital, for example through universal access to education, may also abate the social stratification of work.

Strengthening of social safety nets would also likely diminish the links between work and health inequities by addressing differential susceptibility and consequences. In fact, a typical measure of the

strength of a welfare policy regime is the extent of labor decommodification, or, the degree to which individuals must rely on labor income for their own welfare (Esping-Andersen, 1990). Societies that exhibit lower levels decommodification—that is, societies in which people must work to maintain a basic standard of living; for example, the U.S.—exhibit steeper social gradients in health (McCartney et al., 2019; Mcleod et al., 2012). Unemployment insurance policy is one key lever of intervention in this regard. Providing more inclusive coverage (i.e., the proportion of the unemployed that receive compensation), longer duration of support, and increasing generosity of unemployment benefits (i.e., rate of compensation), would potentially improve health for workers of low social position in several ways (Mcleod et al., 2012; Shahidi et al., 2016). In particular, it would dampen the relationship between unemployment and health by providing direct financial support to those without labor earnings. Reducing differential long term consequences could also come from more generous and accessible workers' compensation (WC) programs, which are designed to cover health care and disability-related costs (e.g., lost income) associated with occupational injury/illness. Disparities in WC coverage and payment have been well-documented (Sears et al., 2019). For instance, despite the fact that undocumented workers are often legally entitled to WC benefits, there is likely severe underreporting due to fear of negative consequences of seeking this assistance—including being reported to immigration authorities by employers or insurance companies (Smith, 2012). Such an anecdote also highlights the notion of how policy distal from labor standards (e.g., immigration laws) can have substantial impact on worker-employer power dynamics. Generally, policies related to providing a robust social safety net, such as universal access to health care, could fundamentally alter power dynamics at lower ends of the labor market: workers would feel less pressure to work low quality jobs, and employers would be incentivized to improve the quality of their positions to compete for workers.

Lastly, the weight of our findings suggests that the widespread trend of declining union representation is likely to exacerbate work-related health disparities. Particularly, unions have been shown to be effective in balancing power relations between workers and employers, which has widespread implications for worker health. For instance, by increasing workers' bargaining power union

representation can promote increased wages and benefits; decreased exposure to hazardous working conditions, such toxic exposures; decreased exposure to poor employment conditions, such as insecure contracts or precarious work schedules; and improve worker decision-making power (Hagedorn et al., 2016; Malinowski et al., 2015; Reynolds & Brady, 2012). Further, union-related job quality improvements may disproportionately benefit marginalized workers, including those with less education and racial/ethnic minorities (Eisenberg-Guyot et al., 2020; Farber et al., 2018). Beyond the workplace, unions also affect worker-employer power relations at the society level. For example, unions can improve population health by advocating for expanded labor rights, improved social protections, and public-health programs, as well as more progressive norms around compensation and job quality that affect workers throughout the labor market, regardless of union membership (Eisenberg-Guyot et al., 2020; Feigenbaum et al., 2018; Western & Rosenfeld, 2011). Thus, policies promoting workers' right to organize unions and collectively bargain could have widespread implications for work-related health inequities, potentially addressing all pathways and mechanisms included in our conceptual model.

3. Final remarks

The theoretical and empirical research presented in this dissertation add to a growing literature focused on the contribution of work in creating and perpetuating health inequities. In particular, we expand the traditional occupational health framework to advance a construct of EQ that accounts for contractual and relational aspects of employment that effect health independently of physical and psychosocial environments. We find that EQ in the U.S. is non-randomly distributed across working populations, is associated with workers' physical and mental health, and contributes to health inequities. To our knowledge, this is the first study to investigate EQ in the U.S. context using a typological measurement approach. While generally similar to prior studies in the E.U., our results suggest that the distribution and character of employment in the U.S. is distinct in several respects, as is expected due to differences in legal, political, economic, and social contexts. As discussed throughout the individual chapters, a major limitation of our empirical analyses is the use of cross-sectional data. Yet the coherence of our findings

with theory and other emerging evidence provides a compelling rationale for further investigation of EQ and health, including within data sources that allow for better causal inference. While employment conditions have received less attention compared to other aspects of socioeconomic position, such as education and income, EQ is identified as a potential mechanism of social gradients in population health.

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