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Precariedad laboral, estrés crónico y salud mental:
un estudio sobre el entorno psicosocial laboral como posible mecanismo causal

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Universitat
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*A la educación pública uruguaya,
que me permitió llegar hasta aquí.*

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Resumen

El objetivo principal de esta tesis es avanzar en el conocimiento de los mecanismos que vinculan el empleo precario, la salud mental y el estrés crónico, analizando el posible papel mediador del entorno psicosocial del trabajo en esta relación. Se combinan diferentes enfoques de análisis de mediación para estimar el efecto indirecto de los riesgos psicosociales laborales, tales como las altas demandas psicológicas, el bajo control del trabajo, el insuficiente apoyo social de los superiores y compañeros en el lugar de trabajo, así como el conflicto trabajo-vida. Estos análisis se realizaron en diferentes muestras, incluyendo una muestra de trabajadores de la ciudad de Barcelona, una muestra de trabajadores de 23 países europeos y una cohorte de trabajadores suecos, utilizando diseños transversales y longitudinales. El empleo precario se asoció a una peor salud mental percibida, al diagnóstico de trastornos mentales, a los trastornos por consumo de sustancias y a los intentos de suicidio, así como al estrés crónico. Aunque con diferencias según la muestra, se comprobó que una proporción significativa de estas asociaciones fue atribuible al efecto de los riesgos psicosociales laborales, especialmente entre las mujeres.

Abstract

The main objective of this thesis was to advance knowledge on the mechanisms linking precarious employment, mental health and chronic stress, analyzing the possible mediating role of the psychosocial work environment in this relationship. Different mediation analysis approaches were combined to estimate the indirect effect of occupational psychosocial risks such as high psychological demands, low job control, insufficient social support from superiors and colleagues in the workplace, as well as work-life conflict. These analyzes were performed on different samples, including a sample of workers from the city of Barcelona, a sample of workers from 23 European countries, and a cohort of Swedish workers, using cross-sectional and longitudinal designs. Precarious employment was associated with more poorly perceived mental health, diagnosis of mental disorders, substance use disorders, suicide attempts, and chronic stress. Although with differences according to the sample, it was found that a significant proportion of these associations were attributable to the effect of the occupational psychosocial risks, especially for women.

Prefacio o prólogo

Esta tesis doctoral se realizó en el Grupo de Investigación en Desigualdades en Salud y Ecología- *Employment Conditions Network (GREDS-EMCONET)*, del Departamento de Ciencias Políticas y Sociales de la Universidad Pompeu Fabra, en el marco de la línea de investigación sobre “Precarización, Condiciones de empleo y trabajo”.

Por tanto, forma parte de la acumulación académica que el GREDS-EMCONET ha venido desarrollando por más de veinte con el objetivo de conceptualizar, medir y explicar el impacto de la precarización de las condiciones de empleo sobre la salud de la población trabajadora. Basados en esta experiencia, esta tesis se planteó como objetivo avanzar en el estudio del camino causal por el cual la precariedad laboral acaba impactando en la salud, explorando el entorno psicosocial laboral como un posible mecanismo.

De esta manera, una parte importante de esta tesis se enmarca en el proyecto PRESSED, que tuvo como objetivo estudiar la relación de la precariedad laboral y el estrés crónico, explorando los mecanismos causales que subyacen a ella. A su vez, uno de los artículos que la conforman se desarrolló en el marco del PWR Project, un proyecto de investigación internacional abocado al estudio de los efectos del empleo precario y del empleo no estándar sobre la salud.

La tesis se desarrolla en siete capítulos: el primero consiste en una introducción que sintetiza el enfoque teórico y los antecedentes; el segundo contiene la justificación del problema de investigación

abordado; en el tercero se presentan los objetivos y las hipótesis que orientan la investigación; el cuarto sintetiza la metodología utilizada; el capítulo cinco destinado a los resultados, contiene cuatro artículos de investigación originales; en el sexto capítulo se discuten los resultados de los cuatro artículos, sus fortalezas y limitaciones, se proponen futuras líneas de investigación, y se esbozan algunas implicancias de los hallazgos para las políticas públicas; y finalmente, el capítulo siete ofrece algunas conclusiones generales sobre los resultados y sus alcances.

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1. INTRODUCCIÓN

1.1. La determinación social de la salud

a) Enfoques teóricos y marcos conceptuales

La perspectiva de los determinantes sociales de la salud (DSS) se ha consolidado en las últimas décadas como un nuevo paradigma sobre la salud, que pone énfasis en las condiciones en las que las personas nacen, viven, trabajan y envejecen (CSDH, 2008). Heredero de una larga tradición iniciada con los estudios pioneros de Engels y Virchow en el siglo XIX, en Inglaterra y Polonia, respectivamente, este enfoque se ha forjado a partir de varios hitos como los estudios de McKeown e Illich, el Informe Black y los estudios Whitehall, entre otros (Frank & Mustard, 1994; Marmot, 1994). Todos ellos comparten la premisa de que el contexto socioeconómico y político es el principal determinante de la salud tanto individual como colectiva. Este enfoque busca superar las miradas biologicistas sobre la salud que la reducen a la ausencia de enfermedad, a la exposición a factores de riesgo o al resultado de conductas individuales. Pero también tiene una finalidad práctica que es la implementación de políticas de salud orientadas a la reducción de las desigualdades sociales y basadas en la acción conjunta entre varios sectores de la política pública más allá del sistema de salud, como la vivienda, la educación, el empleo, el medio ambiente y la política fiscal, entre otros (Marmot & Wilkinson., 2005; Evans et al., 2009).

De esta manera, la relación entre las condiciones sociales y la salud humana tiene renovada vigencia y se convierte en el foco principal de esta perspectiva, fundada en la cuestión sobre cómo ocurre el proceso de determinación social de la salud.

Basado en los trabajos de Diderichsen et al. (2009), el marco conceptual de los DSS de la Organización Mundial de la Salud se ha consolidado como una referencia destacada para explicar este proceso: distingue entre las causas sociales de la salud y los factores que determinan su distribución entre los distintos grupos sociales (Figura 1).

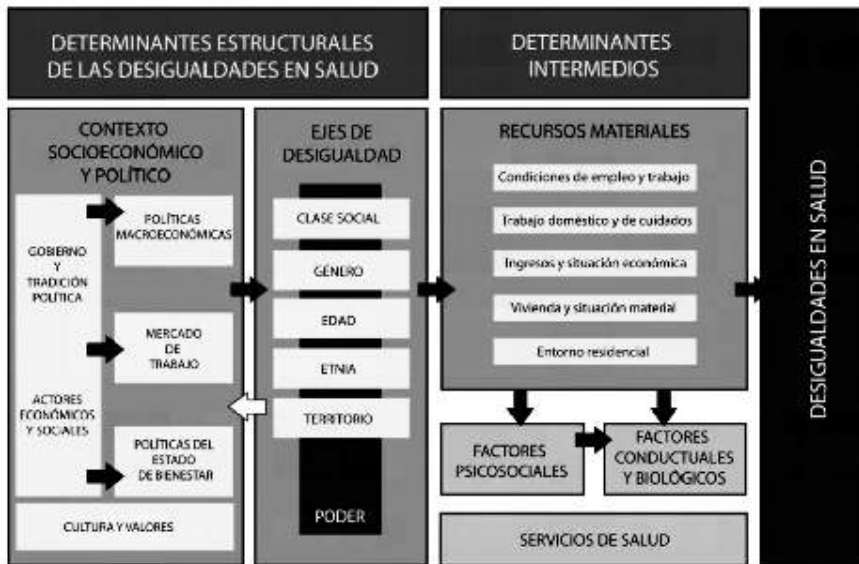


Figura 1. Marco conceptual de los determinantes sociales de las desigualdades en salud. (Comisión para reducir las desigualdades sociales en salud en España, 2015).

En este marco conceptual se distingue entre los determinantes estructurales y los determinantes intermedios, ubicados en distintos niveles dentro de la cadena causal que acaba impactando sobre la salud. Los primeros refieren al contexto socioeconómico y político y a las desigualdades sociales (de clase, género, étnicas, etcétera). Los determinantes intermedios refieren a las condiciones inmediatas de vida y trabajo (tales como las condiciones de vivienda, la disponibilidad de alimento, el empleo, entre otras), que actúan como mecanismos a

través de los cuales los determinantes estructurales influyen sobre la salud (CSDH, 2008).

Otros enfoques teóricos que buscan dar cuenta del proceso de determinación social de la salud remiten a la relación del cuerpo humano como entidad biológica y las condiciones sociales en las que se desarrolla su existencia. Particularmente, el concepto de “embodiment” se ha extendido a partir de los estudios pioneros de Nancy Krieger y ha ganado importancia en el campo de la epidemiología social para explicar cómo el contexto ecosocial deja huellas en el cuerpo y acaba afectando la salud a nivel individual y poblacional (Krieger and Davey Smith, 2004; Krieger, 2005). Desde este enfoque se argumenta que las condiciones sociales determinan la salud porque el cuerpo humano las incorpora biológicamente a lo largo del tiempo, transformando sus características fisioanatómicas, y generando patrones poblacionales de salud, enfermedad, discapacidad y muerte (Krieger and Davey Smith, 2004; Krieger, 2005). Es decir, el cuerpo es capaz de incorporar la estructura social en la que vive; en consecuencia, el estado de salud de los individuos dependerá de las posiciones que ocupe en esa estructura a lo largo de su vida. Así, los determinantes sociales no son solamente factores de exposición que pueden dañar la salud de los individuos, sino que son intrínsecos a ella porque constituyen biológicamente el cuerpo humano.

La perspectiva de los DSS y la noción de “embodiment” de las condiciones sociales se complementan para ofrecer un marco conceptual potente desde el cual analizar la relación entre la salud y el empleo como determinante social, que es el foco principal de esta tesis.

b) Desigualdades de género y su impacto en la salud

Desigualdades sociales

Como se ha dicho antes, desde la perspectiva de los DSS la producción social de la salud está determinada por las contradicciones e injusticias propias del modo de producción capitalista y del orden social que conlleva, razón por la cual las desigualdades sociales en sentido amplio (de clase, de género, étnicas, geográficas, etcétera), son inherentes a la salud como fenómeno colectivo (Laurell, 1983; Breilh, 2013).

Las desigualdades sociales tienen un carácter eminentemente interseccional, es decir, se originan a partir de la interrelación de factores de distinta naturaleza en los procesos y sistemas de poder a nivel individual, institucional y global. Estos factores incluyen el origen étnico, la clase social, el nivel socioeconómico, la discapacidad, la edad, la ubicación geográfica, la orientación y la identidad sexual, entre otros (Hankivsky, 2012).

De este modo, las desigualdades en salud entendidas como diferencias injustas y evitables en las que sistemáticamente los grupos en desventaja tienen peores resultados y mayor riesgo de enfermar que los más privilegiados (Santos, 2011; Whitehead, 1991) han sido destacadas como unas de las principales problemáticas de salud pública, dentro de los países y entre ellos (Marmot, 2005).

Desigualdades de género y salud

El reconocimiento de diferencias evitables en los resultados de salud y bienestar entre hombres y mujeres ha colocado al género como un eje destacado de desigualdad en salud. Las mujeres tienen mayor

esperanza de vida que los hombres y menor mortalidad en todas las edades (incluso *in utero* por razones parcialmente asociadas a factores genéticos); sin embargo, tienden a experimentar mayor morbilidad a lo largo del ciclo vital (Malmusi et al., 2012; Boerma et al., 2016), prevalencias más altas de trastornos agudos, mayor prevalencia de enfermedades crónicas no mortales, niveles más altos de discapacidad en el largo plazo y peor salud autopercebida (Boerma et al., 2016; Dahlin and Härkönen, 2013; Roxo et al., 2021; Palència et al., 2016). Esto se expresa en menores niveles de calidad de vida, bienestar y felicidad (Solé-Auró et al., 2018; Van Oyen et al., 2013).

Manandhar et al (2018) señalan que en cierta medida estas diferencias pueden deberse a las especificidades del sexo biológico en el crecimiento, el metabolismo, los ciclos reproductivos, las hormonas sexuales y los procesos de envejecimiento. No obstante, las explicaciones biológicas son limitadas para dar cuenta de las diferencias mundiales entre hombres y mujeres en los resultados de salud a lo largo de la historia de la humanidad, incluso en tiempos de rápida transición demográfica y epidemiológica (Manandhar et al., 2018; Cullen et al., 2016).

Algunos autores señalan que la desventaja de las mujeres y con respecto a los hombres en la morbilidad es la expresión del acceso desigual a los recursos económicos y a los beneficios sociales relacionados con el empleo (Gkiouleka et al., 2018; Palència et al., 2016; Stanistreet et al., 2005). De esta manera, el peor estado de salud de las mujeres se ha interpretado como una diferencia injusta y evitable,

atribuible a su posición de subordinación dentro de un orden de género eminentemente patriarcal (Doyal, 1995).

Un estudio reciente para 27 países europeos encontró que entre 2004 y 2016, las mujeres fueron más propensas a reportar mala salud; se observaron las mayores brechas de género entre las personas con menor nivel educativo (Roxo et al., 2021). De manera consistente con estudios previos, también se encontró que las desigualdades de género en la mala salud autorreportada se explicaron completamente por las disparidades socioeconómicas entre hombres y mujeres, en tanto que, al controlar el nivel educativo y el empleo, las mujeres llegaron incluso a mostrar una pequeña ventaja en salud en comparación con los hombres (Roxo et al., 2021). Estudios previos han destacado cómo las diferencias de género en los resultados de salud se ven afectadas por las desigualdades en la distribución de los determinantes sociales de la salud, (Dahlin and Härkönen, 2013; Denton et al., 2004; Zajacova et al., 2017), especialmente por la sobrerrepresentación de las mujeres en los grupos con menores recursos sociales (Denton et al., 2004).

Sistema de género

Las causas profundas de las desigualdades de género en salud deben buscarse en el sistema de género vigente, que convierte las diferencias biológicas entre el hombre y la mujer en diferencias sociales basadas en la distribución de roles. Este sistema consiste en un conjunto de elementos que expresan una forma culturalmente específica de registrar y entender las diferencias y semejanzas entre hombres y mujeres, que incluye formas y patrones de relaciones sociales, prácticas

asociadas a la vida social cotidiana, símbolos, costumbres, identidades, vestimenta, tratamiento y ornamentación del cuerpo, creencias y argumentaciones, sentidos comunes, entre otros variados aspectos (Anderson, 2006).

Desde un enfoque clásico dentro de la teoría feminista, el género refiere a las relaciones de poder entre las personas en función de su sexo en todos los niveles sociales: interpersonal, institucional (en el gobierno y las instituciones del estado) y de las economías (Manandhar et al., 2018). De este modo, constituye (junto a la clase social y la etnia, con los que interactúa) un eje fundamental en el nivel macroeconómico de asignación y distribución de recursos dentro de una sociedad estratificada jerárquicamente (Gómez Gómez, 2002). Enfoques teóricos más recientes cuestionan el binarismo hombre/mujer como piedra angular sobre la que se construyen las diferencias culturales entre lo “masculino” y lo “femenino”, en la medida que deja por fuera la construcción de identidades no binarias (Sabsay, 2010). Dado que la información disponible en esta tesis solamente cuenta con la variable del sexo biológico, el análisis de género se limita a la relación entre hombres y mujeres y su impacto en la salud.

Género, división sexual del trabajo y ciudadanía

El sistema de género alcanza su máxima expresión en la división sexual del trabajo, que consiste en la organización de las actividades y el tiempo en función del sexo de las personas. Asigna a los hombres a la esfera de lo productivo y a las mujeres a la esfera reproductiva (Gary Becker, 1987). Esta división tiene implicancias muy

importantes en la definición de las posiciones que hombres y mujeres ocupan en la estructura social, por ejemplo, en el mercado laboral.

Como determinante histórica de la construcción social de la ciudadanía, la división sexual del trabajo ha implicado que el reconocimiento de los derechos políticos, civiles y sociales de las mujeres fuese posterior al de los hombres. La condición de ciudadano estaba reservada solamente a los hombres que eran quienes se desempeñaban en el ámbito de lo público (o en la esfera productiva) (Astelarra, 1992).

Por otra parte, la falta de reconocimiento del trabajo no remunerado por parte de los Estados de Bienestar ha contribuido a reforzar las limitaciones de la ciudadanía social de las mujeres, en la medida que los derechos y las políticas sociales se han centrado en aquellas personas que participan en el mercado de empleo (Orloff, 1993). En consecuencia, la población no asalariada se encuentra en una posición de mayor vulnerabilidad frente a riesgos como la enfermedad, la discapacidad, la dependencia, la insuficiencia de ingresos o la pobreza.

El rezago histórico de la ciudadanía de las mujeres con respecto a los hombres, tanto en Europa como en otras partes del mundo, tiene consecuencias persistentes hasta nuestros días. A pesar de la igualdad formal consagrada en la legislación, la igualdad efectiva entre hombres y mujeres es un desafío vigente en diversos planos de la realidad social. Los resultados del Índice de Igualdad de Género para la Unión Europea en 2021 (con datos de 2019 en su mayoría) evidencian que, a pesar de las mejoras alcanzadas en las últimas décadas en la región, aún persisten brechas de género en las áreas de trabajo y empleo,

salud, ingresos y riqueza, poder, violencia, tiempo y equilibrio entre la vida familiar y laboral (EIGE, 2021).

Trabajo remunerado versus trabajo no remunerado

En perspectiva histórica, la división sexual del trabajo ha ido perdiendo rigidez a lo largo del tiempo en casi toda Europa, en buena medida por el ingreso masivo y sostenido de las mujeres en el mercado de empleo, por razones asociadas a factores demográficos (Soares and Falcão, 2015). Sin embargo, estas transformaciones en la dimensión del trabajo remunerado no guardan relación con una efectiva redistribución de las actividades en el plano familiar, donde los cambios se producen a un ritmo mucho más lento y la corresponsabilidad entre hombres y mujeres es aún lejana (Beghini et al., 2019; Gromada et al., 2020).

La dificultad de conciliar la vida familiar y laboral afecta principalmente a las mujeres con dependientes en el hogar y migrantes (Barbieri et al., 2019). Esta realidad no solo deja en evidencia la vigencia de la división sexual del trabajo tradicional, sino también la persistencia de la falta de apoyo institucional a las familias en la provisión de servicios de cuidados (Tang and Cousins, 2005).

Con el trabajo remunerado como la principal fuente de ingresos para la mayoría de las familias e individuos, el aumento de la participación laboral de las mujeres es un objetivo estratégico en cualquier escenario prospectivo de desarrollo humano, especialmente en un mercado de empleo en constante cambio debido a fenómenos como la digitalización, la globalización y el cambio demográfico (European Commission, 2019). Sin embargo, el trabajo no remunerado y los

mandatos de género, especialmente aquellos relativos a la maternidad, continúan limitando las posibilidades de las mujeres de participar en el mercado de empleo. Así, en 2021, la ratio entre la tasa de participación de mujeres y hombres en la fuerza laboral (en porcentajes) para la UE fue de 82%, lo cual indica que, por cada 100 hombres ocupados, solamente hay 82 mujeres ocupadas, aun siendo la mayoría de la población en edad de trabajar (The World Bank, 2022). A su vez, para el mismo año, la proporción de mujeres empleada en la UE fue 12 puntos porcentuales menor que la masculina (47% contra 59%) (The World Bank, 2022). Como contrapartida, hay un 11,3% de mujeres cuidadores no remuneradas a tiempo completo frente a un 0,7% de hombres (Beghini et al., 2019).

También se observan diferencias de género considerables en la prevalencia del empleo a tiempo parcial, que en 2021 alcanzó al 29% de las mujeres con empleo en la UE, frente a un 8,0% de los hombres (Eurostat, 2022). En España, este guarismo fue de 13,7% con una brecha de 16 puntos porcentuales entre hombres (6%) y mujeres (22%), en tanto que en Suecia fue aún más alto: alcanzó al 20% con una brecha de 18 puntos porcentuales entre hombres (12%) y mujeres (30%) (Eurostat, 2022). Esta diferencia de género notable puede entenderse, en parte, como la respuesta de las mujeres a las dificultades de compatibilizar sus responsabilidades familiares y laborales, en su doble rol de cuidadoras y proveedoras de ingreso, en contextos en los que sus parejas masculinas tienen largas jornadas laborales (Artazcoz, 2021).

A su vez, las brechas salariales entre hombres y mujeres permanecen como un desafío difícil de solucionar. Boll and Lagemann (2019) señalan que, en Europa, en 2014, la brecha salarial de género entre países se situó en 14,2% en promedio, y se explica en parte por la afiliación sectorial de género y la alta proporción de empleos atípicos entre las mujeres.

Segregación ocupacional de género

La división sexual del trabajo no solo limita la participación de las mujeres en el mercado laboral, sino también las oportunidades de empleo propiamente dichas, ya que las restringe a una gama de “ocupaciones femeninas”, con frecuencia menos prestigiosas y expuestas a peores condiciones laborales (Menéndez et al., 2007). La segregación ocupacional de género ha marcado profundamente la calidad del empleo femenino; se destaca que las mujeres han estado históricamente fuera de las pautas del empleo estándar, y muchos de los aspectos actualmente vinculados a la precariedad laboral, como el trabajo temporal, ausencia o insuficiencia de protección social, bajos salarios, etcétera, han sido más bien la norma para el empleo femenino (Carrasquer-Oto and Torns-Martín, 2007).

Estudios recientes sugieren que la pandemia de la covid-19 ha profundizado las brechas de género preexistentes en algunos indicadores económicos relativos al mercado de empleo en algunos países. En este sentido, se ha señalado que las mujeres tienen un 24% más de probabilidades de perder permanentemente su trabajo que los hombres; esperan que sus ingresos laborales caigan un 50% más que los hombres, y, quizás debido a estas preocupaciones, tienden a reducir

su consumo actual y aumentar los ahorros (Dang and Viet Nguyen, 2021). Por otra parte, se ha destacado que, en comparación con las recesiones “regulares”, que afectan el empleo de los hombres más severamente que el de las mujeres, la caída del empleo relacionada con las medidas de distanciamiento social durante la pandemia tiene un gran impacto en los sectores de la economía con una alta proporción de empleo femenino. Además, el cierre de escuelas y guarderías ha aumentado enormemente las necesidades de cuidado infantil, lo que tiene un impacto particularmente grande en las madres trabajadoras (Alon et al., 2020). Sin embargo, más allá de estas consecuencias inmediatas de la crisis, existen fuerzas opuestas que podrían promover la igualdad de género en el mercado laboral. Una de ellas es la adopción de modalidades de trabajo flexibles por parte de las empresas, que probablemente persistirán y que facilitan la conciliación familia-trabajo. En segundo lugar, también hay muchos padres que ahora tienen que asumir la responsabilidad principal del cuidado de los niños, lo que puede erosionar las normas sociales que actualmente conducen a una distribución desigual del trabajo doméstico y de cuidado de los niños (Alon et al., 2020).

1.2. Empleo, trabajo y salud

a) Condiciones de empleo y trabajo

Demarcación conceptual

Las condiciones de empleo y trabajo tienen un peso clave para explicar la salud y el bienestar de trabajadores, familias y comunidades, debido a su importancia en la organización de la estructura social y

la definición de las condiciones de vida de la población (Benach et al., 2014). Desde la perspectiva de los determinantes sociales de la salud se busca superar el enfoque de los factores de riesgos laborales, centrado en el entorno inmediato de los trabajadores, para entender el empleo como un fenómeno histórico vinculado a las relaciones de poder entre empresarios y trabajadores, a las regulaciones del mercado de trabajo y al Estado de Bienestar (Benach and Muntaner, 2011).

Las condiciones de empleo y las condiciones de trabajo son dos conceptos interrelacionados pero que refieren a dimensiones distintas del trabajo remunerado. Las **condiciones de trabajo** refieren a las características del trabajo propiamente dichas dentro de las empresas. Estas condiciones incluyen aspectos como el entorno físico y químico, condiciones ergonómicas, factores psicosociales, la tecnología utilizada, etcétera. Un aspecto central de las condiciones de trabajo es la organización del trabajo, que incluye jerarquías y relaciones de poder, participación de los trabajadores en la toma de decisiones, la discriminación y el acoso laboral, entre otros aspectos. Así, la organización del trabajo determina las características del entorno psicosocial laboral, algunas de las cuales pueden ser riesgos para la salud de los trabajadores (Benach and Muntaner, 2011). Este aspecto reviste particular importancia para esta tesis y será desarrollado en profundidad más adelante.

Por otra parte, las **condiciones de empleo** pueden definirse a partir de dos elementos fundamentales (sin desmedro de otros) relacionados entre sí: las relaciones laborales, y la protección social laboral

(Benach and Muntaner, 2011). Las *relaciones laborales* se definen como las reglas (formales e informales) que rigen el vínculo y la interacción entre empleador y empleado (Köhler and Martín-Artiles, 2006). En las economías capitalistas, especialmente en los países industrializados, esta relación suele tener una dimensión individual y una colectiva. La primera se expresa a través de un contrato entre el empleador y el empleado, que estipula los derechos y las obligaciones a las que están sujetas ambas partes. De esta manera, el contrato contiene aspectos decisivos para la calidad del empleo, como el salario, las condiciones de trabajo (jornada, licencias, subsidios, etcétera) y el nivel de protección social con el que pueden contar los empleados.

Las relaciones laborales son asimétricas por definición, y en ellas los empleadores se encuentran siempre en una posición de ventaja relativa con respecto a los trabajadores. De aquí que su dimensión colectiva remite a la representación y la negociación colectiva de los trabajadores organizados.

Por otra parte, la *protección social* refiere fundamentalmente al conjunto de políticas sociales orientadas a asegurar el bienestar de la población trabajadora ante el retiro permanente o temporal del mercado de empleo. La mayoría de los estados disponen de regímenes de seguridad social y de un conjunto más o menos desarrollado de políticas sociales que buscan asegurar los ingresos y ciertos derechos sociales de la persona trabajadora que se jubila (régimen de pensiones) o tiene una baja temporal involuntaria (enfermedad, discapacidad, desempleo), o ante ciertos eventos o sucesos vitales

(maternidad/paternidad, duelo, entre otros) (Brunori and O'Reilly, 2010; Devereux and Sabates-Wheeler, 2004).

La protección social está consagrada en la legislación y en los convenios colectivos, en los que se estipulan los mínimos que deben ser garantizados por los empleadores y el Estado, y debidamente estipulados en los contratos de trabajo (Devereux and Sabates-Wheeler, 2004). Sin embargo, el nivel de protección social no es constante en el tiempo y puede cambiar a partir de la configuración de factores como el ciclo económico, la orientación política e ideológica de los gobiernos de turno, la capacidad de influencia de los sindicatos y organizaciones sociales conexas, entre otros (Brunori and O'Reilly, 2010). La experiencia histórica en Europa muestra que se suceden períodos de mayor expansión y profundidad de la cobertura de la protección social y los derechos laborales, con otros períodos marcados por su retracción y disminución generalmente en el marco de políticas macroeconómicas de austeridad fiscal (Gómez-Allende, 2002).

Esta distinción entre condiciones de trabajo y empleo es teóricamente relevante porque implica que ambas dimensiones se encuentran en diferentes niveles en la cadena causal que acaba afectando la salud y el bienestar, donde las primeras anteceden y determinan las segundas (Benach and Muntaner, 2011). De esta manera, es esperable que la precarización de las condiciones de empleo impacte negativamente sobre las condiciones de trabajo, como parte de un proceso generalizado de deterioro de las relaciones laborales (Benach et al., 2014).

Contexto actual del empleo en Europa

El trabajo moderno está en permanente cambio debido a la creciente globalización, el libre mercado y el desarrollo de las tecnologías de la información y la comunicación, así como cambios demográficos notables que disminuyen la población económicamente activa (EU-OSHA, 2008; Kompier, 2006).

Aunque con grandes diferencias entre países, el período comprendido entre las décadas de 1950 y 1970 se caracterizó por la expansión del Estado de Bienestar, la regulación de las relaciones laborales y el fortalecimiento de los sindicatos, entre otros factores, que generaron el marco propicio para unas condiciones de empleo de alta calidad, relativamente generalizadas a todos los sectores y categorías ocupacionales. De esta manera, se consolidó un mercado laboral basado en la negociación salarial centralizada y a largo plazo, jornadas laborales completas y estabilidad en el puesto de trabajo.

Sin embargo, este modelo de relaciones laborales empezó a transformarse a partir mediados de 1970 como resultado de la crisis del modelo fordista de producción, (Buchholz et al, 2009). Las élites empresariales y políticas respondieron a la crisis pasando del keynesianismo a políticas económicas neoliberales, incluyendo la desregulación de las relaciones laborales, cambios en la organización del trabajo, recortes en las políticas sociales y pérdida de influencia de las organizaciones sindicales. A partir de ese momento comenzó en Europa un proceso de degradación de las condiciones de empleo que permanece hasta el presente, en el que emergen problemáticas como

la flexibilidad, la precariedad laboral, la informalidad y el alto desempleo (Buchholz et al., 2009).

La crisis económica y social de 2008 profundizó la orientación neoliberal de la política macroeconómica global y con ella la tendencia desreguladora y flexibilizadora de las relaciones laborales. De este modo, las condiciones de austeridad fiscal han erosionado aún más los niveles de protección social y laboral, y las reformas laborales han provocado despidos masivos y una disminución de la protección del empleo (Miguélez and Prieto, 2009; Verd and López-Andreu, 2012).

Actualmente, la realidad del empleo en Europa muestra importantes desafíos con relación a la calidad de las relaciones laborales y las condiciones de trabajo, a lo que se suma la problemática del desempleo como fenómeno estructural en varios países. De acuerdo con Eurostat, el porcentaje de trabajadores con empleos temporales en 2021 fue del 14% del total de trabajadores de 15 a 64 años de los 27 países de la UE: 13,5% es para los hombres y 15% para las mujeres (Eurostat, 2022).

Este panorama llama la atención por la tendencia decreciente de las formas de empleo estándar (es decir, aquellos trabajos que cumplen la doble condición de ser por tiempo indefinido y a tiempo completo), que si bien siguen siendo los más frecuentes en toda la UE (a excepción de los Países Bajos), han caído del 62% al 59% entre 2006 y 2016 a favor de tipos de trabajo más flexibles (Broughton, 2016). La Comisión Europea advierte que, de continuar esta tendencia, podría suceder que los contratos estándar se apliquen a una minoría de trabajadores durante la próxima década, precarizando las condiciones

de empleo y trabajo de la mayoría de la fuerza laboral europea (Broughton, 2016).

b) La precariedad laboral en la investigación: conceptos y aproximaciones empíricas

El fenómeno de la precariedad laboral es socialmente reconocido como uno de los rasgos más característicos del proceso de degradación de las relaciones laborales y las condiciones de empleo, ampliamente extendido en las últimas décadas en países que previamente habían alcanzado altos estándares al respecto, principalmente en Europa (Benach et al., 2014).

Como una primera aproximación, el empleo precario debe entenderse como un continuo en las condiciones de empleo que van desde quienes, en un extremo, disponen de un contrato de trabajo estable y a tiempo completo, todo el año, bien remunerado y ajustado a la protección social, hasta quienes poseen un alto grado de precariedad en los distintos aspectos de la relación laboral, en el otro extremo (Julià et al., 2017b). Desde este enfoque, a menudo se recurre a la noción de “precarización” para designar un fenómeno generalizado de inseguridad laboral, con ingresos insuficientes y falta de derechos y protección social, que es transversal a todas las categorías ocupacionales y sectores de la economía (Ervasti and Virtanen, 2019).

Así pues, la precarización del empleo constituye un rasgo estructural de los mercados de empleo actuales que, si bien es más prevalente en los empleos menos cualificados y más desprotegidos, afecta tanto a trabajadores temporales como a quienes tienen contratos

permanentes (Julià et al., 2017b). En ese sentido, se ha señalado que el empleo llamado “estándar” también presenta riesgos de precariedad que se asocian a salarios bajos, mayor pobreza (*in-work poverty*) y malas condiciones laborales en algunos sectores y ocupaciones, como en el caso de la restauración, personal de ventas, operadores de maquinaria de planta, trabajadores de la minería, construcción y manufactura y aquellos involucrados en la preparación de alimentos (Broughton, 2016).

De todo lo anterior se desprende que la precariedad laboral constituye un fenómeno complejo y multidimensional cuyo análisis exige precisión en su delimitación. Aunque no existe aún una definición estandarizada a nivel internacional de la precariedad laboral, los desarrollos conceptuales y empíricos realizados desde principios de los años 1980 confluyen hacia un consenso en designar con este término a un proceso generalizado de pérdida de calidad del empleo y vulneración de derechos laborales y sociales, ampliamente extendido en el mercado de empleo (Barbier, 2005).

A partir de entonces se han desarrollado distintas aproximaciones empíricas de la precariedad laboral, que pueden dividirse en dos grandes grupos en función de cómo definen y cómo miden el fenómeno: de tipo unidimensional y multidimensional. Las primeras incluyen principalmente la temporalidad y la inseguridad laboral. La temporalidad hace referencia a vínculos laborales provisionales, es decir, que no son permanentes y que carecen de estabilidad a largo plazo. Adopta una gran variedad de formas legales entre distintos países y

dentro de ellos, por lo que no se trata de una situación contractual homogénea (Bardasi and Francesconi, 2004; Ferrie et al., 2008).

Por otra parte, la inseguridad laboral remite a la incertidumbre sobre la continuidad laboral. Los enfoques sobre la inseguridad laboral han variado a lo largo del tiempo, y en la actualidad hay un amplio predominio en la literatura de una aproximación basada en la percepción subjetiva de la pérdida involuntaria de la ocupación (Sverke et al., 2002; De Cuyper and De Witte, 2007). Esta percepción se puede originar en base a factores objetivos que amenazan la continuidad laboral o a partir de la interpretación individual de elementos contextuales, como la crisis económica, el aumento del desempleo, los recortes de plantilla, entre otros (Greenhalgh and Rosenblatt, 1984).

Varios enfoques críticos con las aproximaciones unidimensionales han señalado que los resultados son poco consistentes entre sí, a menudo contradictorios, y que además no permiten comprender los mecanismos de tipo estructural que relacionan la precariedad laboral con la salud (Benach et al., 2002). Las limitaciones de estos enfoques inspiraron el desarrollo de medidas multidimensionales de la precariedad laboral basadas en indicadores objetivos y que buscan captar con mayor precisión la heterogeneidad y amplitud de características de las distintas situaciones sociolaborales (Kreshpaj et al., 2020).

Al economista británico Gerald Rodgers se le atribuye una de las definiciones multidimensionales más influyente en la literatura, según la cual el empleo precario se define en función de dimensiones como la inseguridad, la flexibilidad, la incertidumbre crónica y la vulnerabilidad (Rodgers, 1989). Además de esta aproximación, se han

identificado otras principalmente basadas en combinaciones de distintos aspectos de la inseguridad laboral y el tipo de contrato, que han sido reseñadas exhaustivamente por Julià (2016) y Kreshpaj et al. (2020).

A los efectos de esta tesis, la *precariedad laboral* se define como un constructo multidimensional que comprende aspectos tales como la inseguridad del empleo, relaciones de negociación individualizadas entre los trabajadores y los empresarios, bajos salarios y privaciones económicas, derechos laborales y protección social limitados y falta de poder para ejercer los derechos laborales legalmente consagrados (Amable, 2009; Vives et al., 2010; Kreshpaj et al., 2020). La Escala de Precariedad Laboral (EPRES por su sigla en inglés) y el “Swedish Register-based Operationalization of Precarious Employment (SWE-ROPE)” (Jonsson et al., 2021) son los dos instrumentos de medición de la precariedad laboral que se utilizan en esta tesis, y que se desarrollarán en detalle en el capítulo 4 dedicado a la metodología.

La asociación entre la precariedad laboral y la salud

La preocupación sobre el impacto de la precariedad laboral en la salud es de larga data (Amable and Benach, 2000), con una prolífica acumulación empírica y conceptual en el campo epidemiológico, que ha llevado a su reconocimiento como un determinante social de la salud de primer orden (Tompa et al., 2007; Benach et al., 2014). A su vez, son muy diversos los resultados en la salud física, mental y la salud autopercebida cuya relación con la precariedad laboral ha sido estudiada en la literatura. Dado el volumen de estudios previos, se

tomarán como antecedentes directos de esta tesis solamente aquellos estudios que se centran en la salud mental de los trabajadores, que es uno de los dos resultados de salud de interés. El otro resultado de salud en el que se hace foco es el estrés crónico; sin embargo, no se encontraron antecedentes que lo relacionen la precariedad laboral multidimensional.

Una revisión sistemática reciente ha encontrado varios estudios que relacionan la precariedad laboral con diversos resultados de salud mental (Rönnblad et al., 2019). A partir del enfoque unidimensional, se ha observado que la inseguridad laboral se asocia con la ansiedad y la depresión (tanto síntomas como trastornos) (Hammarström et al., 2011a), la angustia psicológica (Bültmann et al., 2002; Johannessen et al., 2013), la mala salud mental (Burgard et al., 2009) y el uso de drogas psicotrópicas (Lassalle et al., 2015). También se encontró que el empleo temporal se asocia con el ausentismo laboral debido a la depresión (Ervasti et al., 2014), los síntomas depresivos y el malestar psicológico (Hammarström et al., 2011; Quesnel-Vallée et al., 2010), entre otros resultados.

En lo que refiere a los enfoques multidimensionales de la precariedad laboral, los estudios con la escala EPRES han mostrado asociaciones con una mala salud mental en España y Cataluña (Benach et al., 2015; Julià et al., 2017; Vives et al., 2013) y en Europa (Padrosa et al., 2020; Padrosa and Julià, 2020; Méndez Rivero et al., 2021). Además, estudios en Chile también muestran una asociación con el uso de la medicación, la insatisfacción y el absentismo laboral (Vives-Vergara et al., 2017a). En Suecia también se ha encontrado que la precariedad

laboral se asocia con una peor salud mental (Jonsson et al., 2021a), y en base al SWE-ROPE se encontraron asociaciones con trastornos mentales comunes (depresión, ansiedad y trastornos relacionados con el estrés), trastornos por consumo de sustancias e intentos de suicidio (Jonsson et al., 2021d)

Desde otros enfoques multidimensionales se encontró que los síntomas depresivos y el malestar psicológico se asociaron con la combinación del empleo temporal y un bajo nivel educativo (Hammarström et al., 2011). Otro estudio observó una asociación entre el malestar psicológico y el empleo precario definido en función de la inseguridad laboral autopercebida, el tipo de contrato y el desempleo (Canivet et al., 2016). También se encontró relación entre el malestar psicológico y el efecto combinado de la inseguridad laboral y el empleo temporal (Virtanen et al., 2011). Otro estudio utilizó una versión ampliada del modelo núcleo-periferia de Aronsson et al. (2000) para construir una medida acumulativa de la posición periférica en el mercado laboral (“puntuación de empleo periférico”) como proxy de precariedad laboral, que indica que cuanto más precario es el empleo, más se aleja del núcleo compuesto por aquellos empleos con contratos permanentes. Se encontró que los trabajadores con mayor puntuación de empleo periférico tienen una mayor probabilidad de sufrir depresión (tanto hombres como mujeres), en comparación con los de menor puntuación (Waenerlund et al., 2011). Por último, se encontró una probabilidad más alta en el uso de medicamentos psicotrópicos recetados para aquellos individuos con un historial de desempleo prolongado que señalan tener inseguridad laboral (Waenerlund et al., 2011).

c) Precariedad laboral y salud: el entorno psicosocial laboral como mecanismo causal

A pesar de la creciente evidencia sobre el impacto de la precariedad laboral en la salud física y mental de los trabajadores, los mecanismos y vías causales a través de los cuales ocurre este proceso no han sido suficientemente explorados (Rönnblad et al., 2019; Kreshpaj et al., 2020a).

Las transformaciones de las condiciones de empleo están estrechamente vinculadas con la organización del trabajo, donde emergen nuevos retos en el ámbito de la salud y seguridad en el trabajo, como los riesgos psicosociales laborales (EU-OSHA, 2007; Murphy, 2002). Así, algunos marcos conceptuales señalan al entorno psicosocial laboral como posible correa de transmisión entre la precariedad laboral y la mala salud mental. Tal premisa constituye el foco principal de esta tesis, en la que se propone explorar el entorno psicosocial laboral como un posible mecanismo causal entre el empleo precario y (i) el estrés crónico y (ii) la salud mental.

Por un lado, desde la perspectiva de los determinantes sociales de la salud, se ha señalado que la precariedad laboral expone a los individuos a situaciones de estrés por medio de tres vías causales principales: la incertidumbre y la inseguridad, el deterioro de las condiciones de vida, y el empeoramiento de las condiciones de trabajo, incluido el entorno psicosocial. (Figura 2) (Bolibar et al., 2021).

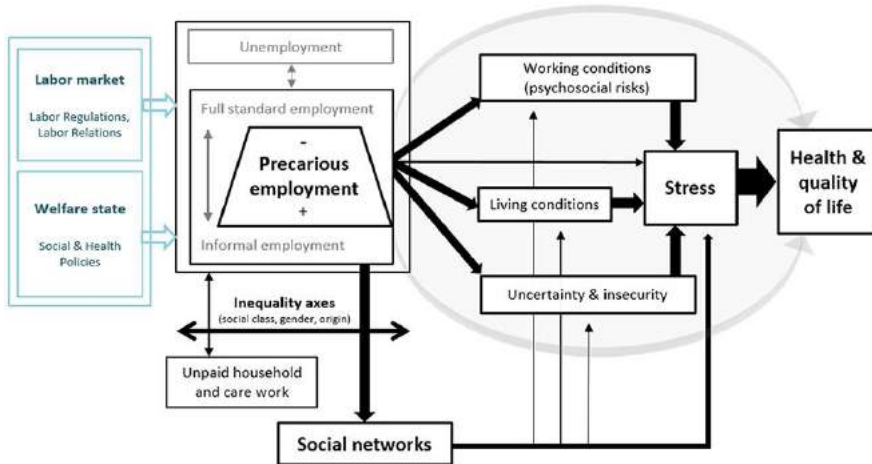


Figura 2. Modelo conceptual que vincula el empleo precario con el estrés, la salud y la calidad de vida (se muestran las principales vías causales; el aumento del grosor de la flecha indica una mayor importancia). (Bolibar et al., 2021).

Por otro lado, desde la epidemiología psicosocial, se ha sugerido que los factores psicosociales podrían considerarse como influencias que actúan principalmente entre el nivel social y el individual en dos sentidos posibles: mediando los efectos de los factores sociales estructurales (niveles macro y meso) en los resultados de salud individuales (nivel micro), o condicionados y modificados por las estructuras sociales y los contextos en los que se desarrollan (Figura 3) (Martikainen et al., 2002; Rugulies, 2012).

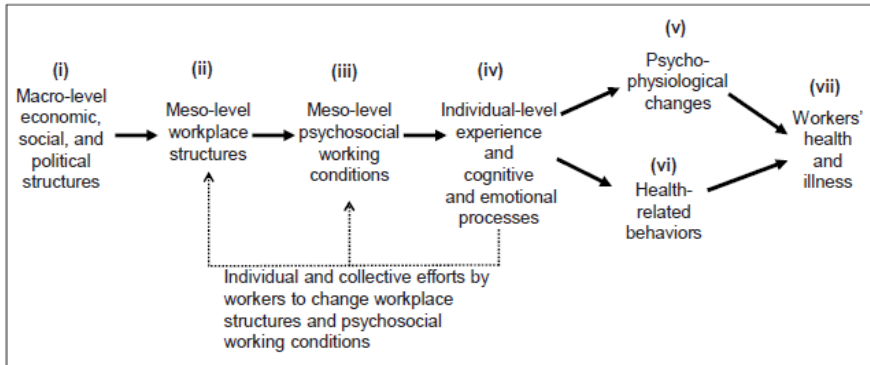


Figura 3. Marco conceptual para la investigación sobre el entorno psicosocial laboral y la salud. (Rugulies, 2019)

En este marco, el entorno psicosocial laboral se define como un paso intermedio en un camino causal que vincula las estructuras económicas, sociales y políticas con la salud y la enfermedad a través de procesos psicológicos y psicofisiológicos. Así, la respuesta biológica al entorno psicosocial laboral supone que puede ser incorporado al cuerpo ("embodied"), alterando sus cogniciones, emociones, comportamiento y fisiología (Rugulies, 2019). Más adelante se profundizará en la noción de "embodiment", las implicancias metodológicas de su medición y el alcance que tiene dentro de los estudios que componen esta tesis.

Definiciones de entorno psicosocial laboral

Aunque el reconocimiento social y político de los factores psicosociales laborales como riesgos emergentes significativos es relativamente reciente (Murphy, 2002), la preocupación por las consecuencias del entorno psicosocial de trabajo sobre la salud de los trabajadores en la investigación ocupacional se remonta a la década de los sesenta del siglo pasado, con los estudios pioneros de French y Kahn sobre el estrés laboral. Desde entonces, el concepto de *entorno*

psicosocial laboral ha ido evolucionando para definir la interacción entre las cogniciones, las emociones y los comportamientos de una persona y su entorno laboral (Johannes Siegrist, 1996).

Los riesgos para la salud asociados al entorno psicosocial se denominan comúnmente *factores de riesgo psicosociales* y han sido definidos como “las interacciones entre el contenido, la gestión y la organización del trabajo y otras condiciones ambientales y organizativas, por un lado, y las competencias y necesidades de los trabajadores, por otro, que ejercen una influencia negativa sobre su salud a través de sus percepciones y experiencias” (ILO, 1986). Más recientemente han sido definidos de manera más sintética como “los aspectos del diseño y la gestión del trabajo, así como sus contextos sociales y organizativos, que tienen potencial para causar daños psicológicos o físicos” (Cox and Griffiths, 2005).

Modelos de riesgo psicosocial laboral

Se han desarrollado varios modelos teóricos para la medición de los riesgos psicosociales, que originalmente surgieron como herramientas para evaluar el estrés laboral relacionado al entorno de trabajo, para luego ser aplicados a diversos resultados de salud tanto física como mental. Uno de los trabajos pioneros es el ya mencionado modelo procesual de la escuela de Michigan (modelo del ambiente social) que propone que el estrés es el resultado final de un proceso en el que intervienen cuatro elementos fundamentales: las condiciones físicas y sociales objetivas, la percepción subjetiva del contexto objetivo, el repertorio de respuestas del trabajador, las consecuencias en la salud física y mental (French and Kahn, 1962). Este modelo

continúa siendo una referencia en la psicología laboral y ha influido notoriamente en trabajos posteriores. No obstante, dos modelos han sido los más utilizados. Por un lado, el modelo “Desequilibrio Esfuerzo-Recompensa” (ERI, por su sigla en inglés), desarrollado por Siegrist, plantea que el desequilibrio entre el esfuerzo personal y la recompensa obtenida (es decir, una situación de altos costos y baja ganancia) tiende a generar un estado de angustia emocional relacionado con el estrés (J. Siegrist, 1996).

Por otro lado, el modelo de “Demanda-Control-Apoyo social”, desarrollado inicialmente por Karasek ha sido el más influyente en la literatura y es el que se ha tomado como referencia para los estudios que forman parte de esta tesis (Karasek, 1979). A continuación, se desarrollan sus principales postulados.

Muntaner y Ocampo (1993) han identificado como antecedentes inmediatos del modelo de Karasek las investigaciones de Gardell sobre la organización psicosocial del trabajo (carga de trabajo, autonomía, participación) y el estrés en Suecia (Frankenhaeuser and Gardell, 2010; Gardell, 2016), y el trabajo de Kohn y Schooler sobre las características de trabajo (complejidad, rutinización, cercanía de la supervisión) y el funcionamiento psicológico (autodirección) en los Estados Unidos (Kohn and Schooler, 1973). Ambos programas de investigación mostraron los efectos de las demandas y el control sobre el estrés por separado que Karasek sintetiza en un mismo modelo.

La dimensión de las *demandas psicológicas* refiere a aspectos tales como la rapidez y la intensidad con que el trabajador debe realizar las tareas, la naturaleza agitada del trabajo, la disponibilidad de tiempo

suficiente para realizar las tareas, la proporción de trabajo realizado bajo presión por cumplir con ciertos tiempos, la cantidad de trabajo, el nivel de concentración requerido, la presencia de demandas conflictivas y la frecuencia con la que se interrumpen las tareas o se ralentiza el trabajo al tener que esperar a otros (Karasek, 1979).

Por su parte, la dimensión de *control* tiene dos componentes principales: por un lado, la amplitud de las habilidades que se pueden utilizar en el trabajo (el grado en que el trabajo implica aprender cosas nuevas, repetitividad, creatividad, tareas variadas y desarrollo de las habilidades especiales del individuo). Por otro lado, la capacidad de decisión (o autoridad) del individuo sobre su propio trabajo, de influir en el grupo de trabajo e influir en la política de la empresa).

Concretamente, el modelo “Demanda-Control” parte de la premisa de que hay distintas combinaciones posibles de altas y bajas demandas con alto y bajo control que puede devenir en situaciones de estrés para el trabajador. Formulaciones posteriores incorporaron la insuficiencia del apoyo a los trabajadores por parte de superiores y colegas como una dimensión que puede moderar (tanto aumentando como disminuyendo) el efecto del desacople entre las demandas y el control (Theorell et al., 1990). La figura 4 ilustra este modelo.

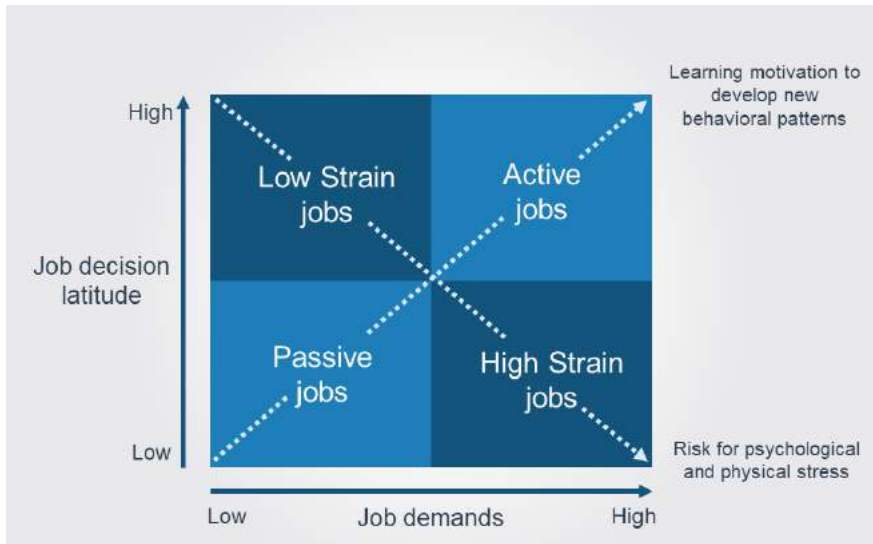


Figura 4. Modelo de Demanda-Control. (Basado en Karasek, 1979)

Más recientemente se ha desarrollado el “Copenhaguen Psychosocial Questionnaire” (COPSOQ), un instrumento internacional de origen danés utilizado para la investigación, la evaluación y la prevención de los riesgos psicosociales (Kristensen et al., 2005), que ha sido validado en varios países, incluido también España (Moncada et al., 2014). Este cuestionario está basado en la teoría general del estrés e integra elementos conceptuales de los distintos modelos de riesgo psicosocial como son el Demanda-Control-Apoyo Social y el ERI, así como también otras aportaciones relevantes sobre el trabajo emocional (Zapf and Holz, 2007) y la inseguridad laboral (Ferrie, 2001). Desde su primera versión publicada en 2005, el COPSOQ ha sido modificado en dos oportunidades, la última en 2019 cuando se consensuó una tercera versión que contiene 140 ítems (versión larga) distribuidos en 45 dimensiones (algunas contienen un solo ítem) agrupadas en 8 dominios: demandas en el trabajo, organización laboral y contenido del trabajo, relaciones interpersonales y liderazgo,

interacción individuo-trabajo, capital social, conflictos y comportamientos ofensivos, salud, y características de la personalidad (Burr et al., 2019).

Un aspecto destacable de este instrumento es que incluye el conflicto entre la vida familiar y laboral (conflicto familia-trabajo) como un factor de riesgo psicosocial. Aunque esta dimensión no fue incluida en los modelos tradicionales, el conflicto familia-trabajo ha sido destacado por la literatura como un factor de estrés psicológico relevante para la vida laboral contemporánea, que ha ido en aumento entre los trabajadores en la mayoría de los sectores económicos (Lewis and Cooper, 2005; Kinman and Jones, 2008). Se trata de una forma de conflicto entre roles en el que el cumplimiento de las demandas del rol que emana del ámbito laboral interfiere con el cumplimiento de las demandas del rol existentes en el ámbito doméstico o en las actividades de ocio (Greenhaus and Beutell, 1985). Dado que la distribución de estos roles viene determinada por la división sexual del trabajo, el conflicto trabajo-familia no es neutral a las relaciones de género. Por el contrario, podría expresar el impacto diferencial del estrés psicológico entre hombres y mujeres, atribuible a las dificultades de conciliar el trabajo remunerado con el trabajo doméstico y de cuidados.

Los modelos de riesgos psicosociales han recibido críticas a causa de restringirse a las características más inmediatas del entorno de trabajo sin incluir dimensiones del nivel social (Muntaner and O'Campo, 1993; Rugulies, 2019). Es decir, dado que el entorno psicosocial laboral se halla estrechamente vinculado a las condiciones de empleo,

es esperable que condiciones de empleo precarias generen entornos psicosociales también precarios y en consecuencia mayores riesgos para la salud. Sin embargo, los modelos de riesgos psicosociales tradicionales no han logrado captar suficientemente esta relación. Los marcos conceptuales desarrollados en el apartado anterior resultan especialmente útiles a estos efectos, dado que plantean una probable relación causal entre la precariedad laboral y el entorno psicosocial como dos fenómenos distinguibles entre sí que se corresponden con diferentes niveles de la esfera laboral. El primero remite a las condiciones de empleo y el segundo a las condiciones de trabajo. No obstante, son muy escasos los estudios que contrastan estos postulados teóricos con la evidencia empírica, un vacío de conocimiento que esta tesis se propone contribuir a llenar.

1.3. *Embodiment* de la precariedad laboral: el estrés laboral como resultado de salud

Como se señaló anteriormente, desde la perspectiva ecosocial se argumenta que los humanos somos a la vez seres sociales y organismos biológicos, por lo que el cuerpo es capaz de incorporar biológicamente las condiciones sociales de vida. Así, el *embodiment* de estas condiciones refiere a "la transformación temporal de las características corporales como consecuencia de los términos de participación de los seres humanos en su mundo" (Krieger, 2005).

A los efectos de esta tesis es relevante analizar en qué medida el empleo precario y el entorno psicosocial laboral pueden expresarse biológicamente, particularmente a través del estrés crónico como un

resultado de salud estrechamente ligado a las condiciones laborales, que ha sido ampliamente reconocido como un reto importante para la salud y seguridad en el trabajo (EU-OSHA, 2008),

En los trabajos pioneros de Hans Selye el estrés fue definido como una alteración en el equilibrio del organismo causada por la acción de un agente externo o interno; el organismo reacciona de manera extraordinaria ante esta alteración para restaurar su equilibrio (Selye, 1950). Posteriormente, Lazarus y Folkman lo definieron como los esfuerzos cognitivos y conductuales constantemente cambiantes, desarrollados para manejar las demandas específicas externas y/o internas que son evaluadas como excedentes o desbordantes de los recursos de los individuos (Richard S. Lazarus and Susan Folkman, 1984).

Desde entonces, estos enfoques clásicos han sido adaptados a los distintos campos de la investigación sanitaria. En el ámbito de la salud ocupacional, concretamente, se ha definido como la respuesta individual ante ciertas demandas y presiones en el trabajo que no se corresponden con los conocimientos y habilidades del individuo, y que ponen en peligro su capacidad de resistencia (Leka et al., 2003).

Desde el enfoque del *embodiment* podría entenderse el estrés laboral como la incorporación biológica de un entorno psicosocial riesgoso vinculado a condiciones de empleo precarias. Esto implica que la vivencia de la precariedad laboral y del entorno psicosocial no requiere necesariamente un proceso consciente, sino que podrían ser asimilados por el organismo pasando por alto la conciencia del individuo (Krieger, 2005b; Rugulies, 2019). De esta manera, el foco debe

ponerse en la respuesta fisiológica del organismo ante entornos psicosociales estresantes.

a) La respuesta fisiológica al estrés

Fisiológicamente, el estrés activa dos ejes fundamentales, el eje hipotálamo-pituitario-adrenal (HPA) y el eje simpaticomedulo-adrenal (SMA). Estos dos ejes actúan a través de vías separadas, uno a través de la hipercortisolemia y el otro a través de citocinas y reacciones inflamatorias. La hipercortisolemia, implica aumentos en los niveles de cortisol, lo que lo ha convertido en un biomarcador de estrés ampliamente utilizado a través de diversos medios biológicos como el suero sanguíneo, la saliva y la orina (Thayer et al., 2010; Nater et al., 2013).

Sin embargo, varios estudios basados en cortisol sérico o salival como biomarcadores de estrés crónico muestran resultados contradictorios y con alta variabilidad (Chandola et al., 2008). Es probable que los factores estresantes relacionados con el trabajo tengan efectos a largo plazo, y la representación precisa de los niveles de estrés sea más difícil con estas técnicas dado que sufren de baja resolución temporal a largo plazo (Rankin et al., 2012).

Para estudiar el estrés crónico, en cambio, el medio que ha ganado mayor consenso científico es la extracción de cortisol del cabello humano, ya que puede proporcionar información valiosa sobre la exposición al estrés en un periodo de tiempo que puede ser de hasta meses de duración (Staufenbiel et al., 2013; Lee et al., 2015). Dado que la tasa de crecimiento del cabello es de aproximadamente 1 (un)

centímetro al mes, y que las hormonas son transportadas de la circulación sanguínea a los folículos pilosos, este método hace posible un examen retrospectivo de los niveles de cortisol, permitiendo el establecimiento de un nivel basal y de la consideración de posibles eventos de estrés que han ocurrido durante este período (Staufenbiel et al., 2013)

En la literatura abundan los estudios que utilizan cortisol como biomarcador de estrés crónico, aplicado a diversos estresores. Con respecto a las condiciones laborales en particular, se encontró que el trabajo por turnos está asociado con un aumento de los niveles de cortisol en el cabello y obesidad abdominal, que es un efecto tisular típico del cortisol (Manenschijn et al., 2011). La alteración del patrón de sueño y la alteración del ritmo circadiano asociado a la secreción de cortisol aumentan el estrés potencial del trabajo por turnos (Dhande and Sharma, 2011) y conducen a niveles crónicos elevados de cortisol que producen efectos adversos para la salud. El desempleo, que también es un factor de estrés destacado por su relación con la tensión financiera y los problemas psicológicos que se derivan de ella, también se ha asociado con una mayor concentración de cortisol en el cabello (Dettenborn et al., 2010). Los estudios con el modelo ERI muestran una asociación con la inseguridad laboral y niveles más altos de concentración de cortisol en el cabello (Herr et al., 2017) y sugieren asociaciones prospectivas entre ERI y cortisol (Penz et al., 2019). Sin embargo, hasta donde sabemos, no existen estudios sobre la relación entre la precariedad laboral multidimensional y el cortisol capilar.

Por otro lado, el uso de cortisol capilar como biomarcador del estrés crónico ha arrojado también resultados contradictorios. Mientras que algunos estudios encontraron una correlación positiva entre los niveles de cortisol en el cabello y las medidas subjetivas de estrés crónico (Kalra et al., 2007), otros encontraron una correlación pobre o incluso inexistente (Kramer et al., 2009; Dettenborn et al., 2010; Karlén et al., 2011) Esta mala correlación puede deberse en parte al efecto potencial de factores confusores como la edad y el índice de masa corporal (Manenschijn et al., 2011; Stalder et al., 2012; Chan et al., 2014; Stalder et al., 2017). En esta tesis se utilizan marcadores adicionales para evaluar la producción de esteroides del eje HPA, que se detallan con precisión en el capítulo cuatro, en la sección destinada a las medidas de salud.

2. JUSTIFICACIÓN

Debido a la centralidad del empleo y el trabajo en la organización de la estructura social y la definición de las condiciones de vida de una población, las condiciones en que se desarrollan tienen un peso clave para explicar la salud y el bienestar de trabajadores, familias y comunidades (Benach et al., 2014).

En los últimos 50 años se ha producido un deterioro generalizado de la calidad del empleo en Europa y otras partes del mundo que previamente habían alcanzado altos estándares de calidad de empleo para vastos sectores de la fuerza laboral (aunque con exclusiones) (Dooley et al., 1996). Este deterioro se expresa en problemáticas como la temporalidad, la inseguridad y el desempleo estructural, ampliamente desarrollados en la literatura en las últimas décadas. En este contexto, desde la epidemiología social y la salud ocupacional se ha puesto de manifiesto el notable impacto de la precariedad laboral sobre la salud física y mental de la población trabajadora (Kreshpaj et al., 2020), que ha llevado a su reconocimiento como un importante determinante social de la salud (Benach et al., 2014; Quinlan et al., 2001)

Sin embargo, a pesar de los crecientes avances conceptuales, metodológicos y empíricos sobre este fenómeno, aún persisten vacíos de conocimiento por llenar, algunos de los cuales esta tesis se ha propuesto abordar.

En primer lugar, cabe destacar que la mayoría de los resultados en salud que se han relacionado con la precariedad laboral multidimensional se han medido a través de indicadores autorreportados y recientemente, a partir de registros hospitalarios (Kreshpaj et al., 2020).

Esta tesis se propone innovar al respecto, analizando la relación de la precariedad laboral con marcadores biológicos de salud (particularmente del estrés crónico). Esto permite plantear hipótesis sobre la relación entre la precariedad laboral y la salud que no son posibles con medidas autorreportadas. Por ejemplo, la hipótesis del *embodiment* de la precariedad laboral requiere necesariamente el uso de indicadores biológicos para su evaluación porque hace referencia a la transformación temporal de las características corporales (fisiológicas, concretamente) en un período de tiempo, como consecuencia de los términos y las condiciones en que los individuos están insertos en el mercado de empleo y desarrollan su trabajo (Krieger, 2005).

En segundo lugar, además de constatar el impacto de la precariedad laboral en la salud una tarea fundamental de la investigación científica en esta área es ofrecer explicaciones a cerca de por qué y cómo se da esta relación. Un paso importante en este sentido es evidenciar los mecanismos causales que subyacen tras ella y así comprender mejor la manera en que se produce. Sin embargo, hasta el momento no se ha profundizado demasiado al respecto, más allá de algunos marcos conceptuales que sugieren diversos mecanismos causales posibles, entre ellos el entorno psicosocial laboral. Este último es un destacado factor de riesgo para la salud, tanto física como mental, ampliamente reconocido en la literatura epidemiológica, que ha sido estudiado a partir de diversos modelos de riesgos psicosociales, tal como se señaló en el capítulo anterior. Así, tomando estas referencias como punto de partida, esta tesis se propone indagar empíricamente en el posible papel mediador de los riesgos psicosociales laborales en la relación entre la precariedad laboral y la salud de los trabajadores.

Finalmente, las diferencias entre hombres y mujeres en el impacto de la precariedad laboral sobre la salud a menudo aparecen soslayadas. Aunque se ha constatado que las mujeres están más expuestas a la precariedad laboral y tienen peores resultados de salud que los hombres, son muy pocos los estudios que estratifican el análisis por sexo, y menos aún los que incorporan variables relativas a la división sexual del trabajo, como la composición familiar o el estado civil (Valero et al., 2021). Por esta razón, en esta tesis se ha buscado incorporar la perspectiva de género estratificando todos los análisis estadísticos por sexo con el objetivo de identificar diferencias entre hombres y mujeres tanto en la asociación entre la precariedad laboral y la salud como en el efecto mediador del entorno psicosocial en ella. La persistencia de la división sexual del trabajo tradicional en los hogares y de la segregación ocupacional de género (vertical y horizontal) en los mercados de trabajo europeos (Menéndez et al., 2007) hace suponer que el efecto mediador de los riesgos psicosociales no será igual para hombres y mujeres. En otras palabras, las dificultades de conciliación entre la familia y el trabajo, así como la inserción en puestos de trabajo de peor calidad podría llevar a que las mujeres se vieran más afectadas que los hombres por las condiciones inmediatas y cotidianas en las que realizan su trabajo, incluido el entorno psicosocial. Considerar estas especificidades en el análisis aporta elementos novedosos para comprender mejor la dinámica social del impacto de la precariedad laboral sobre la salud.

Por otra parte, cabe destacar que esta tesis está motivada también por la pertinencia social de profundizar en el conocimiento de una problemática cada vez más acuciante para vastos sectores de la

ciudadanía, especialmente jóvenes, mujeres, inmigrantes y las clases sociales más empobrecidas. Mejorar la comprensión pública de los procesos por los cuales la precariedad laboral constituye un riesgo para la salud tiene importantes implicancias para varios sectores de la política pública, como son la atención sanitaria, el empleo y el trabajo y la seguridad social, entre otros. Con esta tesis se aspira a contribuir a la acumulación de un mejor conocimiento científico, con un enfoque crítico y un sentido político, que pueda ayudar a mejorar las condiciones de empleo y trabajo y la calidad de vida de trabajadores y trabajadoras.

3. HIPÓTESIS Y OBJETIVOS

3.1. Hipótesis de investigación

A partir de los antecedentes y definiciones desarrollados en el capítulo 1, la hipótesis principal que orienta esta investigación es que *el entorno psicosocial laboral es un mecanismo a través del cual la precariedad laboral afecta la salud y el bienestar de los trabajadores en distintos contextos europeos, cuya distribución entre hombres y mujeres evidencia la existencia de diferencias de género.*

De aquí se desprenden cuatro hipótesis específicas (HE):

HE1: La relación entre la precariedad laboral, el entorno psicosocial laboral, el estrés crónico y la salud mental presenta diferencias entre hombres y mujeres que evidencian especificidades asociadas a la construcción social de género y a la división sexual del trabajo.

HE2: Las distintas dimensiones de la precariedad laboral se asocian de manera diferencial con la producción de cortisol y otras hormonas esteroides, en función de los roles de género que hombres y mujeres ocupan en el mercado de trabajo y la familia.

HE3: Una parte de la asociación entre la precariedad laboral y la producción de cortisol y otras hormonas esteroides se explica por el entorno psicosocial laboral, aunque su efecto es mayor entre las mujeres que entre los hombres.

HE4: Los riesgos psicosociales tienen un efecto mediador en la relación entre la precariedad laboral y un mal estado de salud mental tanto percibido como objetivo, y es mayor entre las mujeres que entre los hombres.

3.2. Objetivo general

El objetivo principal de esta tesis es analizar los riesgos psicosociales laborales como posibles mecanismos causales entre la precariedad laboral, el estrés crónico y la mental de la población trabajadora, así como las diferencias de género que subyacen a esta relación.

3.3 Objetivos específicos

El objetivo general se desarrolla a través de los artículos que componen la tesis, cada uno de los cuales representa un objetivo específico:

Artículo 1: “Association between precarious employment and chronic stress: Effect of gender, stress measurement and precariousness dimensions. A cross-sectional study”

- Examinar si existen diferencias en la asociación entre la precariedad y el estrés medido a través de medidas subjetivas y utilizando biomarcadores de los ejes HPA/HPG, y posibles diferencias de género en estas asociaciones.

Artículo 2: “Gender differences in the indirect effect of psychosocial work environment in the association of precarious employment and chronic stress: A cross-sectional mediation analysis”

- Analizar el efecto indirecto de un conjunto de factores de riesgo psicosocial y la producción de hormonas suprarrenales.

Artículo 3: “Precarious employment, psychosocial risk factors and poor mental health: A cross-sectional mediation analysis”

- Analizar el efecto mediador de los factores de riesgo psicosocial en la relación entre la precariedad laboral y la salud mental de hombres y mujeres asalariados formales de 22 países europeos.

Artículo 4: “The role of psychosocial risk factors in the association of precarious employment and common mental disorders, substance use disorders and suicide attempts: A mediation analysis”

- Analizar el potencial efecto mediador de los factores de riesgo psicosocial en la relación entre la precariedad laboral y los trastornos mentales comunes, trastornos por consumo de sustancias e intentos de suicidio y autolesiones.

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4. METODOLOGÍA

Los métodos utilizados en esta tesis varían según cada uno de los artículos que la componen. Se han definido en función de su adecuación a las características de la información disponible y, principalmente, a los objetivos de investigación. A pesar de sus especificidades, en todos los casos se trata de métodos cuantitativos de análisis de datos provenientes de encuestas y registros administrativos. La metodología está suficientemente desarrollada en cada artículo de modo que para evitar redundancias este capítulo se limitará a enunciar las principales características de las fuentes de información, las medidas utilizadas y el análisis estadístico aplicado.

4.1. Fuentes de información

Los primeros dos artículos están basados en el estudio “Precariedad laboral y estrés: Factores sociales con impacto biomédico (PRES-SED)”, desarrollado en el GREDS-EMCONET entre los años 2018 y 2021. Este estudio consta de tres fases, una de las cuales consistió en la realización de una encuesta a una muestra de 255 trabajadores asalariados de 24 a 60 años de Barcelona (130 mujeres y 125 hombres), que es la que se utiliza en esta tesis. El cuestionario incluye preguntas estándar sobre características sociodemográficas y un conjunto de ítems sobre los diferentes temas de interés del estudio tales como precariedad laboral, condiciones de trabajo (incluidos los riesgos psicosociales laborales), pobreza, incertidumbre, redes sociales de apoyo y estrés percibido, entre otros. Además de la aplicación del cuestionario, se tomó una muestra de cabello de los participantes equivalente al grosor de un bolígrafo (entre ~30 y 50 mg) de la parte posterior de la cabeza usando unas tijeras y cortando lo más cerca

posible de la piel. El primer centímetro del mechón de cabello que está en contacto con el cuero cabelludo fue el material biológico sometido a análisis de laboratorio. Dado que el cabello crece alrededor de un centímetro por mes (Grova et al., 2020), la selección de este segmento implica que se puede identificar el nivel de estrés acumulado durante el mes anterior al muestreo. El análisis se llevó a cabo utilizando un método validado llamado cromatografía líquida-espectrometría de masas en tándem (LC-MS/MS) (Gomez-Gomez and Pozo, 2020). A partir de este análisis, se cuantificó el cortisol y sus metabolitos, así como otros compuestos relacionados. En el protocolo del estudio se ofrece un detalle exhaustivo de todo el proceso de investigación (Bolibar et al., 2021).

El tercer artículo se realizó en base a la Encuesta Europea de Condiciones de Trabajo (EWCS en inglés) del 2015 (Eurofound, 2016). Se trata de una fuente de información especialmente útil para el estudio de la precariedad laboral y la salud porque incluye información exhaustiva sobre las condiciones de trabajo y empleo en Europa. Para este estudio se utilizaron datos de la edición 2015 que se realizó en treinta y cuatro países europeos con una muestra total de 43.850 encuestados. Los detalles sobre el diseño muestral y otras características de la encuesta han sido ampliamente desarrollados en otros sitios (Eurofound, 2016). A su vez, en el artículo se detallan las características de la submuestra de veintidós países que se utilizó para el análisis.

El cuarto artículo se basa en la cohorte sueca de trabajo, enfermedad y participación en el mercado laboral (“SWIP cohort”, en inglés), que

contiene información de múltiples registros vinculados entre sí sobre todas las personas registradas en Suecia, con edades entre 16 y 65 años (aproximadamente 5,4 millones) en 2005 y seguidos hasta finales de 2016 (Jonsson et al., 2021c).

4.2. Medidas utilizadas

a) Medidas de la precariedad laboral

Un constructo multidimensional de la precariedad laboral para la investigación en salud

Un intento destacado por superar las limitaciones conceptuales y metodológicas de los enfoques unidimensionales es el constructo de la precariedad laboral medido a través de la Escala de Precariedad Laboral (EPRES, por su sigla en inglés) (Amable, 2009). La EPRES destaca por su enfoque sociológico en el objetivo de abordar la precariedad laboral como un determinante social de la salud, especialmente de la salud mental de la población trabajadora, aunque sus múltiples aplicaciones incluyen también otros resultados de salud. Desarrollada en el GREDS-EMCONET de la Universidad Pompeu Fabra, esta escala se compone originalmente de seis dimensiones: las cuatro propuestas por Rodgers (inestabilidad laboral, falta de negociación colectiva, falta de protección en el puesto de trabajo y derechos en la seguridad social, e ingresos bajos), a la que se suman dos nuevas dimensiones, la vulnerabilidad ante el trato injusto y arbitrario en el trabajo y la falta de poder para ejercer los derechos legalmente consagrados (desempoderamiento). La EPRES ha sido validada en países como España (Padrosa et al., 2020; Vives et al., 2010), Chile

(Vives-Vergara et al., 2017b), Suecia (Jonsson et al., 2019), y Grecia (Tsopoki Vassiliki et al., 2019), de manera que varios estudios han desarrollado en profundidad el proceso de su elaboración, así como el detalle de las dimensiones que la componen (Amable, 2006; Vives et al., 2015; Julià, 2017).

En esta tesis, se utilizan tres versiones de la EPRES. Una de ellas se validó utilizando la European Working Condition Survey para 22 países europeos (EPRES-E) y a diferencia de la EPRES original no contiene la dimensión de derechos y se incluyó la dimensión de jornada laboral (Padrosa and Julià, 2020). La segunda versión fue validada para la muestra de 255 trabajadores de la ciudad Barcelona mencionada en el apartado anterior e incluye todas las dimensiones de la escala original con modificaciones en la dimensión de salarios que fueron actualizados a los parámetros actuales (Bolibar et al., 2021). La tercera, es una versión de la segunda en la que se incluye la dimensión de jornada laboral. Estas dos últimas se desarrollaron en el marco del proyecto PRESSED (Bolibar et al., 2021). En la Tabla 1 se muestran las dimensiones e indicadores de las tres versiones utilizadas.

Tabla 1. Dimensiones y variables de las distintas versiones de la Escala de Precariedad laboral (EPRES)

Dimensiones	Encuesta europea de condiciones de trabajo (EWCS)	Proyecto PRESSED	
	Variables	Variables	Variables
Temporalidad	Tipo de contrato, Duración	Tipo de contrato, Duración,	
Salario	Salario mensual y salario por hora	Categorías escala y nº de pagas anuales; Cubre necesidades, Gastos imprevistos	
Desempoderamiento	Existencia de sindicatos, Reuniones regulares de trabajadores	Decisión sobre la jornada laboral, Decisión sobre el salario	
Vulnerabilidad	Falta de respeto por parte del jefe, Trato injusto en el lugar de trabajo	Miedo de reclamar, Indefenso ante trato injusto de superiores, Amenaza de despido, Trato autoritario, Le hacen sentir sustituible	Mismas dimensiones y variables que EPRES V2
Derechos		No derecho a paternidad/maternidad, pensiones, indemnización por desempleo	
Ejercicio de derechos	Hacer un descanso cuando lo desea, Facilidad para disponer de un par de horas libres	Días libres, vacaciones, permisos familiares, permisos personales, bajas por enfermedad	
Jornada laboral	Imprevisibilidad de los horarios de trabajo, Horarios de trabajo irregulares, Se requiere que trabaje con poca antelación		Cantidad de horas extras, frecuencia de cambios en la jornada laboral

Operacionalización multidimensional de la precariedad laboral en base a datos de registros administrativos

En el cuarto artículo de esta tesis se utiliza también una versión de la operacionalización de la precariedad laboral desarrollada en Suecia. La operacionalización de la precariedad laboral basada en registros administrativos suecos (SWE-ROPE por su sigla en inglés) se construye a partir de la Base de datos Longitudinal Integrada para el Estudio del Aseguramiento Médico y el Mercado Laboral (LISA, por su sigla en inglés). La operacionalización se basó en una revisión de literatura de Kreshpaj et al. (2020), que identificó tres dimensiones y nueve variables de la precariedad laboral: (i) inseguridad en el empleo, que incluye elementos de inseguridad en la relación contractual (contrato con el empleador o con otra parte, por ejemplo, agencia o autónomo), la temporalidad contractual (contrato permanente o de duración determinada), el subempleo (contrato a tiempo completo o a tiempo parcial) y la multiplicidad de empleos o trabajos en múltiples sectores económicos; (ii) la insuficiencia de ingresos, que incluye el nivel de ingresos (bajo salario por hora, ingresos mensuales o ingresos anuales), y (iii) la falta de derechos y protección, que incluye la falta de sindicalización (representación en el lugar de trabajo), falta de seguridad social (apoyo social/prestaciones), falta de apoyo normativo (políticas laborales) y falta de derechos en el lugar de trabajo (poder para ejercer los derechos en el lugar de trabajo). La tabla 2 muestra las dimensiones, subdimensiones y variables de la versión del SWE-ROPE utilizada en esta tesis.

Tabla 2. Dimensiones y variables de la Operacionalización de la precariedad laboral basada en registros administrativos de Suecia (SWE-ROPE).

SWE-ROPE		
Dimensiones	Subdimensiones	Variables
Inseguridad laboral	Inseguridad de la relación contractual	(1) Empleado directamente por el empleador (2) Empleado por una agencia (3) Combinación de empleo autónomo y directo
	Temporalidad contractual	(1) Empleo estable (2) Empleo inestable
Insuficiencia de ingresos	Nivel de ingresos	(1) Tener un empleo (empleador) durante el año en curso (2) Tener varios empleos (3) Tener varios empleos en varios sectores
	Falta de derechos y protección	Falta de sindicalización
		Nivel de ingresos (después de impuestos) con relación a la mediana de la población total
		Probabilidad de estar cubierto por un convenio colectivo

b) Medidas de riesgos psicosociales laborales

Los riesgos psicosociales laborales tienen diferentes aproximaciones conceptuales y metodológicas, tal como se mencionó en capítulo 1. En esta tesis se ha tomado como referencia principal el modelo de Demanda-Control-Apoyo social de Karasek, que ha sido adaptado a las distintas fuentes de información que se han utilizado en cada artículo. En el artículo 2 además de las escalas de demanda, control y apoyo social se construyó también una escala sobre el conflicto entre la vida familiar y laboral. Para las cuatro escalas se seleccionaron

ítems del COPSOQ, y luego fueron validadas para la muestra del proyecto PRESSED.

En el artículo 3 se construyeron tres escalas correspondientes a las dimensiones de demanda, control y apoyo social, en base a una selección de ítems de la EWCS.

En el cuarto artículo, además de las altas demandas y el bajo control se utilizan las combinaciones de bajo control/alta demanda (“trabajo de alta tensión”) y bajo control/baja demanda (“trabajo pasivo”) como factores de riesgos psicosociales. La demanda y el control se midieron a partir de la Matriz Sueca de Exposición Laboral (Swedish Job Exposure Matrix, JEM, en inglés).

En los cuatro artículos se presentan en detalle las preguntas seleccionadas para cada escala de riesgo psicosocial.

c) Medidas de salud

En cada uno de los artículos se utilizaron diferentes medidas de salud mental y estrés crónico tanto percibido como objetivo. En el artículo 1, la salud mental de los trabajadores se midió a través de la escala de la Organización Mundial de la Salud-5 (WHO-5, en inglés), que consta de cinco ítems o preguntas tipo Likert. La puntuación bruta se calcula sumando las cifras de las cinco respuestas y luego se multiplica por 4 para obtener una puntuación que va de 0 a 100, dividida en dos categorías, donde menos de 50 representa mala salud mental y más de 50 representa buena salud mental (Topp et al., 2015).

En el artículo 2, se tomaron dos variables de resultado. Por un lado, se midió el estrés percibido a través de la versión española 2.0 de la Escala de Estrés Percibido (PSS) (Sanz-Carrillo et al., 2002). La puntuación bruta se calcula sumando las cifras de los 14 ítems, que varían entre 0 a 4.

Por otra parte, se midió un conjunto de esteroides y metabolitos suprarrenales y gonadales en el pelo que incluyen el nivel de Cortisol, 20α -dihidro cortisol (20α DHF), 20β -dihidro cortisol (20β DHF), Cortisona, 20α -dihidro cortisona (20α DHE), 20β -dihidro cortisona (20β DHE), Cortolona, 11-dehidrocorticosterona y Androstenediona (AED), testosterona y progesterona. Estos biomarcadores son los mismos que se utilizan como variables de resultado en salud en el artículo 3.

Finalmente, en el artículo 4 se consideraron tres resultados de salud mental: diagnóstico de trastornos mentales comunes (depresión, ansiedad y trastornos relacionados con el estrés) y trastornos por consumo de sustancias —ambos informados en los registros de pacientes hospitalizados y ambulatorios— e intentos de suicidio informados en el registro de pacientes hospitalizados.

4.3. Análisis estadístico

El objetivo de esta tesis supone la utilización de técnicas estadísticas que permitan evaluar si el entorno psicosocial laboral puede ser un mecanismo a través del cual la precariedad laboral acabe afectando la salud de los trabajadores. El análisis de mediación es una herramienta adecuada porque permite estimar la proporción de la

asociación entre la precariedad laboral y el resultado de salud que puede atribuirse a los riesgos psicosociales laborales, es decir, lo que en el lenguaje del análisis de mediación se denomina *efecto mediador*.

Este tipo de análisis ha sido ampliamente utilizado en varios campos del conocimiento en las últimas décadas desde el influyente artículo de Baron and Kenny (1986). En este enfoque, la mediación se evalúa estimando el efecto de la variable de exposición sobre el mediador y el efecto del mediador sobre la variable de resultado (ajustado por la exposición); luego se multiplican las dos estimaciones para derivar el efecto indirecto o mediador. Alternativamente, el efecto de la exposición sobre el resultado se estima con y sin ajuste por el mediador, y la diferencia entre las dos estimaciones se usa para cuantificar el efecto mediado. Este enfoque se aplicó en dos estudios que forman parte de esta tesis. En uno de ellos se estimó el efecto indirecto de las demandas psicológicas, la capacidad de decisión, el apoyo social y el conflicto entre la vida familiar y el trabajo en la relación entre la PL y la producción de hormonas esteroides (tanto suprarrenales como gonadales) en trabajadores asalariados de la ciudad de Barcelona (artículo 2). En el otro estudio se estimó el efecto mediador de las demandas, el control y el apoyo social en la relación entre la PL y la salud mental percibida de hombres y mujeres asalariados formales de 22 países europeos (artículo 3). En ambos artículos se aplicó un método de descomposición de efectos que no se ve afectado por el cambio de escala o el sesgo de atenuación que surge en las comparaciones entre modelos no lineales. El método Karlson, Holm, and Breen (KHB) creado en Stata, permite estimar el grado en que una variable

de control (Z) media o explica la relación entre una variable de exposición (X) y una variable de resultado latente (Y^*) subyacente al modelo de probabilidad no lineal (Karlson et al., 2012; Kohler et al., 2019). El método ha sido diseñado para modelos no lineales buscando superar las limitaciones del método clásico basado en modelos de ecuaciones estructurales (SEM en inglés), pero se puede extender a otros modelos de la familia de los modelos lineales generalizados (Kohler et al., 2019).

El enfoque tradicional de Baron y Kenny se basa en la suposición de que no hay interacción entre la exposición y el mediador en el resultado (Valeri and VanderWeele, 2013), lo cual introduce un riesgo de sesgo severo en el efecto mediado (Pearce and Vandembroucke, 2016). Para subsanar las limitaciones del método clásico de mediación, se ha ido desarrollando una nueva metodología de mediación, a menudo denominada “análisis de mediación causal” (Pearce and Vandembroucke, 2016; Richiardi et al., 2013; Valeri and VanderWeele, 2013) que se caracteriza por la definición contrafactual de efectos directos e indirectos, que son independientes de cualquier modelo y que bajo ciertos supuestos permiten una interpretación causal de los efectos estimados (Robins and Greenland, 1992). Las definiciones contrafactuales permiten evaluar previamente si las relaciones entre las variables que el investigador se plantea en base a los datos de los que dispone se ajustan a los supuestos que subyacen al análisis de mediación (Oude Groeniger and Burdorf, 2020).

Este método se aplicó en esta tesis a través del comando “paramed” de Stata, que permite estimar dos tipos diferentes de efectos; por un

lado, los directos e indirectos naturales, y, por otro lado, los directos controlados. El directo natural mide el efecto de la precariedad laboral sobre la salud mental que no se debe a su influencia sobre los riesgos psicosociales (las variables mediadoras), mientras que el indirecto natural captura el efecto de la precariedad laboral sobre la salud mental que se debe a su impacto sobre los riesgos psicosociales (Richiardi et al., 2013). Por su parte, el directo controlado captura el efecto de la precariedad laboral sobre la salud mental si el mediador se fija en un valor específico uniformemente en la población (Oude Groeniger and Burdorf, 2020).

5. RESULTADOS

Los artículos que forman parte de esta tesis son:

Artículo 1: Association between precarious employment and chronic stress: Effect of gender, stress measurement and precariousness dimensions. A cross-sectional study. (*International Journal of Environmental Research and Public Health* 2022, 19(15), 9099)

Artículo 2: Gender differences in the indirect effect of psychosocial work environment in the association of precarious employment and chronic stress: A cross-sectional mediation analysis. (*International Journal of Environmental Research and Public Health* 2022, 19(23), 16073)

Artículo 3: Precarious employment, psychosocial risk factors and poor mental health: A cross-sectional mediation analysis. (*Safety science* 2021, 143, 105439).

Artículo 4: The role of psychosocial risk factors in the association of precarious employment and common mental disorders, substance use disorders and suicide attempts: A mediation analysis (Work in progress).

Artículo 1

Association between precarious employment and chronic stress: Effect of gender, stress measurement and precariousness dimensions. A cross-sectional study

Mireia Julià, Fabrizio Méndez-Rivero, Álex Gómez-Gómez, Óscar J. Pozo & Mireia Bolívar (2022). Association between Precarious Employment and Chronic Stress: Effect of Gender, Stress Measurement and Precariousness Dimensions—A Cross-Sectional Study. *International Journal of Environmental Research and Public Health*, 19(15), 9099. <https://doi.org/10.3390/ijerph19159099>.

Association between precarious employment and chronic stress: Effect of gender, stress measurement and precariousness dimensions. A cross-sectional study

Abstract

Precarious employment has been highlighted as a social determinant of health, being associated with chronic stress. However, few studies have been conducted comparing perceived stress indicators and biological markers. Accordingly, the present study analysed the association of multidimensional (6 dimensions) precarious employment scale with perceived stress and 23 markers of adrenal and gonadal hormone production, including cortisol. The sample consisted of 255 salaried workers from Barcelona (125 men, 130 women) aged 25-60. OLS regression models stratified by sex were conducted. Results showed that precarious employment increased the probabilities of having perceived stress in both sexes. In addition, the production of adrenal hormones among men is associated with precarious wages and among women with precarious contracts ("Temporariness", "Disempowerment", and "Rights" dimensions). Therefore, precarious employment could be embodied by workers, altering their perceived well-being and physio-logical characteristics. Differences between men and women in the physiological effect of precarious employment could express not just the biochemical differences inherent to biological sex, but also the social construction of gender identities, positions and roles in society and family, as well as gender inequalities in the labour market.

Keywords: Cortisol; chronic stress; precarious employment; gender; social determinants of health

1. Introduction

Precarious employment is considered a social determinant of health and of health inequalities due to the importance of work in people's lives (Benach et al., 2014). In recent decades and especially in recent years, the economic crisis, technological and political changes, and, more recently, the COVID-19 pandemic, have increased the precariousness of employment conditions due to the greater flexibility of employment conditions and of the labour market (Benach et al., 2016; Buchholz et al., 2009; Matilla-Santander et al., 2021). Although there is no standard and consensual definition of precarious employment, different approaches exist to measure it (Kreshpaj et al., 2020). One of the most used is based on single-dimensional measurements, that is, from a single variable such as temporariness (Hammarström et al., 2011c; Virtanen et al., 2005, 2011) or perceived insecurity (De Cuyper and De Witte, 2007; Ferrie, 2001; Sverke et al., 2002). In recent years, however, different multidimensional approaches have emerged (Bodin et al., 2020; Julià et al., 2017a; Kreshpaj et al., 2020) because precarious employment has been seen as a widespread phenomenon not only related to the type of contract (Julià et al., 2017b) -since employees with permanent contracts can also find themselves in a precarious situation- but also related to other characteristics of labour relations such as wages, the power to exercise labour rights, helplessness in the face of authoritarian treatment, or the level of negotiation of employment conditions.

One of the known consequences of precarious employment is the negative influence on working population health. In recent decades, many studies have been conducted analysing the impact of precarious

employment on both physical and mental health (Lewchuk et al., 2008; Matilla-Santander et al., 2020; Mayhew and Quinlan, 2006; Quinlan, 2016; Virtanen et al., 2005). Indeed, results show that employees in highly precarious employment measured multidimensionally had worse mental and/or self-perceived health than employees in less precarious employment (Benach et al., 2015b; Jonsson et al., 2021d, 2021b; Julià et al., 2017b, 2017a; Matilla-Santander et al., 2022). Various studies also show that there is more precarious employment among certain groups of workers such as women, young people, immigrants, and manual workers (Vives-Vergara et al., 2017c; Vives et al., 2015, 2013). In particular, women's insertion in the labour market is more precarious as a result of persistent vertical and horizontal occupational gender segregation, whereby women get access to less prestigious occupations and within them to less important positions (Charles, 2016), which are usually subject to worse working conditions (Menéndez et al., 2007). Although several studies have indicated that women's greater exposure to precarious employment increases the likelihood of poorer physical and mental health (Gray et al., 2021; Valero et al., 2021), little is known about the psychophysiological response of men and women to overall precarious employment or its different dimensions and their relationship with gender stereotypes. Thus, for example, the literature shows that low wages or income can cause stress through increased precariousness and eventually lead to mental health problems (Doki et al., 2018; Dooley, 2003; Paul Leigh and De Vogli, 2016). Still, little is known about whether there are gender differences in the stress impact of these dimensions or whether any of the dimensions has greater

weight than others in this impact on health. Hence it is important to use multidimensional measures of precarious employment, not only through global indices but also through the sub-dimensions that compose them.

Stress is a major problem in today's society, with significant effects at different levels. Studies show how "stressful events" are associated with poor mental and physical health through psychophysiological mechanisms (Brunner, 1997) and can eventually lead to different health problems such as cardiovascular disease, metabolic syndrome, osteoporosis and/or depression (Schneiderman et al., 2004). As far as we are aware, research into the relationship between precarious employment and stress is scarce, and the existing research only uses single-dimensional measures such as temporariness (Bartoll et al., 2019) or perceived insecurity (Ferrie et al., 2005). However, no studies analyse multidimensional precarious employment and stress, other than the studies related to the PRESSED project (Belvis et al., 2022; Bolibar et al., 2021) which include this study.

In addition, in this field of social epidemiology, stress is studied mainly through self-reported measures such as the Perceived Stress Scale (PSS) (Cohen et al., 1983). The literature shows that a relationship exists between presenting high levels of stress measured using the PSS and poor health. Thus, it has been seen that in patients who have suffered an acute myocardial infarction and have a moderate/high level of stress measured using the PSS had increased 2-year mortality and have a poor 1-year health status compared to those who have low levels of stress (Arnold et al., 2012). Additionally, patients

with peripheral artery disease who suffer from chronic stress after six months of diagnosis have higher odds of worse recovery at 12 months (Malik et al., 2021). Chronic stress has also been related to nutritional problems such as emotional eating (Sims et al., 2008).

Even scarcer in this field is the use of objective measures such as biomarkers. Biomarkers should theoretically allow greater comparability between cases since they should not be so affected by biases in the subjective interpretation of situations. One of the most used biomarkers for studying stress is cortisol. Cortisol is a glucocorticoid steroid hormone that is part of the hypothalamic-pituitary-adrenal (HPA) axis, involved in the body's response to stress by mobilizing resources to supply energy. It also participates in the regulation of other important systems such as the immune system, the cardiovascular system or in affective and cognitive processes (Smith and Vale, 2006). Cortisol can be measured in serum, saliva, or urine, but these determinations may be affected by different factors such as circadian rhythm or needle apprehension. For these reasons, the gold standard in the evaluation of chronic stress is the determination of cortisol in hair (Russell et al., 2012). However, different studies have shown conflicting results in the association between hair cortisol levels and subjective stress measures (Geng et al., 2016; Stalder et al., 2012b). These divergences are also found in the association between hair cortisol levels and some stressful situations or contexts. Thus, some studies show that there is an increase in cortisol levels in the hair in situations such as unemployment, shift work, chronic pain, or major life events (Staufenbiel et al., 2013). At the same time, cortisol levels in hair have also been reported to increase in cases diagnosed with

depression, but decrease in disorders such as anxiety (Staufenbiel et al., 2013). Due to these divergent results, in recent years, some authors have questioned the direct relationship between hair cortisol concentration and different measures of self-reported chronic stress, cast doubt on the suitability of cortisol as the best biomarker to study chronic stress (Chan et al., 2014; Dettenborn et al., 2010; Kramer et al., 2009; Manenschijn et al., 2011; Stalder et al., 2017, 2012b). Thus, other steroid biomarkers related to the HPA axis (e.g., cortisol metabolites) (Lang et al., 2021) or to other axes such as the hypothalamic-pituitary-gonadal (HPG) axis have been recently used. For example, testosterone or dihydroepiandrosterone (Åsberg et al., 2009; Dutheil et al., 2021) may provide new insights into the relationship between steroidal hormones, stress, and precarious employment.

Against this background, the objective of this study is to examine whether there are differences in the association between multidimensional precarious employment and stress measured through subjective and self-reported measures or using biomarkers of the HPA/HPG axes and whether there are gender differences in these associations.

2. Materials and Methods

2.1. Study design and sampling

A cross-sectional study based on a sample of 255 employees from Barcelona, Spain, aged between 25 and 60 years (125 men and 130 women). The sample is non-probabilistic based on proportional quotas by sex, age group (25-34 years vs. 35-60 years), place of origin (born in Spain vs. born abroad) and the socioeconomic level of the district of residence (middle, upper-middle or high vs. low-middle-

and low-income districts). Participants were selected from the records of the 2017 Barcelona Health Survey, from which 215 cases were obtained of persons who agreed to participate in the study. In addition, 40 subjects were recruited through social and workers' organizations in order to compensate for the bias of the initial sample towards profiles of higher levels of education and income. In all cases, the inclusion criteria were: (i) being a salaried worker or a bogus self-employed worker serving a single employer, (ii) being between 24 and 60 years old, (iii) living independently in Barcelona (i.e., persons living with their parents were excluded), (iv) the length of hair at the back of the head being of at least one centimetre, and (v) not having taken holidays or leave from work within the month prior to the interview. The exclusion criteria were: (i) having taken corticosteroids within the month prior to the interview, (ii) having been diagnosed with an adrenal disease, and (iii) being pregnant, due to possible alterations in cortisol levels as a result of gestation.

Each sample subject attended a face-to-face interview of approximately 40 minutes in which a questionnaire was administered that included items on the different subjects of interest of the study (precarious employment, working conditions, uncertainty, support networks, perceived stress, and physical and mental health), as well as questions on sociodemographic characteristics.

Each participant was also asked for a hair sample to be able to analyse cortisol and other metabolites, used as potential biomarkers of chronic stress. The first centimetre of the lock of hair that is in contact with the scalp is the biological material subjected to laboratory

analysis using a previously validated method known as liquid chromatography-tandem mass spectrometry (LC-MS/MS) (Gomez-Gomez and Pozo, 2020). One centimetre of hair was collected in order to obtain information concerning the steroids produced during the month prior to sample collection.

More detailed information on the project can be found in the protocol (Bolibar et al., 2021) as well as concerning the EPRES scale, its dimensions and items (Vives et al., 2010).

2.2. Variables

As outcomes, two groups of variables were taken: the Perceived Stress Scale (PSS) and the set of biomarkers analysed. On the one hand, perceived stress was measured using the Spanish version 2.0 of the Perceived Stress Scale (PSS), based on the complete 14-item Likert-type version by Cohen (Cohen et al., 1983), adapted by Sanz-Carrillo (Sanz-Carrillo et al., 2002). The raw score is calculated by summing the figures for the 14 items, which range from 0 to 4. The minimum value observed in the sample was 1 and the maximum 44.

Also, a set of adrenal and gonadal steroids and metabolites was measured in hair. The adrenal ones provide information on the HPA axis, and include the levels of cortisol, 20α -dihydrocortisol (20α DHF), 20β -dihydrocortisol (20β DHF), cortisone, 20α -dihydrocortisone (20α DHE), 20β -dihydrocortisone (20β DHE), cortolone, 11-dehydrocorticosterone and androstenedione (AED). The gonadal ones provide information on the HPG axis and include levels of testosterone and progesterone as well as AED. In addition to the capillary concentrations of the selected steroids, several ratios were included to

evaluate the activity of key enzymes in steroid production and metabolism. For example, the cortisol/cortisone ratio was calculated to evaluate the activity of the enzyme 11 β -hydroxysteroid dehydrogenase (responsible for cortisol to cortisone interconversion). Also, the relative abundance of each steroid (as a %) was calculated as an additional marker, to account of the amount of cortisol relative to its metabolites. This minimizes the possible effect of different steroid adsorption in hair depending on hair type.

Precarious employment was used as an explanatory variable. This was measured using the Employment Precariousness Scale (EPRES), an instrument that has been validated in various countries (Benach et al., 2015b; Jonsson et al., 2019; Padrosa et al., 2020; Vives-Vergara et al., 2017b; Vives et al., 2015). The scale consists of 22 indicators classified into six dimensions: temporariness - duration of the contractual relationship -, wages - the ability of the employment to generate income to cover needs -, labour rights - social coverage associated with employment -, the exercise of rights - the ability, in practice, to exercise labour rights -, vulnerability - level of helplessness in the face of authoritarian treatment -, and disempowerment - capacity for collective bargaining and influence on employment conditions (Vives et al., 2010). Each dimension contributed equally to the total score, regardless of its number of items. To obtain a scale of equal weight, the score of each dimension was calculated independently, standardized, and integrated into an overall score that results from the sum of the items of each dimension. Thus, each dimension is a subscale whose score was transformed to range between 0 and 4. Finally, the overall EPRES score was calculated, ranging from 0 (not at all

precarious) to 4 (highly precarious), based on the mean of all scales (Vives et al., 2015). For this study, the current parameters in the wages dimension were updated.

The control variables used were age and body mass index (BMI), both continuous. BMI was used as a control variable for regressions with biomarkers since weight can partially determine these biological outcomes (Stalder et al., 2012b).

2.3. Statistical analysis

Initially, a description of the studied sample was made for which the means and their standard deviations were calculated. The variables corresponding to the biomarkers were transformed to a logarithmic scale to normalize their distribution.

A linear regression model was performed to estimate the association between precarious employment and the PSS adjusted for age. Subsequently, similar models were carried out for each of the biomarkers studied, but in this case, in addition to adjusting for age, they were also adjusted for BMI. These same analyses were repeated for each of the dimensions that comprise the EPRES. All analyses were stratified by sex and performed using Stata 16.0.

3. Results

3.1. Descriptive results

The characteristics of the study sample (n=255) are shown in Table 1. The mean age for men was 41.68 years and for women 42.75 years, but these differences were not significant. Regarding BMI, men obtained a mean of 25.34 and women 24.75 and neither was it significant. Regarding precarious employment, differences were found

between men and women for the EPRES wages dimension, revealing that women have higher levels of precarious employment in this dimension (mean 1.44 vs 1.13, $p=0.013$). In the other dimensions, however, no differences were found. Among women, the level of perceived stress (PSS) was significantly higher than among men (mean=26.12 vs 22.50, $p<0.001$). Regarding markers, significant differences were found between the two sexes for 20β DHF, 20β DHE, cortisone, cortolone, 11-dehydrocorticosterone, AED, % 20β DHE, which had higher levels among men; and markers % 20α DHF and % 20α DHE and ratios 20α DHF/ 20β DHF and 20α DHE/ 20β DHE, which were higher among women.

3.2. Precarious employment, perceived stress, and production of adrenal and gonadal steroids

The association of precarious employment with the age-adjusted PSS and with age-adjusted markers and BMI is presented in Table 2, where linear regression coefficients (β) for men and women are shown.

Precarious employment was positively associated with the PSS both in men ($\beta=4.82$; 95% CI: 2.56-7.08) and in women ($\beta=5.49$; 95% CI: 3.35-7.63). However, among men, no associations were found between the global scale of precarious employment and biomarkers. Among women, meanwhile, the scale of precarious employment was associated positively with 20β DHE, % 20β DHE, 20β DHF/cortisol, 11-dehydrocorticosterone and negatively with cortisol/cortisone and %cortisol.

3.3. Perceived stress and production of adrenal and gonadal steroids: their association with the dimensions of precarious employment

Table 3 shows the association between each of the dimensions of precarious employment and the PSS and the markers. Only the results of the steroids that were significantly associated ($p < 0.05$) with any of the dimensions of precarious employment are presented, the others not being associated with any.

The PSS was associated with the “Vulnerability” dimension both in men ($\beta = 1.78$; 95% CI: 0.48-3.08) and in women ($\beta = 2.07$; 95% CI: 0.80-3.34). In addition, among men it was also associated with the “Wages” dimension ($\beta = 0.19$; 95% CI: 0.04-0.35). No significant association was found between the PSS and the other dimensions.

Among men, the wages dimension was the one associated with more fundamentally adrenal markers (cortisol; 20α DHF; 20β DHF; 20α DHE; 20β DHE; cortolone; 11-dehydrocorticosterone; %cortisone). There was also an association between the dimension of “Disempowerment” with Testosterone, and “Exercise of rights” with AED, both of gonadal origin. Furthermore, it was observed that among women, the dimensions of precarious employment with which most biomarkers were associated were “Temporariness” (cortisol, 20β DHF; 20α DHE; cortolone; % 20β DHF); and “Disempowerment” (E/A; cortisol/cortisone; %cortisol; 20α DHF/cortisol; 20β DHF/cortisol). But associations were also found between some markers and the dimension of “Wages” (20α DHE/ 20β DHE; % 20β DHF; % 20α DHE); “Rights” (cortolone; 20α DHE/ 20β DHE), and “Exercise of rights” (cortisol/cortisone). No significant

associations were found between the “Vulnerability” dimension and any of the biomarkers evaluated. All significant associations found in women were found with adrenal markers. As was to be expected in the light of the results of Table 2, it is women who present the highest number of associations between the markers with the highest number of dimensions of the EPRES (five out of six).

4. Discussion

The main objective of this article was to examine the association between multidimensional precarious employment and chronic stress measured both through subjective and self-reported measures and using steroid biomarkers, and whether there are differences between men and women in these associations. To measure precarious employment, a multidimensional global score was considered for the six dimensions together (temporariness, wages, labour rights, exercise of rights, vulnerability, and disempowerment), and a measure for each of the dimensions separately. For the overall score, the results found suggest that precarious employment could be a risk factor for chronic stress both at perceived and hormonal levels.

At the level of perceived stress, a robust positive association has been found between PSS results and precarious employment in both sexes. At the hormonal level, positive associations have been found with several markers related with cortisol metabolism especially among women suggesting that the overall score of precarious employment is associated with an increase in cortisol metabolism. In fact, both the amount of cortisol relative to its metabolites (%cortisol) and the amount of cortisol relative to its inactive form (cortisol/cortisone) are

negatively associated with precarious employment (being significant in women) while some ratios indicative of cortisol metabolism ($20\alpha\text{DHF/cortisol}$, $20\beta\text{DHF/cortisol}$) are positively associated. These results suggest that cortisol overproduction could lead to an increase in its metabolism (in order to minimize exposure to cortisol) and be reflected in the hair due to the accumulation of some of its metabolites and not necessarily the accumulation of cortisol itself.

The association between biological markers and precarious employment is substantially lower than the association between precarious employment and PSS results. This result does not permit a single interpretation as there are several factors that could explain this. Some potential interpretations are that: (i) experiencing stressful phenomena and the self-perception of chronic stress is not necessarily associated with a chronic physiological increase in adrenal glucocorticoid production; (ii) the accumulation of cortisol and other adrenal steroids in the hair may be altered by various factors such as hair type or age [64]; (iii) biological markers are less sensitive to small changes in precarious employment and require greater variations to be modified and display significant differences; and (iv) the two measures provide additional information of different dimensions of precariousness.

Another of the main findings of this study are the gender differences found in the relationship between the dimensions of precarious employment and chronic stress. The analysis of each dimension of precarious employment separately allows connecting the differences between men and women in the physiological response to precarious

employment with the social construct of gender roles that is not observed in the general index. In other words, these differences could demonstrate a complex process of the embodiment of gender roles, in which the biochemical differences inherent in biological sex are related with gender stereotypes and their relationship with the insertion of individuals in the employment market.

The results obtained seem to indicate that the dimension that most influences the results of perceived stress (measured using the PSS) is vulnerability, which refers to helplessness against authoritarian treatment by the company. Interestingly, this dimension shows no association with any of the steroidal markers considered, either in men or women. At the same time, the dimensions that were associated with the markers did not have associations with the PSS (except the dimension of wages, in men). This result could indicate that the PSS and biomarkers provide complementary information on psychophysiological response to precarious employment. That is, they are not substitute measures that can be used alternatively as indicators of stress associated with precarious employment, indicating that stress at the perceived level does not necessarily have its correlation at the hormonal level. These results seem to indicate that the physiological processes whereby precarious employment generates hormonal responses are not, in themselves, conscious, but that precarious employment can be embodied independently of the consciousness of individuals [65].

From a biochemical standpoint, the results of this study suggest the existence of a gender bias in the stressors causing the overactivation

of the HPA axis. Thus, in women there is a clear association between temporariness and the activation of the HPA axis (shown by a positive association not only with the amount of cortisol but also with that of several of its metabolites) showing that temporariness, and therefore its associated uncertainty, affect them more. Other markers related to cortisol metabolism (20α DHF/cortisol, 20β DHF/cortisol, cortisol/cortisone) are associated with dimensions such as “Disempowerment” or “Exercise rights”. These dimensions mainly refer to the contractual dimension of precarious employment, which indicates that women are mainly affected by the characteristics of labour relations. This result acquires meaning in the context of gender inequalities in the labour market in variables such as flexibility, temporariness, and underemployment, among others [29,66,67]. Persistent occupational gender segregation is a structural problem that is directly linked to the precarious insertion of women into the employment market, at both the level of occupations (horizontal segregation) and of the positions they hold within them (vertical segregation) [28,29].

Regarding men, the results of this study show that the overactivation of the HPA axis occurs basically with precarious wages. This activation is highlighted not only by the association between wages and cortisol but also by the positive association with several of its metabolites (20α DHF, 20β DHF, 20α DHE, 20β DHE and cortolone). In other words, men are mainly affected by precarious wages, a dimension closely linked to the stereotype of the “male breadwinner”. This result is in line with the literature in the field of gender roles and stress. Since a classic study pointed out that masculine gender role socialization affects whether men evaluate certain situations as

stressful or not [68], several subsequent investigations have agreed that men have a greater tendency than women to feel emotionally affected if they receive insufficient wages [69].

4.1. Limitations and strengths

As this is a cross-sectional design, it is not possible to establish a direct causal relationship between steroid production and precarious employment. In addition, there is no information on the period during which subjects have been exposed to precarious employment, which could alter the results. Longitudinal studies could overcome these limitations. Another limitation of the study is that it refers only to the wage-earning population, and it excludes a portion of non-standard work, such as self-employment or informal labour, etc.

On the other hand, one notable strength of this article is its use of biological markers, which is novel not only in the study of precarious employment but also in the field of social epidemiology in general, where subjective and/or self-reported health measures are usually used. In this sense, the interdisciplinary approach of this study is noteworthy, since by combining social and biochemical aspects, it provides novel evidence on the psychophysiological response of multidimensional precarious employment. In turn, the analysis of the different dimensions of precarious employment separately revealed that this response is substantially different for men and women. Moreover, the simultaneous study of the two axes, gonadal and adrenal, by the determination of both hormones and metabolites in hair, is a novelty in biochemical research, given that in previous studies only steroids of the adrenal axis have been studied.

5. Conclusions

The results of this study showed that multidimensional precarious employment was associated with chronic stress, although the association with perceived stress was more robust than with biological markers. However, when breaking down precarious employment into its dimensions, differences were observed in the association with the PSS and biological markers, which suggest that both measures provide complementary information on the psychophysiological response to precarious employment. In turn, a gender bias was observed in the overactivation of the HPA axis, which must be understood in the articulation of the biochemical differences inherent to biological sex, with gender socialization and its relationship with gender inequalities in the insertion of individuals in the employment market.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to their containing information that could compromise the privacy of research participants.

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Table 1. Characteristics of the study population stratified by sex. Precarious Employment and Stress Study sample, 2020. [SD=Standard deviation]

	Men (n=125)		Women (n=130)		p-value
	Mean	SD ¹	Mean	SD ¹	
Age (years)	41,68	9,84	42,75	9,79	0,383
Body mass index (BMI) (kg/m ²)	25,34	3,59	24,75	4,31	0,233
Precarious employment (EPRES)					
Global scale	1,04	0,56	1,02	0,55	0,797
Temporarines	1,27	1,20	1,04	1,13	0,124
Wages	1,13	0,93	1,44	1,06	0,013
Rights	0,45	0,76	0,38	0,64	0,445
Disempowerment	1,40	1,16	1,26	1,16	0,341
Excercise of rigts	0,62	0,77	0,69	0,82	0,523
Vulnerability	1,18	0,98	1,12	0,96	0,625
Perceived Stress Scale (PSS)	22,50	7,59	26,12	7,43	0,000
Adrenal and gonadal steroids (ng/mg)					
Cortisol	12,42	18,90	9,33	7,35	0,090
20αDHF	0,99	1,15	0,99	0,96	0,977
20βDHF	5,67	4,19	4,46	2,71	0,007
20αDHE	10,20	8,42	9,05	6,41	0,223
20βDHE	7,48	5,70	5,37	3,26	0,000
Cortisone	33,89	18,37	26,88	17,20	0,002
Cortolone	8,73	3,94	7,09	3,08	0,000
11-Dehidrocorticosterone (A)	2,99	1,59	2,54	1,57	0,023
Testosterone	2,07	2,10	3,08	24,36	0,638
Androstenedione (AED)	5,43	3,07	3,91	2,90	0,000
Progesterone	232,62	1.511,24	27,01	32,96	0,130
20αDHF/20βDHF	0,17	0,17	0,20	0,10	0,048
20αDHE/20βDHE	1,38	0,33	1,65	0,39	0,000
Cortisone/11-Dehydrocorticosterone (E/A)					
Cortisol/Cortisone	13,01	7,09	12,97	8,82	0,968
Cortisol/Cortisone	0,36	0,45	0,36	0,24	0,901
%Cortisol	15,12	9,25	16,04	6,42	0,359
%Cortisone	50,54	10,29	48,51	9,16	0,097
%20αDHF	1,23	0,76	1,61	0,82	0,000
%20βDHF	8,18	2,74	8,24	2,15	0,843
%20αDHE	14,30	3,92	15,85	4,39	0,003
%20βDHE	10,63	2,80	9,75	2,18	0,006
20αDHF/Cortisol	0,09	0,06	0,11	0,08	0,030
20βDHF/Cortisol	0,65	0,31	0,59	0,28	0,074

¹SD=Standard deviation.

Table 2. Linear regression coefficients and 95% confidence intervals (CI) for EPRES global scale predicting Production of Adrenal and Gonadal steroids and PSS, adjusted for control variables, and stratified by sex. Precarious Employment and Stress Study sample, 2020.

Outcome ¹	Men (n=125)		Women (n=130)	
	β	95%CI	β	95%CI
Perceived Stress Scale	4.82**	(2.56 - 7.08)	5.49**	(3.35 - 7.63)
Adrenal and gonadal steroids				
Cortisol	-0.00	(-0.27 - 0.27)	-0.05	(-0.27 - 0.17)
20 α DHF	0.08	(-0.25 - 0.42)	0.11	(-0.15 - 0.37)
20 β DHF	0.06	(-0.14 - 0.26)	0.11	(-0.05 - 0.27)
20 α DHE	0.04	(-0.15 - 0.24)	0.18	(-0.00 - 0.35)
20 β DHE	0.05	(-0.14 - 0.25)	0.18*	(0.02 - 0.34)
Cortisone	0.04	(-0.14 - 0.22)	0.12	(-0.05 - 0.29)
Cortolone	0.02	(-0.16 - 0.19)	0.01	(-0.16 - 0.17)
11-dehydrocorticosterone (A)	0.13	(-0.04 - 0.29)	0.18*	(0.01 - 0.36)
Testosterone	0.16	(-0.06 - 0.38)	0.08	(-0.28 - 0.45)
Androstenedione (AED)	0.09	(-0.08 - 0.27)	0.16	(-0.04 - 0.37)
Progesterone	0.14	(-0.53 - 0.80)	0.12	(-0.43 - 0.67)
20 α DHF/20 β DHF	0.01	(-0.22 - 0.24)	0.00	(-0.16 - 0.16)
20 α DHE/20 β DHE	-0.01	(-0.08 - 0.06)	-0.00	(-0.07 - 0.06)
Cortisone/11-dehydrocorticosterone (E/A)	-0.08	(-0.26 - 0.10)	-0.07	(-0.27 - 0.14)
Cortisol/Cortisone	-0.05	(-0.25 - 0.16)	-0.17*	(-0.33 - -0.00)
%Cortisol	-0.04	(-0.18 - 0.10)	-0.16**	(-0.28 - -0.05)
%Cortisone	0.01	(-0.07 - 0.09)	0.01	(-0.06 - 0.08)
%20 α DHF	0.04	(-0.19 - 0.28)	0.00	(-0.17 - 0.17)
%20 β DHF	0.02	(-0.08 - 0.13)	-0.00	(-0.08 - 0.08)
%20 α DHE	0.01	(-0.07 - 0.09)	0.07	(-0.02 - 0.15)
%20 β DHE	0.01	(-0.07 - 0.10)	0.07*	(0.00 - 0.14)
20 α DHF/Cortisol	0.09	(-0.16 - 0.34)	0.16	(-0.02 - 0.34)
20 β DHF/Cortisol	0.06	(-0.13 - 0.25)	0.16*	(0.02 - 0.30)

¹ All outcomes have been transformed into logarithms to correct skewness.

**p<0.01,*p<0.05.

Table 3. Linear regression coefficients and 95% confidence intervals (CI) for Production of Adrenal and Gonadal steroids and EPRES dimensions (Temporariness, Vulnerability, Wages, Rights, Disempowerment and Exercise of rights), adjusted for control variables and stratified by sex. Precarious Employment and Stress Study sample, 2020.

	Temporariness		Vulnerability		Wages		Rights		Disempowerment		Exercise rights	
	β	95%CI	β	95%CI	β	95%CI	β	95%CI	β	95%CI	β	95%CI
3a. Men. N=125												
PSS	-0.04	(-0.1- 0.09)	1.78**	(0.48- 3.08)	0.19*	(0.04- 0.35)	0.06	(-0.14- 0.25)	-0.04	(-0.17- 0.08)	-0.09	(-0.28- 0.10)
Adrenal and gonadal steroids ¹												
Cortisol	-0.07	(-0.23- 0.09)	-0.06	(-0.21- 0.09)	0.32**	(0.13-0.51)	0.12	(-0.11-0.36)	-0.04	(-0.19- 0.12)	-0.01	(-0.25- 0.23)
20 α DHF	-0.03	(-0.13- 0.06)	-0.05	(-0.23- 0.14)	0.22**	(0.12-0.33)	0.06	(-0.08- 0.20)	-0.01	(-0.11- 0.08)	-0.03	(-0.17- 0.11)
20 β DHF	-0.04	(-0.13- 0.05)	-0.05	(-0.16- 0.06)	0.20**	(0.09- 0.31)	0.07	(-0.06- 0.21)	0.00	(-0.09- 0.09)	-0.02	(-0.15- 0.12)
20 α DHE	-0.04	(-0.13- 0.06)	-0.07	(-0.18- 0.03)	0.22**	(0.11- 0.32)	0.08	(-0.05- 0.22)	0.00	(-0.09- 0.10)	-0.04	(-0.18- 0.10)
20 β DHE	-0.06	(-0.14- 0.03)	-0.08	(-0.19- 0.03)	0.16**	(0.05- 0.26)	0.04	(-0.09- 0.17)	0.03	(-0.06- 0.11)	-0.03	(-0.15- 0.10)
Cortolone	0.02	(-0.06- 0.10)	-0.02	(-0.12- 0.08)	0.15**	(0.06- 0.24)	0.11	(-0.00- 0.23)	0.01	(-0.07- 0.08)	0.05	(-0.06- 0.17)
11-dehydrocorticosterone (A)	0.04	(-0.07- 0.14)	-0.04	(-0.13- 0.05)	0.19**	(0.06- 0.31)	0.14	(-0.01- 0.29)	0.03	(-0.08- 0.13)	-0.03	(-0.18 - 0.13)
Testosterone	-0.03	(-0.12- 0.05)	-0.04	(-0.16- 0.08)	0.05	(-0.06-0.15)	0.03	(-0.09- 0.15)	0.09*	(0.01- 0.17)	0.02	(-0.11 - 0.14)
Androstenedione (AED)	0.02	(-0.30- 0.34)	0.02	(-0.08- 0.11)	0.04	(-0.35-0.43)	0.10	(-0.37- 0.57)	-0.12	(-0.44- 0.19)	0.47*	(0.00 - 0.93)
%Cortisone	-0.02	(-0.13 - 0.09)	0.01	(-0.03- 0.06)	0.14*	(0.00-0.27)	0.08	(-0.09- 0.24)	-0.04	(-0.15- 0.07)	0.02	(-0.14- 0.19)
3b. Women. N=130												
PSS	0.06	(-0.06 - 0.18)	2.07**	(0.80- 3.34)	-0.05	(-0.17- 0.06)	-0.03	(-0.22- 0.16)	-0.07	(-0.17- 0.03)	-0.06	(-0.21- 0.08)

Adrenal and gonadal
steroids¹

Cortisol	0.14*	(0.00 - 0.28)	0.04	(-0.08- 0.17)	0.00	(-0.13- 0.14)	0.04	(-0.19- 0.27)	-0.04	(-0.16- 0.08)	0.02	(-0.15- 0.19)
20βDHF	0.12*	(0.02 - 0.21)	0.07	(-0.02- 0.16)	0.03	(-0.06- 0.13)	0.09	(-0.06- 0.25)	-0.00	(-0.08- 0.08)	0.05	(-0.06- 0.17)
20αDHE	0.10*	(0.01 - 0.18)	0.06	(-0.04- 0.16)	0.03	(-0.06- 0.11)	0.09	(-0.05- 0.23)	0.02	(-0.06- 0.09)	0.06	(-0.05- 0.16)
Cortolone	0.11*	(0.02 - 0.21)	-0.02	(-0.11- 0.07)	0.08	(-0.01- 0.17)	0.20*	(0.05- 0.35)	-0.01	(-0.09- 0.07)	0.07	(-0.05- 0.18)
20αDHE/20βDHE	-0.08	(-0.19 - 0.03)	-0.01	(-0.05- 0.03)	-0.10*	(-0.21--0.00)	0.20*	(-0.37--0.02)	0.09	(-0.01- 0.18)	-0.02	(-0.16- 0.11)
Cotisone/11-dehydro- corticosterone (E/A)	0.02	(-0.06 - 0.11)	0.03	(-0.08- 0.14)	-0.03	(-0.11- 0.06)	-0.03	(-0.18- 0.11)	0.14**	(-0.22--0.07)	-0.10	(-0.21- 0.00)
Cortisol/Cortisone	-0.01	(-0.07 - 0.06)	-0.01	(-0.10- 0.08)	-0.04	(-0.10- 0.02)	-0.07	(-0.17- 0.04)	0.09**	(-0.14--0.04)	-0.09*	(-0.16--0.01)
%Cortisol	-0.03	(-0.07 - 0.00)	-0.01	(-0.08- 0.05)	-0.02	(-0.05- 0.02)	-0.03	(-0.09- 0.02)	0.05**	(0.02- 0.08)	0.02	(-0.03- 0.06)
%20βDHF	0.05*	(0.00 - 0.09)	0.02	(-0.03- 0.06)	0.04*	(0.00- 0.09)	0.06	(-0.02- 0.13)	-0.02	(-0.06- 0.02)	0.03	(-0.03- 0.08)
%20αDHE	0.03	(-0.01 - 0.07)	0.00	(-0.05- 0.05)	0.04*	(0.00- 0.07)	0.05	(-0.00- 0.11)	-0.00	(-0.04- 0.03)	0.03	(-0.01- 0.07)
20αDHF/Cortisol	0.00	(-0.08 - 0.08)	-0.00	(-0.10- 0.10)	0.06	(-0.02- 0.13)	0.07	(-0.06- 0.20)	0.07**	(0.01- 0.14)	0.08	(-0.01- 0.18)
20βDHF/Cortisol	0.00	(-0.08 - 0.08)	0.03	(-0.05- 0.11)	0.06	(-0.02- 0.13)	0.07	(-0.06- 0.20)	0.07**	(0.01- 0.14)	0.08	(-0.01- 0.18)

¹ All outcomes have been transformed into logarithms to correct skewness.

**p<0.01, *p<0.0

Artículo 2

Gender differences in the indirect effect of psychosocial work environment in the association of precarious employment and chronic stress: A cross-sectional mediation analysis

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Gender differences in the indirect effect of psychosocial work environment in the association of precarious employment and chronic stress: A cross-sectional mediation analysis

Abstract:

Gender differences in the association between precarious employment and chronic stress have been found but the mechanisms underlying this relationship have not been explored. The main objective of this study was to evaluate the mediating effects of psychosocial risk factors at work (i.e., demands, control, and support) and work–life conflicts in the relationship between precarious employment and chronic stress as measured through the production of steroid hormones (both adrenal and gonadal) for men and women separately.

Cross-sectional data were derived from a sample of workers from Barcelona ($n = 125\text{--}255$ men; 130 women). A set of 23 markers were determined from hair samples to evaluate the production of both adrenal and gonadal steroids. Decomposition analyses were applied to estimate the indirect effects of psychosocial risk factors and work–life conflict using linear regression models.

Gender differences in the association between precarious employment and steroids production were confirmed. Psychosocial risk factors and work–life conflicts had indirect effects only among women ($\beta_{\text{Cortisol}} = 0.18$; 95% CI: 0.04–0.32; $\beta_{\text{Cortisol/Cortisone}} = 0.19$; 95% CI: 0.08–0.31; $\beta_{\% \text{Cortisol}} = 0.12$; 95% CI: 0.05–0.20). Gender

differences suggest that the physiological response to precarious employment could be determined by the social construction of gender identities, as well as by positions and roles in the labour market and family.

Future studies should delve further into these differences to improve employment and working policies, thus mitigating gender inequalities in the labour market to prevent work-related stress.

Keywords: cortisol; stress; precarious employment; psychosocial risk factors; gender.

1. Introduction

Precarious employment (PE) refers to a generalized phenomenon of employment insecurity, income inadequacy, and lack of rights and protection that has become widely extended in recent decades in Europe [1–3]. It is recognized as a significant social determinant of workers health, both physical and mental [4]. The Precarious Employment and Stress: The Biomedical Embodiment of Social Factors (PRESSED) project, which includes this study, aims to explain the links between PE and stress [5–7].

Stress is associated with poor mental and physical health [8] and increases the risk of suffering from various health problems, such as cardiovascular disease, metabolic syndrome, osteoporosis and/or depression [9], coronary heart disease [10], mental health [11], hypertension [12], and musculoskeletal disorders [13]. For these reasons, stress is a major public health problem in today's societies. In social epidemiology research, stress is mainly measured through self-reported indicators; however, it is often pointed out that these measures can be affected by biases in the subjective interpretation of stressful events. Furthermore, from the embodiment perspective, the psychosocial work environment can be biologically incorporated, transforming the individual's physiological characteristics over time while bypassing their consciousness [14]. Such assumptions imply that the embodiment of PE should be measured through biomarkers and not only self-reported indicators. The PRESSED project aims to overcome these limitations by using indicators of steroid hormone production, such as cortisol and its metabolites.

Cortisol is a glucocorticoid steroid hormone involved in the body's response to stress and, therefore, it is widely used as an indicator of stress [15]. Other steroid biomarkers related to both the hypothalamic–pituitary–adrenal (HPA) axis (e.g., cortisol metabolites) and the hypothalamic–pituitary–gonadal (HPG) axis, (e.g., testosterone or dehydroepiandrosterone) have recently been used [16,17]. Hair is normally preferred for chronic measurements since it has been shown to be a more accurate and robust medium than serum, saliva, or urine, which may be affected by factors such as circadian rhythm or needle apprehension [18]. In the PRESSED project, cortisol and metabolites from both the HPA and HPG axes were measured in hair to obtain chronic information from both axes.

Previous studies found associations between stress, temporariness [19], and perceived insecurity [20], two unidimensional measures of PE widely used in the literature. However, unidimensional measures have not been proven to be able to capture the phenomenon of PE in its full extent, and often the results of their association with health have been contradictory [1]. For this reason, the PRESSED project uses a multidimensional measure—the EPRES scale—that has been highlighted as an insightful tool for operationalizing PE, employing an instrument that encompasses six dimensions: temporariness, disempowerment, vulnerability, wages, rights, and the exercise of rights [21].

A recent PRESSED-related study showed an association between PE and both subjective (PSS) and objective (adrenal and gonadal steroid production) chronic stress, although the latter showed significant

differences between men and women [6]. The next step within this project is to study the pathways underlying this association that could explain the differences between men and women in physiological responses to PE.

Some conceptual frameworks suggest that PE may affect health through the psychosocial work environment shaped by the work organisation. On the one hand, from a social epidemiology perspective, the health risks associated with the psychosocial environment are related to the deterioration of working conditions because of the precariousness of employment conditions [4]. On the other hand, from a psychosocial epidemiology approach, it has been pointed out that social processes at the macro-level (e.g., employment conditions) and meso-level (e.g., work organisation) lead to perceptions and psychological processes at the individual level, such as work-related stress. Chronic stress could be produced by the psychosocial work environment through direct psychobiological processes or by modifying behaviours and lifestyles [22–24]. Based on this approach, the *PRESSED* conceptual framework suggests that the psychosocial work environment is an intermediate step in a causal pathway that links economic, social, and political structures with chronic stress through psychological and physiological processes [5].

PE conditions have a negative impact on work organization, creating psychosocial environments that are hazardous for the health and well-being of workers. Recent studies suggest that workers in PE are more likely to experience psychosocial risks, such as work- place violence,

sexual harassment, bullying, discrimination [25], high-strain jobs [26], and effort–reward imbalance [27,28].

Therefore, recent evidence shows a moderate association between stress-related mental disorders and effort–reward imbalance, high job demands, organizational justice, social support, high emotional demands, and decision-making authority [29]. Strong evidence shows that high job demands, low job control, low support from co-workers, low supervisor support, low procedural fairness, low relational justice, and high effort–reward imbalance can be used to predict the incidence of stress-related disorders [30].

According to the International Labour Organization’s definition, psychosocial risk factors extend to extra-organizational aspects, such as domestic demands, which may affect workers’ health [31]. Specifically, work–life conflict (WLC) is a relevant psychological stressor in contemporary working life that has increased amongst employees in most economic sectors [32,33]. It is a form of inter-role conflict whereby fulfilling role demands emanating from the work domain interferes with fulfilling role demands in the home domain or in leisure activities [34]. Strong main effects of job-related efforts, rewards, and over-commitment on WLC were found, while perceived schedule flexibility and work–life integration were also found to significantly reduce WLC [33]. In turn, it has been found that a poor work–life balance is associated with poor psychosocial well-being [35].

This study analyses gender differences in the indirect effects of a set of psychosocial risk factors (i.e., psychological demands, control, and social support) and work–life conflict on the relationship between multidimensional PE and the production of steroid hormones (both adrenal and gonadal) in salaried workers from Barcelona city.

2. Materials and Methods

2.1. Study Design and Sampling

A cross-sectional study was conducted based on a sample of 255 employees from Barcelona, Spain, aged 25–60 years (125 men and 130 women), as described elsewhere [6]. Briefly, the sample design was non-probabilistic and based on proportional quotas determined by sex, age group, place of birth, and socioeconomic level of the district of residence. Participants were recruited from a pool of participants from the 2017 Barcelona Health Survey within the selected age range who had agreed to being contacted again for future studies and agreed specifically to being contacted by the University for this project ($n = 1210$). Furthermore, the abovementioned recruitment strategy was complemented with 40 individuals contacted through social and labour organizations in order to offset the bias of this subsample toward profiles with higher levels of education and income. Under the assumptions of an alpha risk of 0.05 and a beta risk below 0.2 (80% power) in a two-sided test, and with a sample loss rate of 0%, our sample size allowed us to estimate correlation coefficients of 0.175. Without exemptions, the inclusion criteria were: (i) being a salaried worker or an independent worker, (ii) being between 24 and

60 years old, (iii) living independently in Barcelona, (iv) having hair at least 1 cm in length on the back of the head, and (v) not having been off work (on holiday or on work leave) within the month prior to the interview. Exclusion criteria were: (i) having taken corticosteroids in the month prior to the interview, (ii) having an adrenal disease, and (iii) being pregnant, as gestation could alter cortisol levels.

A face-to-face interview of approximately 40 min was conducted with each sample subject in which a questionnaire was administered including questions on the topics of interest for the study (PE, working conditions, uncertainty, support networks, perceived stress, and physical and mental health), as well as items on sociodemographic characteristics.

The first centimetre of the lock of hair in contact with the scalp was sent for analysis in order to obtain information on steroids produced during the month prior to sample collection.

2.2. Variables

Outcome variables. A comprehensive steroid profile was measured in hair using a previously validated method based on as liquid chromatography-tandem mass spectrometry [34]. Steroids and metabolites were divided between adrenal steroids (providing information about the HPA axis), including hair cortisol level 20 α -dihydrocortisol (20 α DHF), 20 β -dihydrocortisol (20 β DHF), Cortisone, 20 α -dihydrocortisone (20 α DHE), 20 β dihydrocortisone (20 β DHE), Cortolone, 11-dehydrocorticosterone and androstenedione and gonadal steroids (providing information about the HPG axis), also including

androstenedione, testosterone, and progesterone levels. Besides the hair concentrations of the targeted steroids, several ratios were included in order to evaluate the activity of key enzymes in the production and metabolism of steroids. As an example, the cortisol/cortisone ratio was calculated to evaluate the activity of the enzyme 11 β -hydroxysteroid dehydrogenase (responsible for the interconversion between cortisol and cortisone). Additionally, the relative abundance of each glucocorticosteroid (in %) was calculated as an additional marker. Since the distributions of the steroids and ratios are very dissimilar, the natural logarithm has been used to fit them to a normal distribution and obtain more reliable statistics.

Explanatory variables. PE was measured through an adaptation of the EPRES validated to the PRESSED data. The psychometric properties of this scale were published elsewhere [6]. The scale consists of 24 indicators sorted into the EPRES's dimensions specified above and another dimension related to extra working hours. Each dimension contributed equally to the total score, regardless of its number of items. To obtain an equal weight scale, each dimension score was computed independently, standardized, and integrated into a global summary score. Accordingly, the items in each dimension were added together, and the overall score was transformed into a 0 to 4 score. Then these scores were averaged into a global EPRES score, which ranged from 0 (not precarious) to 4 (most precarious) [21].

Mediators. The WLC and PRF dimensions “Psychological Demands”, “Control”, and “Social Support” were measured using 32 items from the COPSOQ III [37]. Scores for each dimension were

computed through simple averages of its corresponding items. Exploratory analyses, confirmatory factor analyses, and Cronbach's alpha coefficients were used to evaluate the scales' validity and reliability, respectively (see Supplementary Tables S1–S3 in the Supplementary Materials). Regarding the validity, factor-loading estimates revealed that all items were related to their theorized dimensions. The scale exhibited acceptable psychometric properties and reliability ($\omega = 0.78$ for the “Demands” score; $\omega = 0.71$ for the “Control” score; $\omega = 0.76$ for the “Support” score; $\omega = 0.81$ for the “Work–Life Conflict” score). The factor structure was confirmed with CFA (χ^2 (df) = 732.672 (203), $p < 0.0001$; CFI = 0.939; TLI = 0.930; RMSEA (95% CI) = 0.104 (0.096–0.112); all paths statistically significant).

Covariates. The covariates used for adjustment were age (continuous), body mass index (BMI), occupational social class (i.e., "Manual", "Non-manual"), and a proxy of care work (people younger than 14 years old at home).

2.3. *Statistical analysis*

A description of the studied sample was performed. Means and their standard deviation were calculated for continuous variables and prevalence and 95% CI for categorical variables.

Linear regression models were fitted to estimate the association of PE, PRFs and WLC with steroid production. Two models were estimated. Model 1 (crude) was adjusted for age and BMI. Model 2 (adjusted) was further adjusted for occupational social class, care work, demands, control, social support, and WLC.

The Karlson-Holm-Breen (KHB) method was used to estimate the indirect effect of PRFs and WLC on the relationship between PE and markers. Two models were fitted. Model 1 included demands, control, and social support as mediator variables, while in model 2, WLC was added as a mediator. Both models were adjusted for age, BMI, occupational social class, and care work. The KHB method allows the unbiased comparison of regression coefficients between models and the decomposition of mediation effects [36], [37]. This method therefore allows us to compare a reduced model with a full model. In the reduced model, PE predicts markers from two approaches, one fitting crude models, the other controlling for covariates. In the full model, PRFs are introduced as ‘Z variables’, and the model is controlled for them. For theoretical reasons, these Z variables are conceptualized as mediators that influence markers. The difference in coefficients between the reduced and full models represents the spurious component of the effect of PE on markers, which includes the association mediated by PRFs and WLC. Standard errors were adjusted for heteroscedasticity to obtain a robust estimate of variance. All the analyses were stratified by sex and conducted using Stata 16.0. Results were considered significant when $p < 0.05$.

2.4. Ethics

This study was reviewed and approved by the Institutional Commission for Ethics Review of Projects (CIREP) of Universitat Pompeu Fabra (UPF) under CIREP number 0079. All participants in the study signed a written informed consent form prior to the start of the study and were reminded that they could withdraw at any time. All data used in this project followed the laws of Spain governing personal

data protection, fulfilling all legal and ethical requirements. They were duly processed, preserving data anonymity and confidentiality.

3. Results

3.1. Descriptive Results

The characteristics of the sample studied are shown in Table 1. Gender differences on markers levels were significant for 20α DHF, 20α DHE, cortisone, androstenedione, cortolone, testosterone, % 20α DHE, 20α DHF/Cortisol, which were higher among men; and Cortisol/Cortisone, %Cortisol, % 20α DHF, % 20β DHF, % 20β DHE 20α DHF/ 20β DHF, which were higher among women. No gender differences were found for PE. Regarding PRFs, “Demands” was higher among women (0.47; 95%CI: 0.44-0.50 vs. 0.41; 95%CI: 0.38-0.45). Gender differences for WLC were not found.

3.2. Precarious Employment, Psychosocial risk factors, and Production of Adrenal and Gonadal Steroids

The association of markers with PE and PRFs concomitantly is presented in Table 2. Linear regression coefficients adjusted for control variables are shown in Table 2a for men and 2b for women. Among men, androstenedione ($\beta=0.22$; 95%CI: 0.01-0.44) and testosterone ($\beta=0.26$; 95%CI: 0.02-0.50) were associated with PE, after adjusting for PRFs. Concerning PRFs, 20α DHF/ 20β DHF ($\beta=0.68$; 95%CI: 0.01 - 1.34), Cortisol/Cortisone ($\beta=0.66$; 95%CI: 0.13-1.20) and %Cortisol ($\beta=0.53$; 95%CI: 0.16 - 0.90) were positively associated with “Demands”, whilst 20α DHF/Cortisol ($\beta=-0.66$; 95%CI: -1.15 - -0.18) was negatively associated. There are no steroids associated with “Control”. “Social Support” showed positive coefficients for %Cortisone ($\beta=0.28$; 95%CI: 0.04 - 0.51), and negative for 20α DHF ($\beta=-0.95$; 95%CI: -1.84 - -0.07), 20β DHF ($\beta=-0.71$; 95%CI: -1.35 - -0.07) and Cortisol/Cortisone ($\beta=-0.57$; 95%CI: -1.06 - -0.08). WLC

was negatively associated with 20 α DHF/20 β DHF (β =-0.57; 95%CI:-1.09 - -0.06).

Among women, negative associations between PE and Cortisol/Cortisone (β =-0.35; 95%CI: -0.56 - -0.14) and %Cortisol (β =-0.24; 95%CI: -0.38 - -0.09) were found after adjusting for PRFs. Concerning PRFs, “Demands” showed positive coefficients for Cortisol/Cortisone (β =1.02; 95%CI: 0.50 - 1.54), %Cortisol (β =0.59; 95%CI: 0.21 - 0.97), %20 α DHF (β =0.66; 95%CI: 0.18 - 1.14), %20 α DHE (β =0.37; 95%CI: 0.12 - 0.61), and negative coefficients for androstenedione (β =-0.95; 95%CI: -1.63 - -0.27), Cortisone/dehydrocorticosterone (β =-0.78; 95%CI: -1.41 - -0.15), and %Cortisone (β =-0.47; 95%CI: -0.66 - -0.27). “Control” was positively associated with Cortisol/Cortisone (β =0.94; 95%CI: 0.35 - 1.53) and %Cortisol (β =0.52; 95%CI: 0.11 - 0.93), and negatively associated with %Cortisone (β =-0.39; 95%CI: -0.64 - -0.14). Cortisone (β =0.49; 95%CI:0.11 - 0.86), Cortisone/dehydrocorticosterone (β =0.64; 95%CI: 0.14-1.13) and %Cortisone (β =0.37; 95%CI:0.19-0.55) were positively associated with “Social Support”, whilst 20 α DHE/20 β DHE (β =-0.25; 95%CI: -0.45- -0.04), Cortisol/Cortisone (β =-0.53; 95%CI: -1.00 - -0.06), %20 α DHF (β =-0.52; 95%CI: -0.86 - -0.18), %20 β DHF (β =-0.20; 95%CI: -0.40 - -0.00), %20 α DHE (β =-0.45; 95%CI: -0.66 - -0.24) and %20 β DHE (β =-0.20; 95%CI: -0.38 - -0.03) were negatively associated. WLC showed a negative coefficient for dehydrocorticosterone (β =-0.41; 95%CI:-0.78 - -0.03).

3.3. Precarious employment and Production of Adrenal and Gonadal Steroids: The indirect effect of psychosocial risk factors

Table 3 shows the results of KHB decomposition analyses for those steroids that were associated with PE. Thus, the indirect effect of PE through the PRFs and work-life conflict could be estimated, while the comparison between model 1 and model 2 allows estimating the change in the indirect effect when work-life conflict is added as a mediating variable.

Among men, no indirect effect of PRFs was observed. There were no indirect effects when adding WLC as a mediator, although a significant total effect was observed in both gonadal steroids ((β Androstenedione: 0.22; 95% CI: 0.02 - 0.43)); (β Testosterone: 0.26; 95% CI: 0.02 - 0.50)). Among women, indirect effects for some adrenal steroids such as Cortisol (β = 0.18; 95% CI: 0.04 - 0.32), Cortisol/Cortisone (β 0.19; 95% CI: 0.08 - 0.31) and %Cortisol (β 0.12; 95% CI: 0.05 - 0.20) were found in model 1, while, when incorporating WLC as a mediator, there was no indirect effect for Cortisol, and the magnitude of the effect decreased for the other steroids ((β Cortisol/Cortisone: 0.15; 95% CI:0.02 - 0.28) ; (β % Cortisol: 0.09; 95% CI:0.01 - 0.18)).

4. Discussion

Following the results of a previous PRESSED-related article where associations between PE and steroid hormones were found [6], the main objective of this study was to explore the role of the psychosocial work environment as a possible mediator in such a relationship. To achieve this objective, the statistical analysis was performed in

two steps: firstly, the association between PE and steroid hormone production was estimated, adjusting for PRF and WLC, as well as for covariates. Secondly, the indirect effects of PRFs and WLC on this relationship were estimated.

4.1. The Association between Precarious Employment and Steroid Hormone Production, Adjusting for PRF and WLC

The main results showed that the association between PE and steroid hormone production was maintained when adjusting for PRFs and WLC, with remarkable differences between men and women. A positive association between androgens—i.e., gonadal steroids, (AED and testosterone)—and PE was found among men. In contrast, women showed a negative association between PE and corticosteroids; i.e., adrenal steroids (cortisol and metabolites). Several potential explanations might lie behind these results.

From a biochemical point of view, gender differences in the production of steroid hormones and their relationship with stress have been previously described [39]. The results of this study suggested that PE would increase the production of gonadal steroids among men, leading to a subsequent rise in aggressiveness and dominant behaviour [40], thus highlighting the pivotal role of the HPG axis in men. In contrast, it was found that the role of the HPA axis is more important for women. The key function of the HPA axis in the relationship between PE and steroids is not surprising since overproduction of cortisol is a common biological feature under stress conditions. More surprising is the negative association observed between PE and

several metabolites related to the HPA axis. Although several studies have shown gender differences in cortisol production after stressful events [41], it is difficult to conclude that the negative correlation is exclusively due to biochemical reasons.

Sociological factors, such as working conditions, might also exacerbate gender differences in response to stressful situations. Previous studies have found gender differences in occupational health related to working conditions (Campos-Serna et al., 2013) that were linked to structural gender inequality in labour markets (Menéndez et al., 2007). A preliminary hypothesis could be that the physiological effect of PE is influenced by the social construction of gender identities, differentially affecting men and women. In a patriarchal system marked by the sexual division of labour, in which the masculine role mainly draws on the “male breadwinner” stereotype, men can be psychologically affected by the perception of not meeting the social expectations associated with their role. Thus, the increased production of gonadal steroids could be a way for men to respond psychophysiological to PE. This hypothesis is based on classic social psychology approaches suggesting that the impact of employment problems on health is related to the different positions and roles available for men and women in society and the family [42]. For example, it has been found that unemployment was more negatively related to mental health among men than among women in a gender regime in which the need for employment differed between sexes (Ireland), while men and women were equally affected by unemployment in a gender regime where there was a similar need for employment (Sweden) [43].

Therefore, men and women have different psychosocial and economic employment needs based on gender roles [44]. In fact, in this study, we found that, among women, the association between some steroids and PE presented negative coefficients, showing an inverse relationship to that hypothesised. This may have been because, unlike men, women's perceptions of PE are not influenced by the role of providers. Furthermore, the position of women in the sexual division of labour as the main partner responsible for care and home duties may imply that some characteristics of PE, such as flexibility or a low workload, are perceived as beneficial because they contribute to reconciling paid and unpaid work [45].

It should be noted that, although the sexual division of labour has been losing its rigidity over time, mainly due to the massive and sustained entry of women into the job market (Soares and Falcão, 2015), there has not been any effective redistribution of responsibilities within the family, where changes are slower and co-responsibility between men and women is still a long way off [46,47]. Furthermore, gender relations within family frameworks still tend to be patriarchal, and even if occupational status is higher, women rarely have enough power to force men to agree to an equitable division of domestic work and childcare [48–50].

4.2. The Indirect Effect of Psychosocial Risk and Work–Life Conflict in the Association between Precarious Employment and Steroid Hormones Production

Regarding the psychosocial work environment, it was found that, for both men and women, high demands and low social support were the two psychosocial factors associated with the production of the highest number of steroids. Although the meaning of these associations is not entirely conclusive, it is noteworthy that, for low social support, the associations with most steroids were negative, while for high demands, the majority were positive. This implies that, while low social support increases steroid production, high demands reduce it, suggesting that the latter could be a protective mechanism. In this sense, several previous studies of mental health have found that high demands reduce the risk of depression and anxiety disorders [51,52].

At the same time, the existence of indirect effects of PRFs and WLC on the relationship between PE and steroids production would indicate that a proportion of the association between the exposure and the outcome of interest crystallizes through the psychosocial work environment. The results show significant indirect effects only for women, suggesting the existence of gender differences in the psychophysiological response to PE. A recent study found a full mediation by PRFs of PE and mental health among women and a partial mediation among men. The authors suggest that women are more exposed to worse work- ing conditions, including the psychosocial environment, due to occupational segregation of gender in the labour market [53]. Both the findings show that the psychosocial work envi-

ronment has a greater weight in women's psychological and physiological responses to PE than with men. Thus, women may react more to proximal factors, such as the psychosocial environment, than to distal factors, such as PE, while precisely the opposite occurs among men. The study does not allow further progress in determining the possible causes of these differences. However, it will be necessary to delve into gender differences in perceptions of working and employment conditions in future studies.

4.3. Strength and Limitations

This study has some limitations inherent to a cross-sectional design. Firstly, it was not possible to estimate a direct causal effect, and possible reverse causality must be considered: high production of steroids (which could indicate psychophysiological alterations) at the beginning of the study may have increased the chances of having a precarious job or a hazardous psychosocial environment. Second, there was no information on the period during which these individuals were exposed to PE or PRFs, which may have somewhat altered the results. Therefore, further longitudinal studies are needed.

On the other hand, a notable strength of this article was its use of biological markers, something new not just in the study of PE but also in the field of social epidemiology, where subjective and/or self-reported health measures are usually used. In turn, in biochemical research, simultaneously studying the two axes (gonadal and adrenal) in hair is also new. In previous studies, only steroids of the adrenal axis have been studied.

At the same time, this article shows the importance of considering employment conditions in the study of psychosocial working conditions. Most psychosocial risk models theoretically assume social causality, where the organization of work determines the psychosocial work environment, but they do not explain the individual's relationship with the environment [54]. Furthermore, assimilating the "social" to the "psychological" means that the models are unable to explain how the social structure determines the psychosocial work environment [22]. Taking PE into account allows us to explain how the political context and labour relations determine the organization of work in a complex process that impacts on workers' health. Therefore, empirical advances such as those offered in this article stimulate the development of new theoretical and methodological frameworks that relate psychosocial risks to PE to explain the global impact of the workplace on health.

5. Conclusions

Gender differences were found in the association between PE and the production of steroid hormones (both adrenal and gonadal) and in the indirect effects of PRFs and WLC. Biochemically, this could indicate the pivotal role of the HPG axis in men, the HPA axis being more important for women. In turn, these results suggest that the physiological effect of PE could be mediated by the social construction of gender identities, which draws on the "male breadwinner" stereotype. This contributes to supporting the hypothesis that the influence of PE on health is related to the different positions and roles of men and women in society and the family. Future studies should delve further

into these differences in the relationships between PE, PRFs, and their psychophysiological effects to improve employment and working policies, especially from the perspective of the social determinants of health. However, this hypothesis should be evaluated based on research designs and instruments that make it possible to understand the daily dynamics of work organization and how the psychosocial factors that put the health of female workers at risk are produced. Thus, it is necessary to conduct qualitative studies that make it possible to capture the experiences and perceptions of men and women within their daily work context.

Furthermore, this study highlights the importance of relating the psychosocial work environment to employment conditions in order to explain how structural factors (such as labour relations and employment policies) influence working conditions and affect health. Nevertheless, there are even more structural processes that precede PE and configure it, such as the fragmentation of workers' representation, holding multiple jobs, and the complexity of companies and organizations in the global economy. More studies are needed to analyse the impact of these phenomena on organizational structures and the employment and working conditions generated within them.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/ijerph192316073/s1>, Supplementary Table S1. Goodness-of-fit scales for PRFs and WLC from exploratory factor analysis. Precarious Employment and Stress Study sample, 2020. N men = 125, N women = 130; Supplementary Table S2. Goodness-of-fit

scales for PRFs and WLC from confirmatory factor analysis. Precarious Employment and Stress Study sample, 2020. N men = 125, N women = 130; Supplementary Table S3. Reliability of PRFs and WLC scales according to Cronbach's alpha. Precarious Employment and Stress Study sample, 2020. N men = 125. N women = 130.

Author Contributions: M.J. conceived and designed the study and led the data collection process. F.M.-R. participated in data collection. Ó.J.P. supervised the laboratory analysis. F.M.-R. and M.J. undertook the statistical analysis. M.J., F.M.-R. and Ó.J.P. reviewed the literature. All authors (F.M.-R., M.J. and Ó.J.P.) contributed substantially to the interpretation of data and reviewed and edited the final version. M.J. acquired the funding and is one of the PIs of the project. All authors have read and agreed to the published version of the manuscript.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to their containing information that could compromise the privacy of research participants.

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Table 1. Characteristics of the study population stratified by sex. Precarious Employment and Stress Study sample, 2020. [95% CI=95% confidence interval, SD = Standard deviation].

	Men (<i>n</i> = 125)		Women (<i>n</i> = 130)		<i>p</i> -Value
	Proportion	95%CI	Proportion	95%CI	
Occupational social class					
No manual	71.20	(39.95-43.41)	76.15	(68.76-83.54)	.
Manual	28.80	(20.79-36.81)	23.85	(16.46-31.24)	0.820
	Mean	SD¹	Mean	SD¹	
Age (years)	41.68	9.84	42.75	9.79	0.383
Body mass index (BMI) (kg/m ²)	25.34	3.59	24.75	4.31	0.233
Care work	0.54	0.77	0.61	0.85	0.480
Precarious employment (EPRES)	1.04	0.56	1.02	0.55	0.797
Psychosocial risk factors					
Demands	0,41	0.18	0,47	0.19	0,015
Control	0,30	0.18	0,82	0.17	0,440
Support	0,29	0.20	0,28	0.21	0,800
Leadership	0,43	0.21	0,39	0.20	0,176
Work-life conflict	0,44	0.22	0,47	0.26	0,299
Adrenal and gonadal steroids (ng/mg)					
Cortisol	12.42	18.90	9.33	7.35	0.090
20 α DHF	0.99	1.15	0.99	0.96	0.977
20 β DHF	5.67	4.19	4.46	2.71	0.007
20 α DHE	10.20	8.42	9.05	6.41	0.223
20 β DHE	7.48	5.70	5.37	3.26	0.000
Cortisone	33.89	18.37	26.88	17.20	0.002
Cortolone	8.73	3.94	7.09	3.08	0.000
11-Dehydrocorticosterone (A)	2.99	1.59	2.54	1.57	0.023
Testosterone	2.07	2.10	3.08	24.36	0.638
Androstenedione (AED)	5.43	3.07	3.91	2.90	0.000
Progesterone	232.62	1511.24	27.01	32.96	0.130
20 α DHF/20 β DHF	0.17	0.17	0.20	0.10	0.048
20 α DHE/20 β DHE	1.38	0.33	1.65	0.39	0.000
Cortisone/11-Dehydrocorticosterone (E/A)	13.01	7.09	12.97	8.82	0.968
Cortisol/Cortisone	0.36	0.45	0.36	0.24	0.901
%Cortisol	15.12	9.25	16.04	6.42	0.359
%Cortisone	50.54	10.29	48.51	9.16	0.097

%20 α DHF	1.23	0.76	1.61	0.82	0.000
%20 β DHF	8.18	2.74	8.24	2.15	0.843
%20 α DHE	14.30	3.92	15.85	4.39	0.003
%20 β DHE	10.63	2.80	9.75	2.18	0.006
20 α DHF/Cortisol	0.09	0.06	0.11	0.08	0.030
20 β DHF/Cortisol	0.65	0.31	0.59	0.28	0.074

Table 2. Linear regression coefficients and 95% confidence intervals (CI) for Production of Adrenal and Gonadal steroids and PE and PRFs concomitantly, adjusted for control variables and stratified by sex. Precarious Employment and Stress Study sample, 2020.

2a-Men		Psychosocial risk factors								
Adrenal and Gonadal steroids		EPRES	Demands		Control		Support		Work-Life conflict	
20 α DHF	0.23	(-0.14 - 0.59)	0.53	(-0.53 - 1.59)	0.94	(-0.26 - 2.13)	-0.95*	(-1.84 - -0.07)	-0.55	(-1.40 - 0.30)
20 β DHF	0.09	(-0.15 - 0.33)	-0.03	(-0.73 - 0.67)	0.57	(-0.24 - 1.39)	-0.71*	(-1.35 - -0.07)	-0.07	(-0.61 - 0.47)
Androstenedione	0.22*	(0.01 - 0.44)	-0.49	(-1.10 - 0.12)	-0.22	(-0.82 - 0.38)	-0.13	(-0.76 - 0.50)	-0.30	(-0.82 - 0.23)
Testosterone	0.26*	(0.02 - 0.50)	-0.33	(-1.12 - 0.46)	-0.24	(-1.00 - 0.53)	-0.47	(-1.19 - 0.24)	-0.18	(-0.74 - 0.38)
20 α DHF/20 β DHF	0.12	(-0.05 - 0.29)	0.68*	(0.01 - 1.34)	0.08	(-0.67 - 0.83)	0.05	(-0.60 - 0.70)	-0.57*	(-1.09 - -0.06)
Cortisol/Cortisone	-0.08	(-0.28 - 0.13)	0.66*	(0.13 - 1.20)	0.30	(-0.28 - 0.88)	-0.57*	(-1.06 - -0.08)	0.16	(-0.28 - 0.60)
%Cortisol	-0.08	(-0.24 - 0.08)	0.53**	(0.16 - 0.90)	0.18	(-0.23 - 0.58)	-0.25	(-0.60 - 0.09)	0.10	(-0.22 - 0.42)
%Cortisone	0.00	(-0.08 - 0.08)	-0.11	(-0.38 - 0.17)	-0.12	(-0.42 - 0.19)	0.28*	(0.04 - 0.51)	-0.09	(-0.29 - 0.12)
20 α DHF/Cortisol	0.11	(-0.08 - 0.30)	-0.66**	(-1.15 - -0.18)	-0.09	(-0.63 - 0.46)	0.02	(-0.44 - 0.48)	0.01	(-0.38 - 0.41)
2b- Women		Psychosocial risk factors								
Adrenal and Gonadal steroids		EPRES	Demands		Control		Support		Work-Life conflict	
Cortisone	0.09	(-0.11 - 0.29)	-0.47	(-1.04 - 0.10)	-0.33	(-1.00 - 0.34)	0.49*	(0.11 - 0.86)	-0.02	(-0.47 - 0.43)

Androstenedione	0.20	(-0.07 - 0.47)	-0.95**	(-1.63 - -0.27)	-0.15	(-1.04 - 0.74)	-0.06	(-0.61 - 0.48)	0.13	(-0.35 - 0.61)
Dehydrocorticosterone	0.12	(-0.14 - 0.37)	0.26	(-0.22 - 0.74)	0.38	(-0.25 - 1.01)	-0.16	(-0.52 - 0.20)	-0.41*	(-0.78 - -0.03)
20 α DHE/20 β DHE	-0.03	(-0.13 - 0.06)	0.16	(-0.09 - 0.40)	0.11	(-0.17 - 0.38)	-0.25*	(-0.45 - -0.04)	-0.05	(-0.22 - 0.12)
Cortisone/dehydrocorticosterone	-0.01	(-0.32 - 0.30)	-0.78*	(-1.41 - -0.15)	-0.52	(-1.29 - 0.26)	0.64*	(0.14 - 1.13)	0.38	(-0.17 - 0.94)
Cortisol/Cortisone	0.35**	(-0.56 - 0.14)	1.02**	(0.50 - 1.54)	0.94**	(0.35 - 1.53)	-0.53*	(-1.00 - -0.06)	-0.28	(-0.69 - 0.13)
%Cortisol	0.24**	(-0.38 - 0.09)	0.59**	(0.21 - 0.97)	0.52*	(0.11 - 0.93)	-0.16	(-0.49 - 0.17)	-0.21	(-0.50 - 0.08)
%Cortisone	0.09	(-0.00 - 0.17)	-0.47**	(-0.66 - -0.27)	-0.39**	(-0.64 - -0.14)	0.37**	(0.19 - 0.55)	0.10	(-0.07 - 0.27)
%20 α DHF	-0.09	(-0.30 - 0.12)	0.66**	(0.18 - 1.14)	0.56	(-0.00 - 1.13)	-0.52**	(-0.86 - -0.18)	-0.08	(-0.45 - 0.30)
%20 β DHF	-0.06	(-0.17 - 0.05)	0.26	(-0.01 - 0.53)	0.29	(-0.06 - 0.64)	-0.20*	(-0.40 - -0.00)	0.02	(-0.19 - 0.23)
%20 α DHE	0.01	(-0.11 - 0.13)	0.37**	(0.12 - 0.61)	0.15	(-0.14 - 0.43)	-0.45**	(-0.66 - -0.24)	-0.04	(-0.24 - 0.16)
%20 β DHE	0.04	(-0.05 - 0.13)	0.20*	(-0.03 - 0.44)	0.04	(-0.19 - 0.28)	-0.20*	(-0.38 - -0.03)	0.01	(-0.17 - 0.19)

1 All outcomes have been transformed into logarithms to correct skewness. ** p < 0.01, * p < 0.05

Table 3. Linea regression coefficients and 95% confidence intervals (CI) for the Production of Adrenal and Gonadal steroids and PE and PRFs, adjusted for control variables and stratified by sex, from the KHB-Method. Robust standard errors. Precarious Employment and Stress Study sample, 2020.

3a-Men		Direct		Total		Indirect	
Model 1	Coeff.	95%CI	Coeff.	95%CI	Coeff.	95%CI	
Androstenedione (AED)	0.13	(-0.08 - 0.35)	0.17	(-0.04 - 0.39)	-0.04	(-0.10 - 0.02)	
Testosterone	0.18	(-0.05 - 0.40)	0.23	(-0.01 - 0.46)	-0.05	(-0.13 - 0.02)	
Model 2	Coeff.	95%CI	Coeff.	95%CI	Coeff.	95%CI	
Androstenedione (AED)	0.13	(-0.07 - 0.34)	0.22*	(0.00 - 0.44)	-0.09	(-0.20 - 0.02)	
Testosterone	0.18	(-0.05 - 0.40)	0.26*	(0.02 - 0.49)	-0.08	(-0.20 - 0.04)	
3a-Women		Direct		Total		Indirect	
Model 1	Coeff.	95%CI	Coeff.	95%CI	Coeff.	95%CI	
Cortisol/Cortisone	-0.23*	(-0.40 - -0.05)	-0.39**	(-0.59 - -0.20)	0.17**	(0.06 - 0.27)	
%Cortisol	-0.17**	(-0.30 - -0.04)	-0.27**	(-0.41 - -0.14)	0.10**	(0.03 - 0.17)	
Model 2	Coeff.	95%CI	Coeff.	95%CI	Coeff.	95%CI	
Cortisol/Cortisone	-0.23**	(-0.40 - -0.06)	-0.35**	(-0.56 - -0.15)	0.12*	(0.00 - 0.24)	
%Cortisol	-0.17**	(-0.29 - -0.05)	-0.24**	(-0.38 - -0.10)	0.07	(-0.01 - 0.15)	

1 All outcomes have been transformed into logarithms to correct skewness. ** p < 0.01, * p < 0.05.

Supplementary Table S1. Goodness-of-fit PRF's and WLC scales from exploratory factor analysis. Precarious Employment and Stress Study sample, 2020. N men=125, N women= 130.

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Uniqueness
How often do you not have time to complete all your work tasks?	0.28	-0.17	0.55		0.59
Do you have enough time for your work tasks?	0.37		0.53		0.56
Do you have to work very fast?	0.40	0.12	0.43	0.12	0.63
Do you have to deal with other people's personal problems as part of your work?			0.49	-0.12	0.74
Do you work at a high pace throughout the day?	0.35		0.54		0.58
Is your work emotionally demanding?	0.31	0.14	0.65		0.46
Does your work require that you hide your feelings?	0.20	0.26	0.47		0.66
Do you have a large degree of influence on the decisions concerning your work?		0.20	-0.13	0.65	0.52
Do you have any influence on HOW you do your work?		0.17		0.67	0.50
Do you have the possibility of learning new things through your work?	0.12	0.51	-0.32	0.32	0.52
Can you use your skills or expertise in your work?		0.45	-0.30	0.32	0.60
Do you feel that the work you do is important?		0.42		0.13	0.80
How often do you get help and support from your immediate superior, if needed?	0.19	0.65	0.18	0.17	0.48
How often does your immediate superior talk with you about how well you carry out your work?		0.63		0.23	0.55
How often do you get help and support from your colleagues, if needed?		0.64			0.58
Do you feel part of a community at your place of work?		0.63			0.59
Do you feel that your work drains so much of your energy	0.76	0.12	0.21		0.35

that it has a negative effect on your private life? Do you feel that your work takes so much of your time that it has a negative effect on your private life?	0.85	0.10		0.26
Are there times when you need to be at work and at home at the same time? The demands of my work interfere with my private and family life?	0.42	0.15	-0.18	0.77
	0.68	0.16		0.50

Supplementary Table S2. Goodness-of-fit PRF's and WLC scales from confirmatory factor analysis. Precarious Employment and Stress Study sample, 2020, N men=125, N women= 130.

	χ^2 [df], p-value	CFI	Δ CFI	TLI	Δ TLI	RMSEA (90% CI)	Δ RMSEA
Regular CFA							
	732.672 [203]; p<0.001	0.939	-	0.930	-	0.104 (0.096-0.112)	-
Multi-group CFA by women and men							
Configural invariance	1044.355 [406]; p<0.001	0.935	0	0.926	0	0.114 (0.106-0.123)	0.010
Metric invariance	10344.527 [462]; p<0.001	0.930	- 0.005	0.924	- 0.002	0.116 (0.108-0.124)	0.002
Thresholds invariance	31.217.153 [368]; p<0.001	0.935	0.005	0.938	- 0.014	0.105 (0.097-0.113)	-0.011

Supplementary Table S3. Reliability of PRF`s and WLC scales from Cronbach`s alpha. Precarious Employment and Stress Study sample. 2020. N men=125. N women= 130.

Item	Obs	Sign	Item- test corre- lation	Item- rest corre- lation	Ave- rage inter- item cova- riance	Alpha
Demands						
How often do you not have time to complete all your work tasks?	254	+	0.64	0.48	0.03	0.76
Do you have enough time for your work tasks?	254	+	0.65	0.51	0.03	0.75
Do you have to work very fast?	254	+	0.61	0.48	0.04	0.76
Do you have to deal with other people`s personal problems as part of your work?	254	+	0.60	0.41	0.04	0.77
Do you work at a high pace throughout the day?	254	+	0.69	0.57	0.03	0.74
Is your work emotionally demanding?	254	+	0.77	0.64	0.03	0.72
Does your work require that you hide your feelings?	254	+	0.64	0.46	0.03	0.76
Test scale					0.03	0.78
Control						
Do you have a large degree of influence on the decisions concerning your work?	255	+	0.70	0.48	0.03	0.66
Do you have any influence on HOW you do your work?	255	+	0.64	0.43	0.03	0.68
Do you have the possibility of learning new things through your work?	255	+	0.77	0.56	0.02	0.62
Can you use your skills or expertise in your work?	255	+	0.73	0.53	0.02	0.64
Do you feel that the work you do is important?	255	+	0.55	0.36	0.03	0.70
Test scale					0.03	0.71
Support						
How often do you get help and support from your	246	+	0.81	0.63	0.03	0.66

immediate superior. if needed?						
How often does your immediate superior talk with you about how well you carry out your work?	246	+	0.78	0.56	0.03	0.71
How often do you get help and support from your colleagues. if needed?	246	+	0.73	0.54	0.04	0.72
Do you feel part of a community at your place of work?	246	+	0.72	0.52	0.04	0.72
Test scale					0.03	0.76
Work-life conflict						
Do you feel that your work drains so much of your energy that it has a negative effect on your private life?	253	+	0.85	0.70	0.04	0.72
Do you feel that your work takes so much of your time that it has a negative effect on your private life?	253	+	0.89	0.76	0.04	0.68
Are there times when you need to be at work and at home at the same time?	253	+	0.61	0.40	0.07	0.85
The demands of my work interfere with my private and family life?	253	+	0.81	0.65	0.05	0.74
Test scale					0.05	0.81

Artículo 3

Precarious employment, psychosocial risk factors and poor mental health: A cross-sectional mediation analysis

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Precarious employment, psychosocial risk factors and poor mental health: A cross-sectional mediation analysis

Abstract

Objectives:

This study analyzes the mediating effect of psychosocial risk factors at work (i.e. psychological demands, control and social support) (PRFs) in the relationship between precarious employment and mental health among formal salaried men and women from 22 European countries.

Methods:

Cross-sectional data were derived from IV European Working Conditions Survey (n=15,932 —7,650 men, 8,282 women). Linear regression models and KHB decomposition analyses were applied to estimate the mediating effect and confounding percentages of PRFs.

Results:

Among men, the association between PE and poor mental health decreased after controlling for PRFs ($\beta=2.55$, 95%CI:0.43-4.68), leaving a significant indirect effect ($\beta=6.26$, 95%CI: 5.31 - 7.22) (partial mediation effect). Among women, a full mediation effect was found since the direct effect of PE was not significant, leaving a significant indirect effect ($\beta= 6.02$, 95%CI: 5.24 - 6.79).

Conclusions:

Gender differences on the PRFs mediating effect were found, which suggest that women's employment and working conditions are more heterogeneous than among men. These differences may be related to the difficulties of women to improve their working and employment conditions within labor markets and workplaces segregated by gender. Future studies should further delve into these gender inequalities in the relationship between precarious employment, PRFs and mental health, to improve OHS policies, especially from a macro-social perspective.

Keywords:

Quality of employment; psychosocial work environment; psychological well-being; gender difference; KHB decomposition method.

Introduction

Over the last 30 years, there have been substantial changes in labor markets of post-industrial countries. Factors such as globalization, neoliberal policies, technological advances, and deindustrialization have developed a demand for a more flexible workforce.[1] This flexibilization, alongside a decreased impact of trade unions, have contributed to the rise of insecure and low-quality forms of employment.[2] Accentuated by the financial crisis of 2008 and the rise of the “gig economy”, the prevalence of non-standard employment forms characterized by low or no long-term security has increased.[3] In this context, the concept of precarious employment (PE) emerged to indicate this generalized phenomenon of employment insecurity, income inadequacy, and lack of rights and protection, [4] which is transversal to all types (or absence) of contracts and occupational categories.[5]

The precariousness of employment relationships and its impact on organizational structures create new risks for workers' health and safety.[6] Factors that contribute to the configuration of PE, such as for example multiple job-holding, the fragmentation of workers' representation, and the increasing complexity of organizations that blur responsibilities within them, hamper the application of occupational health and safety (OHS) practices.[6] As a result, risks of injury and other adverse health outcomes including poor mental health have emerged associated with more inadequate training and supervision, pressures to work more quickly, deficiencies in risk assessment

processes, as well as fragmented occupational health and safety management systems (OHSMS).[7-10]

As a matter of fact, several longitudinal studies have shown that PE negatively affects the mental health of workers.[11] However, most of these studies were based on one-dimensional proxies of PE (e.g. temporary employment, perceived job insecurity), which simplify the multiple forms PE can take and, consequently, the pathways through which PE can affect health.[12] To overcome these limitations, some multidimensional PE measurement instruments have been developed. One of them, the Employment Precariousness Scale (EPRES), that has been highlighted as an insightful attempt to operationalize PE from a multidimensional perspective.[2,4] Concretely, this instrument encompasses six dimensions: temporariness, disempowerment, vulnerability, wages, rights and exercise of rights.[13] Some studies have already reported clear associations between EPRES and health outcomes such as poor mental health.[14, 15] and low subjective well-being.[16]

Despite these advances, current understanding of the pathways and mechanisms linking PE to poor health, both physical and mental, continues to be a central challenge. From a theoretical perspective, it has been suggested that psychosocial working conditions could act as one of these pathways.[17] Certainly, research on the overall social determinants of health and especially in OHS has long demonstrated that the work environment involves a series of psychological processes determined by the organization of work that constitute risk factors for the physical and mental health of workers.[17].

Accordingly, psychosocial risks and their effect on mental health have been highlighted as one of the main challenges for OHS associated with the loss of job security and PE.[6]

A large body of research on psychosocial risks factors (PRF) is based on the Demand-Control-Social Support model that measures the health effect of high strain situations, in which high demands are combined with low decision opportunities, as well as high social support in the workplace as a moderator of high strain's adverse impact.[19-21] A meta-review found four reviews that provided good evidence for a strong relationship between high job demands, low job control, and low social support, and poorer employee mental ill-health.[**Error! Reference source not found.**] Another systematic review and meta-analysis with additional individual participant data found that high strain was associated with an increased risk of clinical depression.[22]

Despite all the evidence provided, the overarching relationship between PE, PRFs at work, and mental health has not been sufficiently studied.[16] Therefore, this study addresses the hypothesis that PRFs act as a pathway through which PE impacts mental health. Identifying the mechanisms that relate PE with poor mental health, allows the design of tailored policies and interventions, both at the institutional and organizational level, that effectively reduce these adverse effects of PE.

On top of that, it has been pointed out in the literature that socioeconomic characteristics such as occupational social class, gender, immigrant status, and age, may interact with attributes of PE producing

differential health effects.[16] Although other factors such as social class [24] or migration [25] have shown their importance in relation to psychosocial factors at work, gender has been largely highlighted as an important determinant of OHS [29]. Several studies show that employment stability [29] and temporary work,[28] part-time work, and day labor,[30] can affect men and women's health differently. Similarly, other results suggest gender inequalities in the exposure to psychosocial risks at work and its effect on mental health, which are more detrimental to women.[30] However, there is no conclusive evidence on gender differences neither in the effect of multidimensional PE on mental health, nor on the role of PRFs in this relationship, since these are poorly studied aspects.[31]

Against this background, our objective is to analyze the potential moderating effect of PRFs in the relationship between PE and mental health among formal salaried men and women from 22 European countries.

Material and methods

The study is based on the 6th European Working Conditions Survey (EWCS-2015) carried out by the European Foundation for the improvement of living and working conditions (EUROFOUND). This survey is an excellent data source to analyze the impact of PRFs on the mental health of workers in different levels of PE in the European context because it contains exhaustive information on a wide range of PRFs, employment conditions, demographic and socioeconomic characteristics, and of health indicators including mental health.

Data were gathered via face-to-face interviews based on a questionnaire, performed at the respondents' households, in 34 European countries—EU27, Norway, Croatia, the Former Yugoslav Republic of Macedonia, Turkey, Albania, Montenegro, and Kosovo. A multi-stage, stratified, and clustered design was used. The mean response rate was 42.5% (ranging from 10.9% in Sweden to 78% in Albania), and the survey included 43,850 workers.[32] Following the EPRES-E requirements, the studied sample was restricted to people from 22 European countries: Austria, Belgium, Croatia, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Lithuania, Luxembourg, the Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, UK, Norway and Switzerland. Besides, self-employed workers, those without an employment contract, working in the armed forces or with unknown or non-eligible ages (65 or over) were excluded. Therefore, the final sample under analysis was composed of 15,932 individuals' workers—7,650 men and 8,282 women. Further details on the sampling design may be found elsewhere. [32]

Dependent variable

Worker's mental health was measured through the World Health Organization (WHO)-5 scale, which comprises five Likert items or questions. The raw score is calculated by totaling the figures of the five answers and then multiplied by 4 to obtain a score ranging from 0 to 100, dichotomized in two categories, where less than 50 represents poor mental health, whereas more than 50 represents good mental health.[33]

Independent variables

PRFs dimensions “psychological demands”, “control”, and “social support” were measured using those items contained in the EWCS-2015. Items with a different number of response categories were transformed into values lying between 0 and 1, in order to give them equal weights.[34] Scores for each dimension were computed through simple averages of its corresponding items transformed into 0-100 scales. The scales' validity and reliability were evaluated through factor analyses (exploratory and confirmatory) and Cronbach's alpha coefficients, respectively (ST1, ST2).

PE was measured through EPRES-E. It is an adaptation of the EPRES to the EWCS data, which has been validated for its comparative use in the 22 European countries specified above. [35,36]

The scale consists of 13 proxy indicators ordered in the six EPRES' dimensions specified above, except for the rights dimension that is missing, and the dimension “Unpredictable working times” that is added. Response options were all frequency or ordinal scales, where higher values were assigned to more precarious situations. Scores for each dimension were computed through simple averages of its corresponding items, transformed into 0-100 scales. The arithmetic mean of these scores made up the overall EPRES-E score, which was thereafter categorized into terciles. Cases with at least one missing value in any of the items were dropped.

The covariates used for adjustment were age (less than 30, 30-50, more than 50); occupational social class (manual and non-manual); educational attainment (low, medium and high); economic activity (agriculture, forestry and fishing, industry, construction, services,

and public administration and other services); and immigrant status (immigrant, non-immigrant).

Statistical analysis

In order to display the distribution of all variables, a description of the studied sample was performed. Proportions and their 95% Confidence Intervals (CI) of PE terciles and poor and good mental health were calculated. PRFs means and their 95% CI were also calculated.

Logistic regression models were fitted to estimate the contribution of covariates and PRFs on mental health. Two models for men and women were calculated; model 1 was adjusted for age, educational attainment, occupational social class, immigration status, and economic activity. Model 2 was adjusted for the same covariates and added high demands, low control, and low social support.

The user-written Stata command KHB was used to calculate direct and indirect effects to explore the overarching relationship between PE, PRFs and mental health. The KHB method allows the unbiased comparison of regression coefficients between nested models and the decomposition of mediation effects.[37,37] This method therefore allows us to compare a reduced model with a full model while adjusting for the rescaling's coefficients in order to fix the residual variance of the latent outcome.[37; 38]

In the reduced model, PE predicts mental health from two approaches: one fitting crude models, the other controlling for covariates. In the full model, PRFs dimensions are introduced as 'Z variables' and the model is controlled for them. Because of theoretical

reasons, these Z variables are conceptualized as mediators that influence the mental health outcome. The difference in coefficients between the reduced and full models represents the spurious component of PE's effect on mental health, which includes the association generated by the mediation of PRFs.[39] Standard errors during KHB decomposition were clustered by country of residence, to account for the multi-level data structure.

All the analysis were stratified by sex, survey-weighted and conducted using Stata 13.0.[40]

Results

Characteristics of the studied sample are shown in Table 1. The largest proportion of respondents are women, aged 30-50 years old (54.58% men; 56.47% women), with a medium educational level (51.85%; 48.14%) and non-migrants (90.22%; 90.60%). As for the distribution of occupational variables, gender differences were found: 61.04% of men are non-manual workers while this percentage increases to 85.88% among women; and the largest proportion of women works in the public administration and other services sector (49.25%) while most male employees work in the services sector (44.33%). In turn, women have a higher proportion of poor mental health (18.12% vs 15.02%) and higher levels of PE (37.44% in the third tercile vs 29.02%). Regarding PRFs, the difference is not significant except for Low Social Support, which is greater among men (mean 30.65 vs 29.12).

Table 2 shows the odds ratios (ORs) of poor mental health for each covariate in different models, stratified by sex. Workers with higher

PE have higher odds of poor mental health for both men (OR= 3.42; 95%CI: 2.62-4.46) and women (OR=2.38; 95%CI: 1.97-2.88) (Model 1). Among men, poor mental health was positively associated with age and economic activity. When PRF's were added (Model 2), the magnitude of the association with the third tercile of PE decreases (OR=1.61; 95%CI: 1.17-2.21). The association with age also decreases (OR=1.57; 95%CI: 1.13- 2.18) and economic activity with the worst mental health shifts from industry to construction. Among women, only age is associated with mental health for those over 50 years of age (Model 1). When controlling for PRFs, the association with PE as well as with the other covariates loses significance (Model 2).

Results from KHB decomposition analyses are shown in Table 3. Men present higher ORs than women in both terciles, both in the crude and adjusted models, which indicates that PE has a greater effect on the odds of having poor mental health in men. In the reduced adjusted model, aOR of poor mental health increases to 1.76 (95% CI 1.42-2.19) in tercile 2, and to 3.37 (2.44-4.66) in tercile 3. After controlling for PRFs, aOR decreases to 1.16 (1.00-1.60) in tercile 2 and to 1.61 (1.17-2.21) in tercile 3, leaving an indirect effect (partial mediation) of 1.40 (1.26-1.55) and of 2.10 (1.80-2.45), respectively. As for women, in the reduced adjusted model, aOR of poor mental health is 1.23 (1.04-1.45) in tercile 2, and 2.35 (1.75-3.16) in tercile 3; but when controlling for PRFs, the association is no longer significant. The indirect effects' (full mediation, in this case) aOR are 1.25 (1.06-1.47) in tercile 2, and 1.89 (1.57-2.27) in tercile 3.

Additionally, Table 4 shows the contribution of each PRF to the global effect. Among men, in both terciles social support in the workplace is the dimension that contributes the most to poor mental health, followed by high demands and low control. As it happened with men, among women social support is the highest contributor to the global effect in both terciles, but it decreases in tercile 3 as compared to tercile 2. Low control also decreases, and high demands are the only ones increasing from tercile 2 to 3.

Discussion

It has been pointed out that both PE and PRFs are important risks to workers' health and safety; however, the relationship between both phenomena and their joint impact on health has not been studied yet. Thus, the paper's main objective was to explore the potential mediating effect of PRFs between multidimensional PE and mental health among formal salaried employees, both among women and men. In both genders it has been found that workers with higher levels of PE have a higher proportion of poor mental health. In turn, they are also more exposed to harmful PRFs, showing a higher proportion of high demands, low control, and low social support. According to our previous conceptual framework, PE may be a set of adverse employment conditions acting as a distal social determinant of health while PRFs, as working conditions, may act as proximal or intermediate determinants.[16] Thus, our central hypothesis was that PRFs could be a pathway through which PE impacts mental health. Mediation analysis results show that PRFs' effect is different for both genders: a partial mediating effect is observed among men, where PE and PRFs are

associated with each other and have independent effects on mental health; in contrast, a full mediation effect has been found among women, for whom the association between PE and poor mental health is non-significant when adjusting for PRFs.

Women's mental health is less directly affected by PE than men, which could be related to the gendered division of labor markets. That is, the participation of women in labor markets is marked by a generalized occupational segregation of gender, limiting their employment opportunities to a restricted range of "female occupations", frequently less prestigious and with worse working conditions.[41] Unlike men, women have historically been outside the norm for standard employment. Indeed, many of the aspects currently linked to PE (i.e., temporary work, lack or absence of social protection, low wages) have rather been the norm for female employment.[42] Therefore, they suffer from structural employment precariousness and, therefore, might enter the labor market, assuming worse employment conditions than men.

This segregation is based on the gendered division of labor that promotes and, simultaneously, supports the "male breadwinner" model, where women are systematically disadvantaged in terms of their role in the labor market and, consequently, of their employment and working conditions compared to men. It is a widely generalized employment model in Europe although it varies by country.[43] At the same time, results also show that the association between PE and mental health and between PRF and mental health is greater among men, indicating that the differences between precarious and non-

precarious workers are higher than women. This result also suggests that women's working conditions are more homogeneous between the different precariousness levels.

Previous studies linking unemployment to mental health also found gender differences in their results. Classical social psychology literature suggests that gender differences in the effect of unemployment on mental health are related to the different positions and roles defined for men and women in society and the family.[44] It has also been found that levels of equality in the labor market and in the family could determine the way in which gender influences the association between unemployment and mental health.[45] Thus, it could be argued that gender differences in the association between PE on mental health are also based on role differences; therefore, in their traditional role as income providers, men are psychologically worse affected by deficiencies in employment and working conditions.

Finally, our results reinforce the idea that PE should be considered a key social determinant of health and an OHS issue to the extent that it can affect workers' mental health, directly and through PRFs. For this reason, OHSMS should also evaluate the characteristics of the employment relationship, and not only the psychosocial risks, to achieve improvements in the working conditions of those workers in a precarious situation. It may be strategic for many companies to favor their workers' well-being and health, especially in positions where high turnover and absenteeism are inefficient. However, most organizations find it difficult to manage OHSMSs in practice [46], especially in adequately addressing psychosocial risks at work .[47]

In this context, it should be considered that states provide support to organizations through specialized institutions, which at the same time guarantee compliance with the regulations on PRF and PE evaluation. Simultaneously, it is necessary to influence at a structural level, from government institutions and bodies, designing policies that guarantee adequate employment conditions, from a gender perspective.

Future studies should delve into these findings to explain how gender inequalities in the labor market and family promote gender inequalities in the effect of PRF and PE on mental health.

Strengths and limitations

This study has several limitations. First, due to the cross-sectional nature of the data, there is no information on the time that individuals have been exposed to PE or a harmful psychosocial work environment, which may contribute to the effects found. Second, the research design does not solve the possible inverse causality given because a poor previous mental health can increase the probabilities of having a precarious job or an unfavorable psychosocial environment. Therefore, further longitudinal studies are needed, adding the assessment of the direction of causation. Third, all the indicators used are self-reported, and the results are potentially to be biased. Further, the questionnaire's application in different languages may lead to different interpretations in each country. However, to avoid this and self-report bias, all interviews were conducted face-to-face by personnel who received the same training in all countries.

Finally, it should be added that there are 29.5% of cases with missing values in any of the variables of interest. However, after analyzing the cases with missing values, it was found that the distribution of the variables of interest did not show systematic differences or of a relevant magnitude compared to the cases without missing values, so it was decided not to impute the missing values (data not shown) (ST II). We have tried to avoid the imputation of missing values because it would limit some functions of the KHB command that are very useful for this study.

Despite the limitations this article represents an insightful novel contribution to the existing literature since, to our knowledge, this is the first study to explore a fundamental mechanism (namely, PRFs) underlying the relationship between PE and mental health, which is key to effectively tackle the adverse effects of employment at all levels.

Simultaneously, the use of a multidimensional measure of PE validated for the European context means an advance over previous studies that use one-dimensional measures (mainly job insecurity definitions and overly broad temporary employment) that prompted not sufficiently consistent evidence.[12] Finally, a notable contribution of this study is the incorporation of a gender perspective, which allowed us to assess the structural differences through which employment and working conditions affect the mental health of working men and women.

Concluding remarks

Gender differences have been found in PRFs' effect on the relationship between PE and poor mental health. The inequality of

opportunities between men and women in the labor market determines the employment and working conditions that they will have and, consequently, also their mental health. Identifying these inequalities is critical for governments and unions to designing comprehensive policies and interventions, both at the organizational and structural level, that reduce the adverse PEs effects on mental health.

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Competing interests

The authors report no conflicts of interest.

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Table 1. Characteristics of the study population stratified by sex. European Working Conditions Survey, 2015, N men=7650, N women=8282. [CI95%=95% confidence interval; EPRES-E= Precarious Employment Scale- Europe.]

Characteristics	Men			Women		
	N	%	CI95%	N	%	CI95%
Age						
Less than 30	1307	19.06	17.68-20.52	1347	18.80	17.38-20.31
30-50	4237	54.58	52.84-56.31	4710	56.47	54.71-58.21
More than 50	2106	26.36	24.87-27.9	2225	24.73	23.26-26.27
Educational attainment						
Low	1219	17.46	16.18-18.82	998	14.30	13.09-15.60
Medium	4002	51.85	50.11-53.58	3866	48.14	46.40-49.88
High	2429	30.69	29.11-32.32	3418	37.56	35.89-39.27
Occupational social class						
Non manual	4560	61.04	59.34-62.70	7082	85.88	84.67-87.00
Manual	3090	38.96	37.3-40.66	1200	14.12	13.00-15.33
Immigration status						
Non-immigrant	6773	90.22	89.18-91.17	7398	90.60	89.48-91.62
Immigrant	877	9.78	8.83-10.82	884	9.40	8.38-10.52
Economic activity						
Agriculture, forestry and fishing	147	1.82	1.40-2.36	68	0.85	0.6-1.21
Industry	1897	24.81	23.34-26.34	881	9.93	8.92-11.03
Construction	817	8.76	7.91-9.70	98	0.93	0.67-1.28
Services	3288	44.33	42.6-46.07	3311	39.05	37.37-40.75
Public administration and other service	1501	20.28	18.92-21.7	3924	49.25	47.50-51.00
Precarious employment (EPRES-E)						
First tercile	2904	37.97	36.29-39.68	2476	28.18	26.66-29.75
Second tercile	2518	33.01	31.37-34.69	2827	34.38	32.72-36.08
Third tercile	2228	29.02	27.50-30.59	2979	37.44	35.76-39.14
Mental health						
Good	6549	84.98	83.70-86.17	6791	81.88	80.52-83.16
Poor	1101	15.02	13.83-16.30	1491	18.12	16.84-19.48
Psychosocial risk factors (means)						
		Mean	CI95%		Mean	CI95%
High demands	7650	32.19	31.60-32.78	8282	32.74	32.15-33.33

Low control	7650	43.28	42.39-44.18	8282	43.83	42.97-44.70
Low social support	7650	30.65	29.92-31.38	8282	29.12	28.37-29.87

Table 2. Poor mental health (N men=1,101, N women=1,491). Odds ratios (OR) and 95% confidence intervals (CI) from Logistic regression analyses with incremental adjustment for potential confounders. European Working Conditions Survey, 2015, N men=7,650, N women= 8,282.

Poor mental health	N Case/ Exposed	Men				N Case/ Ex- posed	Women			
		Model 1		Model 2			Model 1		Model 2	
		OR	CI95%	OR	CI95%		OR	CI95%	OR	CI95%
Precarious employment (EPRES-E)										
First tercile	276/2904	1.00		1.00		327/2476	1.00		1.00	
Second tercile	339/2518	1.78***	1.49-2.12	1.26*	1.00-1.60	445/2827	1.24**	1.04- 1.48	0.99	0.83- 1.17
Third tercile	486/2228	3.42***	2.62- 4.46	1.61***	1.17-2.21	719/2979	2.38***	1.97- 2.88	1.25	0.91-1.71
Age										
Less than 30	158/1307	1.00		1.00		223/1347	1.00		1.00	
30-50	628/4237	2.16***	1.61-2.91	1.57***	1.13- 2.18	837/4710	1.30*	0.97- 1.73	0.98	0.72-1.33
More than 50	315/2106	1.99***	1.54- 2.59	1.48**	1.09- 2.00	431/2225	1.52***	1.27- 1.83	1.17	0.97- 1.43
Educational attainment										
Low	195/1219	1.00		1.00		214/998	1.00		1.00	
Medium	584/4002	0.80	0.53-1.23	0.78	0.52- 1.18	681/3866	0.81*	0.64- 1.03	0.80	0.59- 1.08
High	322/2429	1.10	0.85- 1.43	0.92	0.70- 1.20	591/3418	1.16	0.91-1.50	0.94	0.76- 1.17
Occupational social class										
Non manual	630/4560	1.00		1.00		1205/7082	1.00		1.00	
Manual	471/3090	0.85	0.63- 1.16	0.83	0.62- 1.12	286/1200	1.24	0.94- 1.64	1.15	0.87- 1.52
Immigration status										
Non- immigrant	957/6773					1321/7398				
Immigrant	144/877	1.00	0.73- 1.38	1.06	0.78- 1.44	170/884	0.76	0.53-1.10	0.76	0.52- 1.12
Economic activity										
Agriculture, forestry and fishing	14/147	1.00		1.00		13/68	1.00		1.00	
Industry	288/1897	5.78***	1.87-17.84	5.91***	1.54- 22.67	190/881	1.50	0.49- 4.56	1.36	0.41- 4.51
Construction	125/817	5.26***	1.62- 17.08	6.25**	1.53- 25.61	dic-98	0.65	0.14- 3.08	0.58	0.11-3.13
Services	452/3288	4.04***	1.42- 11.52	4.42**	1.24- 15.80	587/3311	1.34	0.49- 3.65	1.28	0.43- 3.75
Public administration and other services	222/1501	5.68***	1.95-16.55	6.53***	1.75- 24.41	689/3924	1.49	0.62-3.59	1.45	0.55- 3.85
Psychosocial risk factors (means)										
High demands (continuous)	7650			1.03***	1.02- 1.04	8282			1.03***	1.03- 1.04
Low control (continuous)	7650			1.01***	1.00- 1.01	8282			1.01***	1.00- 1.01
Low social support (continuous)	7650			1.02***	1.01- 1.03	8282			1.02***	1.01-1.02
Constant		0.01***	0.00-0.03	0.00***	0.00- 0.01		0.08***	0.03-0.23	0.02***	0.01-0.06

Table 3. Poor mental health (N men=1,101, N women=1,491). Odds ratios (OR) and 95% confidence intervals (CI), crude and adjusted for covariates from KHB-Method. European Working Conditions Survey, 2015, N men=7,650, N women= 8,282.

Poor mental health		Men				Women			
		Crude ^a		Adjusted ^b		Crude ^a		Adjusted ^b	
		OR	CI95%	OR	CI95%	OR	CI95%	OR	CI95%
EPRES-E Tercile 1	Reduced	1.00		1.00		1.00		1.00	
	Full	1.00		1.00		1.00		1.00	
	Difference	1.00		1.00		1.00		1.00	
EPRES-E Tercile 2	Reduced	1.54***	(1.29-1.84)	1.76***	(1.42-2.19)	1.14	(0.94-1.39)	1.23**	(1.04-1.45)
	Full	1.18*	(0.98-1.42)	1.26*	(1.00-1.60)	0.96	(0.79-1.17)	0.99	(0.83-1.17)
	Difference	1.31***	(1.16-1.47)	1.40***	(1.26-1.55)	1.19**	(1.03-1.37)	1.25***	(1.06-1.47)
EPRES-E Tercile 3	Reduced	2.36***	(1.83-3.05)	3.37***	(2.44-4.66)	1.98***	(1.45-2.70)	2.35***	(1.75-3.16)
	Full	1.31**	(1.06-1.63)	1.61***	(1.17-2.21)	1.17	(0.84- 1.64)	1.25	(0.91-1.71)
	Difference	1.80***	(1.52-2.13)	2.10***	(1.80-2.45)	1.69***	(1.44-1.99)	1.89***	(1.57-2.27)

Table 4. Components of Difference. Decomposition using the KHB-Method. European Working Conditions Survey, 2015, N men=7,650, N women= 8,282.

Poor mental health	Z-Variable	Men				Women			
		Coefficient	Standard Error	Percentage Difference	Percentage Reduced	Coefficient	Standard Error	Percentage Difference	Percentage Reduced
EPRES-E Tercile 1	Demands	0	0	.	.	0	0	.	.
	Control	0	0	.	.	0	0	.	.
	Social support	0	0	.	.	0	0	.	.
EPRES-E Tercile 2	Demands	0.11	0.02	31.45	18.52	0.06	0.03	29.09	31.05
	Control	0.08	0.02	24.26	14.29	0.06	0.02	24.95	26.64
	Social support	0.15	0.03	44.29	26.09	0.10	0.03	45.96	49.07
EPRES-E Tercile 3	Demands	0.22	0.04	30.12	18.37	0.22	0.05	33.98	25.24
	Control	0.18	0.04	24.53	14.96	0.15	0.05	24.26	18.02
	Social support	0.34	0.07	45.35	27.66	0.27	0.04	41.76	31.02

^a Adjusted by high demands, low control, low social support.

^b Adjusted by age, educational attainment, occupational social class, immigration status, economic activity, high demands, low control, low social support.

Artículo 4

The role of psychosocial risk factors in the association of precarious employment and common mental disorders, substance use disorders and suicide attempts: A mediation analysis

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The role of psychosocial risk factors in the association of precarious employment and common mental disorders, substance use disorders and suicide attempts: A mediation analysis

ABSTRACT

Objectives: The aim of this study is to examine the mediating effect of the psychosocial work environment on the association between precarious employment and increased risk of common mental, substance use disorders and suicide attempts.

Methods: This is a longitudinal register-study based on the working population of Sweden, aged 16–65 years between the years 2005–2016 (N=2 552 589). Precarious employment (exposure, measured using a multidimensional approach and classified as precarious/non-precarious) and psychosocial risk factors (mediators, measured using job exposure matrices and classified as low control, high demands, high strain and passive jobs) are measured in 2005. The outcomes are the first diagnosis of common mental, substance use disorders, and suicide attempts occurring over 2006–2017. Mediation analyses based on a decomposition of counterfactual effects are used to estimate the indirect effect of psychosocial work environment on the association between precarious employment and three outcomes, considering an interaction between precarious employment and psychosocial risk factors.

Results: Precarious employment increased the odds of being diagnosed with common mental disorders, alcohol and substance use disorders, and suicide attempts, both in men and women. After adjusting

for precarious employment, 'Low control' increased the odds of the three outcomes in both sexes, while 'High demands' decreased the odds of common mental disorders among women. 'High strain' increased the risk of being diagnosed with common mental disorders and suicide attempts among men, while 'Passive job' increased the risk of all three outcomes among women. The decomposition of effects showed that the indirect effect of precarious employment through the psychosocial risk factors is practically null for the three outcomes considered, both in men and women.

Discussion

Conclusions: The results of this study provided weak evidence for the hypothesis that psychosocial risks could be the mechanisms linking precarious employment with workers' mental health. Future studies in different contexts, with individual measurements of psychosocial hazards, are needed.

BACKGROUND

Precarious employment (PE) refers to a generalized phenomenon of employment insecurity, income inadequacy, and a lack of rights and protection, which has grown in recent decades in Europe and globally and is considered a social determinant of health[1]. While mental disorders are considered a public health problem in European countries and often studied separately[2], their relationship with PE has also been established in an increasing number of studies [3].

PE is a global phenomenon affecting numerous countries, including Sweden, despite its long-standing tradition of protected labour relations. A recent study based on a cohort of Swedish workers has found that low-quality employment trajectories (including spells in precarious employment) represent a risk factor for mental disorders and suicide attempts.[4] It was also found that among non-standard employees in the Stockholm County, the prevalence of poor self-rated general and mental health increased with increased employment precariousness.[5] Related, a recent multi-country study identified that, during the COVID-19 pandemic, almost a quarter of the surveyed Swedish workers who experienced changes to their non-standard employment arrangements self-identified as suffering from severe or extreme anxiety or depression. [6]

Nevertheless, mechanisms and pathways linking PE to poor health outcomes have not been sufficiently explored, especially empirically.[3,7] Some conceptual frameworks indicate that PE could affect health through the psychosocial work environment. A psychosocial

epidemiology perspective has been used to suggest that social processes at the macro-level (e.g., employment conditions) and meso-level (e.g., work organization) lead to perceptions and psychological processes at the individual level. [8] Several studies have suggested that health status could be affected by the psychosocial work environment through direct psychobiological processes or modifying behaviours and lifestyles.[8][9,10] From this perspective, the psychosocial work environment could be an intermediate step in a causal pathway that links economic, social, and political structures with health and disease through psychological and psychophysiological processes.[9]

The Demand-Control model is a widely used framework to assess the influence of the psychosocial work environment on health. This model defines high strain jobs as the result of a combination of high job demands and low control (poor job decision latitude).[11,12] For instance, four reviews providing a good quality level of evidence for a strong relationship between high strain and clinical depression were found in a recent meta-review. [13] Another systematic meta-review found a moderate quality level of evidence, from multiple prospective studies, that high demands and low control, among other psychosocial risk factors (PRFs), are associated with a greater risk of developing common mental health problems. [13] Particularly for Sweden, a recent longitudinal study has shown that lower control was associated with an increased risk of depression, whilst higher demands tended to be associated with a slight decrease in risk for depression, among men and women (with differences between sexes).[14]

Further, recent work has demonstrated the value of using a Job Exposure Matrix (JEM) approach in epidemiological studies by measuring the psychosocial working conditions independently of the health outcome, thus, establishing the level of psychosocial exposure of different occupations from survey data. [14] The JEM score can be assigned to individuals based on their occupations, obtaining a relatively objective measure of the psychosocial conditions to which they are exposed.

Additionally, recent cross-sectional studies provide new evidence about the relationship between the psychosocial work environment and PE. One such study showed that precarious workers from Stockholm County are more likely to experience psychosocial hazards, and these experiences are more prevalent among women than men.[15] Another study based on data from 23 European countries found that the association of PE with poor mental health was completely attributable to the PE-PRFs interaction among women, and partially attributable among men.[16] However, both studies are based on cross-sectional data; therefore, they do not allow for measuring the direction of the effect of PE and PRFs on mental health.

Aside from that, previous research has also pointed out that gender may interact with some dimensions of PE, creating differential effects on the health of men and women.[17,18] Besides, other results suggest that gender inequalities in exposure to PRFs at work have more detrimental effects on women's mental health. [19] However, there are very few studies examining gender differences in the effect

of multidimensional PE on mental health, as well as the role of PRF in this relationship. [20]

Building on this theoretical and methodological background, we hypothesized that psychosocial risk factors mediate the association between PE and workers' mental health. Accordingly, the main objective of this study is to analyse the potential mediating effect of factors such as 'Low control', 'High demands', 'High strain', and 'Passive Job' on the PE-poor mental health relationship among workers in Sweden, with consideration for differences between women and men.

MATERIAL AND METHODS

The present study is based on the Swedish Work, Illness, and Labour-market Participation (SWIP) cohort, which contains linked information from multiple registers and includes all registered individuals in Sweden, aged 16–65 years (approximately 5.4 million), in 2005 and followed until the end of 2016. [21] After exclusions, this study uses a subpopulation of 2,552,589 individuals aged 25–60 years old that were residing in Sweden in 2005. Exclusion criteria for the study were defined as: (1) incomplete information for measuring the exposure variable (2005), mediators (2005) and outcomes (2006-2016) (187,301 excluded); (2) individuals who emigrated or died during follow up (113773 excluded); (3) individuals considered unemployed - with income lower than 100SEK in 2005 (625178 excluded); (4) self-employed in 2005 to avoid their miss-classification as necessarily precariously employed (301081 excluded); (5) unemployed more than 6 months in 2005, in order to differentiate the effects of

long-term unemployment situations from precarious employment (88011 excluded); (6) individuals without information on their employer in 2005 (213866 excluded); (7) students in 2005 (176.349 excluded); (8) individuals receiving pension benefits or early pension benefits in 2005, to avoid misclassifying individuals leaving the labour market into PE (91.340 excluded).

Outcomes

Workers' mental health was measured through diagnosed common mental disorders (CMD) (depression, anxiety, and stress-related disorders; ICD-10 codes F32, F33, F41, F43), and alcohol and substance use disorders (ICD-10 codes F10-F19) reported in the inpatient and outpatient registers during the follow-up period (2006-2016). Similar to previous studies, only suicide attempts (ICD-10 codes X60-X84 and Y10-Y34) reported in the inpatient register were included [22,23].

Both registers are national and comprehensive of the Swedish population. The validity of the inpatient register high despite some limitations for psychiatric diagnoses. [24]

Exposure

PE was measured through the Swedish Register based Operationalization of Precarious Employment (SWE-ROPE), a five-item multidimensional measurement that encompasses three dimensions 'Employment insecurity', 'Income inadequacy', and 'Lack of rights and protection'. [21] A PE score was computed as the sum of all five

items, ranging from -9 to +2, with -9 being the lowest and worst values of PE. The PE score was then transformed into a dichotomous variable (PE score < -3 = 'PE'; PE score ≥ -3 'Non-PE'). The cut-off point (-3) was defined based on a recent analysis using the same data.[25] In addition, two cut-point sensitivity analyzes were performed. First, an alternative cut-off point was defined as PE score ≤ -1 , including among precarious a group of workers with heterogeneous working conditions, which, according to previous studies (REF), are on the border of PE and Non-PE. Second, using the same cut-off point, the analysis was repeated for non-precarious workers (PE score ≥ 0).

Mediators

A standard method of analysing PRFs is the Demand-Control model [26]. In the present study, the PRFs was measured through the Swedish psychosocial JEM which was developed using data from the Swedish Work Environment Surveys from 1997 to 2013 and averaged for each occupation (around 350 occupations).[5] For this analysis, these (or the?) scores were linked to the individuals in the study population based on their registered occupation in 2005.[14] Next, demand and control variables were dichotomized using the median as the cut-off point. As part of a sensitivity analysis, alternative cut-off points were defined, using the lowest quartile of job control to define 'Low control', and the upper quartile of job demands to define 'High demands'.

Finally, the job demands indicator was plotted against job control and four groups were created: high control/high demands ('Active jobs'), high control/low demands ('Low strain jobs'), low control/high demands ('High strain jobs'), and low control/low demands ('Passive jobs').[28] In addition to 'Low control' and 'High demands', 'High strain' and 'Passive jobs' are also widely recognised as psychosocial risk factors.[26] Table 1 (from [14]) shows the English translation of items used for assessing control and demands.

Covariates

Recent studies from the same cohort, using variables very similar to those used in the present study as exposure, mediators, and outcomes, identified the minimal sufficient set of variables for adjustment by presenting the causal assumptions in a directed acyclic graph (DAG) [4,25]. Accordingly, it was determined to use a set of five covariates for adjustment. Age was categorized into '25-35', '36-50', and '51-60'. Educational level was measured based on the number of years of schooling, using three categories '1=<9 years'; '2=10-15 years'; '3=>15 years'. 'Country of birth' (born in Sweden or not). 'Previous psychiatric diagnoses' information was obtained from the inpatient register and was defined as having any psychiatric diagnosis (ICD-10 codes F00 to F99) before 2006 (the first year of follow-up). This adjustment was done to rule out reverse causation. 'Parents' psychiatric diagnoses' were obtained by linking the index person to their parents' inpatient records from 1973 (when the registry began) onward, specifying whether either parent had a first-time psychiatric diagnosis prior to age 65. [14]

Statistical analysis

Mediation analysis is a widely used approach in studies that rely on the need to disentangle the different pathways that could explain the effect of an exposure on an outcome. Typically, this method allows decomposing the effect of an exposure on an outcome (total effect) into two components: the effect of the exposure that is explained by the mediators (indirect effect) and the effect of the exposure unexplained by those same mediators (direct effect). [29]

For this study, mediation analysis based on a decomposition of effects was conducted to estimate the indirect effect of 'Low control', 'High demands', 'High strain' and 'Passive job' in 2005 on the association between PE in 2005 and diagnosis of common mental disorders (i.e., depression, anxiety and stress-related disorders), alcohol and substance use disorders, and suicide attempts, during the 2006-2016 timeframe. The analysis was repeated for a follow-up period from 2006 to 2010 to test the shorter-term effects of the exposure and mediators.

Exposure and mediators were measured for the same year based on the premise that psychosocial risks are inherent to PE and, although theoretically there is a causal relationship between them, it is impossible to establish a temporal sequence. The co-occurrence of the exposure and the mediator implies that the interaction between them should be controlled for, introducing a counterfactual definition of direct and indirect effects. In a counterfactual framework, the individual causal effect of the exposure on the outcome is defined as the

hypothetical contrast between the outcomes that would be observed in the same individual at the same time in the presence of the exposure and in the absence of the exposure (or in presence of two different levels of the exposure).[29]

The user-written Stata command 'paramed' extends the traditional Baron and Kenny mediation procedure to allow for the presence of exposure–mediator interactions in the outcome regression and uses counterfactual definitions of direct and indirect effects.[7] Two logistic regression models were estimated: (1) a model for the mediators' conditional (adjusted) on exposure and specified covariates, and (2) a model for the outcomes conditional on exposure, the mediators, and the same covariates. [8] Figure 1 shows a diagram representing the relationships between variables and the chain of processes through directed arrows.

The 'paramed' command only supports exposures and mediators that are continuous or dichotomous, it does not support categorical variables with more than two categories. Furthermore, two values must be specified for the exposure: the base level (a1) and the alternative level (a2). For the mediator, it is necessary to specify a value 'm' representing the level at which the controlled direct effect is to be estimated. [7] Although the PE score, as well as control and demands, are available as continuous variables, we do not have any theoretical, statistical, or empirical criteria to define a priori values for (a1), (a2) and (m). For this reason, and given the impossibility of using multi-categorical variables, we have chosen to define exposure and mediators as binary variables.

According to Valeri and Vanderweele (REF), the controlled direct effect (CDE) indicates the effect of being exposed to PE on the risk of suffering the mental outcome if the mediator (PRF) were controlled uniformly at a fixed value. The natural indirect effect (NIE) expresses the proportion of the effect of the exposure on the outcome attributable to the mediator. NIE is the most critical component of the effect decomposition because it is the one that allows testing the mediation hypothesis. For this study, the NIE of the PRFs made it possible to assess their possible mediating role in the association of PE with mental health outcomes.

RESULTS

The sociodemographic and health characteristics of the study sample are presented in Table 2. In 2005, 5.17% of men and 6.86% of women were in PE. The proportion of ‘Low control’ and ‘Passive job’ was higher among workers in PE for men and women, while the category of ‘High demands’ was more frequent among workers in ‘Non-PE’ for both sexes. The category of ‘High strain’ was more frequent only among precariously employed men. Those in ‘PE’ had a higher proportion of ‘Common mental disorders’, ‘Substance use disorders’ and ‘Suicide attempts’ during 2006-2016.

Table 3 shows the association between PRFs and PE, expressed as odd ratios (ORs) adjusted for covariates and separately for men and women. In 2005, ‘PE’ was positively associated with ‘Low control’ (OR: 1.53; 95%CI: 1.51-1.56), ‘High demands’ (OR: 1.17; 95%CI: 1.15-1.19) and ‘High strain’ (OR: 2.21; 95%CI: 2.17-2.25), but negatively with ‘Passive job’ (OR: 0.84; 95%CI: 0.82-0.85), among men.

Aversely, among women, 'PE' showed a negative association for 'High demands' (OR: 0.55; 95%CI: 0.54-0.56) and 'High strain' (OR: 0.81; 95%CI: 0.79-0.82), and positive for 'Low control' (OR: 1.18; 95%CI:1.17-1.20) and 'Passive job' (OR: 1.41, 95%CI: 1.39-1.43).

Table 4 shows the associations of the mental health outcomes with the exposure and mediators, adjusted for covariates and separately for men and women. The OR corresponding to 'PE' shows the association between PE and the outcome after adjusting for covariates and the mediators ('Low control', 'High demands', 'High strain' and 'Passive job'). 'PE' workers when compared to 'Non-PE' had an increased odds of developing 'Common mental disorders', 'Alcohol and substance use disorders' and 'Suicide attempt', for men and women during the follow-up period.

The OR corresponding to each mediator shows its association with the outcome after adjusting for covariates and 'PE'. *Paramed* fits one model for each mediator separately, hence, there are four different models for each outcome:

Common mental disorders

Workers with 'Low control' compared to 'High control' had an increased odds of developing 'Common mental disorders', both in men (OR: 1.28, 95%CI:1.26- 1.31) and women (OR: 1.15, 95%CI:1.13-1.16) (model 1). Men with 'High strain' compared to 'Low strain' had an increased odds of developing 'Common mental disorders' (OR: 1.18, 95%CI:1.16- 1.21) (model 3). Those with 'High demands'

compared to 'Low demands' decreased the odds (OR men: 0.92, 95%CI:0.90- 0.93; OR women: 0.88, 95%CI:0.86- 0.89) (model 2), while those with 'Passive job' increased it (OR men: 1.18, 95%CI:1.15- 1.20; OR women: 1.18, 95%CI:1.17- 1.20) (model 4), for both men and women.

Alcohol and substance use disorders

Those with 'Low control' (OR men: 1.25, 95%CI:1.22- 1.28; OR women: 1.17, 95%CI:1.14- 1.21) and 'Passive job' (OR men: 1.18, 95%CI:1.15- 1.21; OR women: 1.26, 95%CI:1.22- 1.31) had an increased risk of developing 'Alcohol and substance use disorders' during the follow-up period (model 1), while 'High demands' had a decreased risk (OR men: 0.86, 95%CI:0.84- 0.88; OR women: 0.81, 95%CI:0.78- 0.84) (model 2). 'High strain' increased the odds among men (OR: 1.11, 95%CI: 1.08-1.15) while decreased it among women (OR: 0.93, 95%CI:0.89- 0.97) (model 3).

Suicide attempts

Workers with 'High demands' compared to 'Low demands' decreased the odds (OR men: 0.78, 95%CI:0.73- 0.84; OR women: 0.69, 95%CI:0.65-0.74) (model 2), while those with 'Passive job' increased it for both men and women (OR men: 1.38, 95%CI:1.30- 1.48; OR women: 1.46, 95%CI:1.38- 1.54) (model 4). 'High strain' increased the odds of 'Suicide attempt' only among men (OR: 1.15, 95%CI:1.06- 1.25) (model 3).

Decomposition of effects

Table 5 presents the CDEs and NIEs of 'PE' on 'Common mental disorders', 'Alcohol and substance use disorders' and 'Suicide attempt' separately for men and women. Only those results with significant NIEs will be mentioned, considering that the objective of this study was to analyse the psychosocial risk factor's mediating effect.

Among men, NIE of 'High strain' (OR: 1.01, 95%CI:1.00- 1.02) in the association of 'PE' and 'Alcohol and substance use disorders' was found, while among women, NIEs of 'Low control' (OR: 1.01, 95%CI:1.00- 1.02) and 'High strain' (OR: 1.01, 95%CI:1.00- 1.01) for 'Suicide attempt' were found. However, the magnitudes are very low and NIEs can be considered practically null.

Results of sensitivity analysis

An alternative PE cut-off point was defined to include "borderline" workers (i.e., those with PE score ≥ -3 and PE score ≤ -1) as 'PE'. The robustness of mediator cut-off points was also assessed, using the lowest quartile of job control and the upper quartile of job demands to define 'Low control' and 'High demands', respectively. Separately, the mediation analysis was conducted for a shorter follow-up period from 2006 to 2010 to test the effects closer to the exposure. After conducting the sensitivity analysis mentioned above, it was found that while the magnitudes of some ORs showed changes (increased and decreased without a clear pattern), results were not considerably different, and they did not modify the tendencies observed in the main analysis (Supplemental material).

DISCUSSION

The main objective of this study was to analyse the psychosocial work environment as a mediator between PE and mental health outcomes. Based on previous conceptual frameworks and cross-sectional studies, it was hypothesized that psychosocial risk factors mediate the association between PE and workers' mental health. In order to contrast this hypothesis, the indirect effects of 'Low control', 'High demand', 'High strain' and 'Passive job' were estimated. The results provided weak evidence to support the mediation hypothesis considering that the indirect effects were either low, null, or not significant, while the controlled direct effects showed a relatively strong influence of PE on mental health (although with differences in the magnitudes between the three outcomes). In other words, when estimating the effect of PE and psychosocial risk factors concomitantly in a mediation model, PE directly affected mental health without the mediation of psychosocial risk factors. This result could suggest that psychosocial risk factors are inherent to PE, and therefore it is not possible to distinguish their effects on mental health separately. Therefore, it could be said that it is not possible to distinguish different levels of causality where PE precedes the psychosocial risk factors and both precede the outcome, which is the theoretical basis of the mediation approach.

On the other hand, technical reasons could also explain this result. The lack of variability of the psychosocial risk factors among precarious workers could be because they were measured from JEMs, so they refer to occupations rather than individual measures of demand and control. Thus, differences in psychosocial exposure between individuals who share the same occupation but perform in different

work environments are not captured by the measures used in this study. Id

Future studies in different contexts, with individual measures of psychosocial risk factors, should further explore these findings.

Despite mediating effects of PRFs were not found, results showed that, after adjusting for PRFs, PE increased the risk of ‘Common mental disorders’, ‘Substance use disorders’, and ‘Suicide attempts’ in both sexes. Consistently, a previous study using the same data found associations between low-quality employment trajectories with these three outcomes [4]. Thus, these results have two considerable implications: firstly, highlight the robustness of the relationship between ‘PE’ and mental health. Second, showing that ‘PE’ can affect mental health independently of working conditions, particularly psychosocial conditions, which had not been pointed out before, as far as we know.

Furthermore, remarkable differences between sexes were found in the association of ‘PE’ and mental health outcomes. Despite women were more exposed to ‘PE’ and mental disorders than men (this is the case for all outcomes except for ‘Substance use disorders’), the association between them was stronger among men. Very similar results were found in a recent study which showed a stronger association between PE and poor mental health among men, despite women being more exposed to both phenomena [30]. The authors focus on the disadvantaged social position of women in relation to men and suggest that women have to deal with many other adversities apart from

PE, that negatively affect their mental health [30]. Alternatively, it could be argued that the perception of the risk of PE may be different for men and women, due to women are socialized in more precarious work environments, they tend to normalize hazardous working and employment situations or conditions [31–33]. Thus, the differences found could be explained as part of an adaptive response to situations of restriction of job opportunities, by which expectations are adjusted to the possibilities offered by the labour market [34,35].

At the same time, differences between men and women were also found in the association of ‘PE’ and PRFs. Among men, PE increased the odds of ‘Low control’ and ‘High demands’. Consequently, the association with ‘High strain’ was positive while negative with ‘Passive job’. Among women, ‘PE’ was positively associated with ‘Low control’ but negatively associated with ‘High demands, while the association PE- ‘High strain’ and PE-‘Passive job’ was inverse to that of men. These results suggest that the most precarious jobs have different psychosocial characteristics for men and women. While precarious jobs tend to be a high strain for men, among women, they tend to be passive. The main reason for this difference could be vertical and horizontal occupational gender segregation, a persistent problem in the Swedish labour market,[36,37] which means that men have access to jobs with higher social and/or financial recognition and are provided with more responsibilities within them. In contrast, women have access mostly to jobs with less social and financial recognition, performing tasks with less responsibility or that are perceived as involving less responsibility.[38,39] This asymmetry could imply differential exposures to psychological demands but also a gap

in the individual's ability to make decisions about his/her own job, to influence the work group, and to influence company policy.

On the other hand, consistent with previous studies, it was found that 'Low control' was associated with an increased risk of 'Common mental disorders', 'Substance use disorders' and 'Suicide attempts' for both sexes, although the association was higher among men. 'High demands' was associated with a decreased risk of 'Common mental disorders', 'Substance use disorders' and 'Suicide attempts' for both men and women.

Limitations and strengths

A first limitation would be that multi-categorical measures of PE and mediators are more appropriate than dichotomous measures, as they make it possible to identify different types and levels of precariousness and psychosocial exposure. Thus, the heterogeneity of the employment situations among the working population could be better captured with this approach. Paramed is one of the few Stata commands to perform mediation analysis controlling the interaction exposure-mediator, however, it does not support multi categorical variables but is restricted to binary variables. In an attempt to assess this limitation, sensitivity analyses were performed varying the dichotomization of the exposure and the mediators defining alternative cut-off points. However, no significant differences were found.

Second, the follow-up period of this study is long enough to change the employment and working conditions to which the individuals were exposed in 2006. This implies that the exposure and the

mediators can have important changes throughout the period. For this reason, a separate sensitivity analysis was conducted using a shorter follow-up period (2006 to 2010) by focusing on the cases that occurred closer to the time exposure was assigned. However, the results of the mediation analysis were not substantially different from those obtained for the 2006-2016 follow-up period.

On the other hand, CDE's estimation requires no unmeasured common causes of the exposure and outcome and the mediator and the outcome. In addition, for natural effects, there must be no unmeasured common causes of exposure and mediator. Following previous studies, since the likelihood of residual confounding for these exposures and mediators, the interpretation of the results emphasizes the direction rather than the precise magnitudes of estimated effects. [40]The limitation of the mediation model that was adjusted in this study to address a job change after 2005 could have caused unmeasured changes in demand/control potentially mediating a diagnosis of 'Common mental disorders', 'Substance use disorders' or 'Suicide attempts'. However, a recent study based on the same cohort found a strong correlation between occupational titles from 2006 to 2016 in a similar population (30-60 age range)[41]. Therefore, it can be expected that the psychosocial exposure estimated in 2005 was consistent throughout the follow-period.

Finally, the JEM occupation score can be assigned to individuals based on their occupations, could introduce potential psychosocial exposure misclassification. However, as was mentioned before, JEMs allows obtaining a measure of the psychosocial exposure,

removing bias of reporting exposure and outcome based on measuring job demands/control in the same individual.

Despite these limitations, this is the first known study analysing the psychosocial work environment as a possible mediator in the relationship between multidimensional PE and register-based mental health indicators for a cohort of workers. Thus, this study implies an advance in the knowledge about the causal pathway that links PE and mental health, a recognised lack in epidemiological research.[42,43]

Concluding remarks

Precarious employment could be considered a risk factor for common mental disorders, alcohol and substance use disorders and suicide attempts in Sweden for both men and women. In addition, some psychosocial factors such as 'Low decision' and 'High strain' can also increase the risk in some of these outcomes, while others such as 'High demands' can be protective. On the other hand, 'Passive job' was protective among men and hazardous among women. While, precarious employment was associated with High demands, Low control, High strain and Passive job, the indirect effects of those psychosocial risk factors were almost null. This finding may be due to measures of demand and control referring to occupations rather than individuals, which could imply a lack of variability of the psychosocial risk factors among precarious workers. Thus, the results of the present study support the hypothesis that psychosocial risks could be mechanisms linking precarious employment with workers' mental health was very weak. Future studies in different contexts, using

individual measurements of psychosocial hazards instead of relying on general occupational measures, should further explore these findings.

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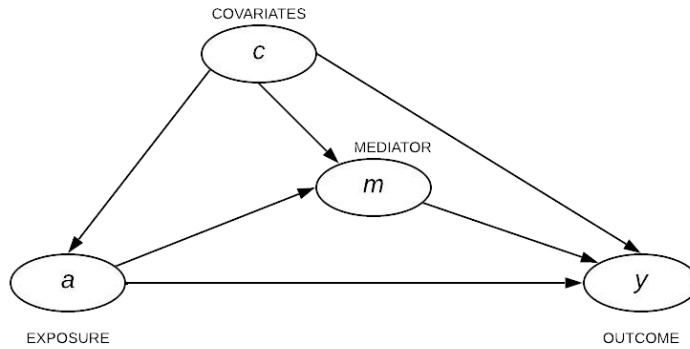
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Table 1. Items used to assign level of control and demands Job Exposure Matrices (JEM)

JEM	Question	Answer options
Control	Can you partially decide when tasks should be done?	Never, mostly not, mostly, always
	Do you have the opportunity to decide your own work pace?	Not at all, occasionally, roughly ¼ of the time, half the time, roughly ¾ of the time, almost all the time
	Can you take short breaks to talk pretty much any time?	Not at all, occasionally, roughly ¼ of the time, half the time, roughly ¾ of the time, almost all the time
	Are you ever involved in deciding how your work is organized?	Never, mostly not, mostly, always
Psychosocial demands	Are you sometimes so stressed that you do not have time to talk about or even think about something besides work?	Not at all, occasionally, roughly ¼ of the time, half the time, roughly ¾ of the time, almost all the time
	Do you sometimes have so much to do that you have to work during lunch, work overtime, or take work home?	Not at all, a few days per month, one day per week, a few days per week, every day

	Does your work require all of your attention and concentration?	Not at all, occasionally, roughly $\frac{1}{4}$ of the time, half the time, roughly $\frac{3}{4}$ of the time, almost all the time
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Figure 2. Directed acyclic graph of the total and mediated effect



PRECARIOUS EMPLOYMENT EXPOSURE (a) (2005)
Precarious employment score (binary, 1=precarious)

MEDIATORS (m) (2005)
Low decision (binary, 1=low)
High demands (binary, 1=high)
High job strain (binary, 1=high)
Passive jobs (binary, 1=passive)

OUTCOMES (y) (2006-2016)
Common mental disorders diagnosis (binary, 1=reported in the inpatient and outpatient registers)
Alcohol and substance use disorders (binary, 1=reported in the inpatient and outpatient registers)
Suicide attempts (binary, 1=reported in the inpatient registers)

COVARIATES (c)
Age (group of age)
Educational level (categorical),
Country of birth (binary, 1=swedish)
Any mental disorder prior to 2006 (binary, 1=reported)
Any psychiatric diagnosis for either parent (binary, 1=reported)

Table 2. Characteristics of the study population stratified by precarious employment status and sex

	Men				Women			
	Precarious (pe_score ≤ -3)		Non- Precarious (pe_score > -3)		Precarious (pe_score ≤ -3)		Non- Precarious (pe_score > -3)	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
	66.089	(5,17%)	1.213.186	(94,83%)	87.360	(6,86%)	1.185.954	(93,14%)
Age in 2005								
25-35	32.734	49,53	336.167	27,71	43.579	49,88	298.786	25,19
36-50	23.082	34,93	555.568	45,79	31.869	36,48	543.171	45,8
51-60	10.100	15,28	318.399	26,24	11.669	13,36	341.208	28,77
Total	65.916	100	1.210.134	100	87.117	100	1.183.165	100
Educational level in 2005								
1=<9 years	11.216	16,97	171.954	14,17	10.609	12,14	110.364	9,31
2=10-15	43.331	65,56	800.740	66	56.406	64,57	765.093	64,51
3>15	10.980	16,61	238.357	19,65	19.972	22,86	309.362	26,09
Total	65.527	100	1.211.051	100	86.987	100	1.184.819	100
Country of birth								
Other than Sweden	12.248	18,55	113.437	9,35	13.661	15,65	125.622	10,59
Sweden	53.765	81,45	1.099.603	90,65	73.656	84,35	1.060.273	89,41
Total	66.013	100	1.213.040	100	87.317	100	1.185.895	100
Children (1 or more)								

≥1 child	23.047	34,87	578.623	47,69	50.123	57,38	640.249	53,99
No children	43.042	65,13	634.563	52,31	37.237	42,62	545.705	46,01
Total	66.089	100	1.213.186	100	87.360	100	1.185.954	100
Any psychiatric diagnosis prior to 2006								
Diagnosed	3.765	5,7	39.977	3,3	4.024	4,61	40.801	3,44
Not diagnosed	62.324	94,3	1.173.209	96,7	83.336	95,39	1.145.153	96,56
Total	66.089	100	1.213.186	100	87.360	100	1.185.954	100
Any psychiatric diagnosis for either parent								
Diagnosed	2.087	3,16	32.065	2,64	2.765	3,17	29.401	2,48
Not diagnosed	64.002	96,84	1.181.121	97,76	84.595	96,83	1.156.553	97,52
Total	66.089	100	1.213.186	100	87.360	100	1.185.954	100
Common mental disorders reported in the inpatient and outpatient registers								
Reported	5.473	8,28	57.618	4,75	9.767	11,18	85.610	7,22
Not reported	60.616	91,72	1.155.568	95,25	77.593	88,82	1.100.344	92,78
Total	66.089	100	1.213.186	100	87.360	100	1.185.954	100
Alcohol and substance use disorders reported in the inpatient and outpatient registers								
Reported	3.161	4,78	29.736	2,45	1.782	2,04	16.024	1,35
Not reported	62.928	95,22	1.183.450	97,55	85.578	97,96	1.169.930	98,65
Total	66.089	100	1.213.186	100	87.360	100	1.185.954	100
Suicide attempts reported in the inpatient registers								
Reported	479	0,72	4.129	0,34	732	0,84	5.300	0,45

Not reported	65.610	99,28	1.209.057	99,66	86.628	99,16	1.180.654	99,55
Total	66.089	100	1.213.186	100	87.360	100	1.185.954	100
Psychosocial risk factors (based on Swedish Job Exposure Matrix)								
Low control	42.828	64,8	603.197	49,72	48.616	55,65	587.884	49,57
High control	23.261	35,2	609.989	50,28	38.744	44,35	598.070	50,43
Total	66.089	100	1.213.186	100	87.360	100	1.185.954	100
High demands	31.580	47,78	600.181	49,47	29.418	33,67	585.650	49,38
Low demands	34.509	52,22	613005	50,53	57.942	66,33	600.304	50,62
Total	66.089	100	1.213.186	100	87.360	100	1.185.954	100
High strain	18.838	28,5	184.313	15,19	13.341	15,27	238.501	20,11
Low strain	47.251	71,5	1.028.873	84,81	74.019	84,73	947.453	79,89
Total	66.089	100	1.213.186	100	87.360	100	1.185.954	100
Passive job	23.990	36,3	418.884	34,53	35.275	40,38	349.383	29,46
Active job	42.099	63,7	794.302	65,47	52.085	59,62	836.571	70,54
Total	66.089	100	1.213.186	100	87.360	100	1.185.954	100

Table 3. Associations between psychosocial risk factors and precarious employment in 2005 by sex.

	Men			Women		
	Odds ratio	95%CI		Odds ratio	95%CI	
Low control	1,53	1,51	1,56	1,18	1,17	1,20
High demands	1,17	1,15	1,19	0,55	0,54	0,56
High strain	2,21	2,17	2,25	0,81	0,79	0,82
Passive job	0,84	0,82	0,85	1,41	1,39	1,43

Table 4. Odds ratios for ‘Common mental disorders’, ‘Alcohol and substance use disorders’ and ‘Suicide attempt’ (from 2006 to 2016) conditional on precarious employment (in 2005), mediators (in 2005), and adjusted for covariates, separately for men and women

			Common mental disorders				Substance use disorders				Suicide attempt								
			Men		Women		Men		Women		Men		Women						
			Odds ratio	95%CI	Odds ratio	95%CI	Odds ratio	95%CI	Odds ratio	95%CI	Odds ratio	95%CI	Odds ratio	95%CI					
Model 1	Precarious employment	Non-PE	ref.				ref.				ref.								
		PE	1,52	1,44	1,60	1,36	1,31	1,41	1,81	1,69	1,94	1,30	1,20	1,41	1,83	1,53	2,20	1,55	1,36
	Control	High control	ref.				ref.				ref.								
Low control		1,28	1,26	1,31	1,15	1,13	1,16	1,25	1,22	1,28	1,17	1,14	1,21	1,53	1,43	1,63	1,38	1,31	1,46
Model 2	Precarious employment	Non-PE	ref.				ref.				ref.								
		PE	1,51	1,45	1,58	1,31	1,27	1,35	1,71	1,63	1,80	1,33	1,26	1,41	1,58	1,39	1,78	1,38	1,26
	Demands	Low demands	ref.				ref.				ref.								
High demands		0,92	0,90	0,93	0,88	0,86	0,89	0,86	0,84	0,88	0,81	0,78	0,84	0,78	0,73	0,84	0,69	0,65	0,74
Model 3	Precarious employment	Non-PE	ref.				ref.				ref.								
		PE	1,54	1,48	1,59	1,36	1,33	1,40	1,72	1,65	1,81	1,37	1,30	1,44	1,62	1,45	1,82	1,46	1,34
	High demands/Low control	Low strain	ref.				ref.				ref.								
High strain		1,18	1,16	1,21	1,01	0,99	1,03	1,11	1,08	1,15	0,93	0,89	0,97	1,15	1,06	1,25	0,97	0,90	1,05
Model 4	Precarious employment	Non-PE	ref.				ref.				ref.								
		PE	1,50	1,45	1,56	1,33	1,29	1,37	1,81	1,72	1,91	1,29	1,20	1,38	1,75	1,53	1,99	1,46	1,30
		Active job	ref.				ref.				ref.								

Low de-
mands/Low con-
trol Passive job

1,18 1,15 1,20 1,18 1,17 1,20 | 1,18 1,15 1,21 1,26 1,22 1,31 | 1,38 1,30 1,48 1,46 1,38 1,54

Note: ref.=Reference group: High PE (PE score<-3), High control (<median job control score), Low demands (<median job demands score), Low strain (High demands=0 & Low control=1), Active job (High control=1 and High demands=1). Odds ratio adjusted for age, educational level, any mental disorder prior to 2006, any psychiatric diagnosis for either parent.

Table 5. Direct and indirect effects of ‘Precarious employment’ (in 2005) on ‘Common mental disorders’, ‘Acohol and substance use disorders’ and ‘Suicide attempt’ (from 2006 to 2016) through ‘Low control’, ‘High demands’, ‘High strain’ and ‘Passive job’ (in 2005), separately for men and women.

Mediator	Common mental disorders						Alcohol and substance use disorders						Suicide attempt								
	Odds ratio	95%CI		Odds ratio	95%CI		Odds ratio	95%CI		Odds ratio	95%CI		Odds ratio	95%CI							
	Low control																				
		Men			Women				Men			Women				Men			Women		
Model 1	Controlled direct effect	1,45	1,39	1,50	1,31	1,28	1,35	1,65	1,57	1,73	1,37	1,28	1,46	1,46	1,30	1,63	1,33	1,20	1,47		
	<i>Natural indirect effect</i>	<i>1,02</i>	<i>1,01</i>	<i>1,03</i>	<i>1,00</i>	<i>1,00</i>	<i>1,01</i>	<i>1,01</i>	<i>1,01</i>	<i>1,02</i>	<i>1,01</i>	<i>1,00</i>	<i>1,01</i>	<i>1,02</i>	<i>1,00</i>	<i>1,04</i>	<i>1,01</i>	<i>1,00</i>	<i>1,01</i>		
	High demands																				
Model 2	Controlled direct effect	1,49	1,43	1,56	1,35	1,30	1,40	1,77	1,67	1,88	1,31	1,19	1,44	1,66	1,43	1,94	1,40	1,19	1,65		
	<i>Natural indirect effect</i>	<i>1,00</i>	<i>0,99</i>	<i>1,00</i>	<i>1,01</i>	<i>1,01</i>	<i>1,02</i>	<i>1,00</i>	<i>0,99</i>	<i>1,00</i>	<i>1,03</i>	<i>1,02</i>	<i>1,05</i>	<i>0,99</i>	<i>0,99</i>	<i>1,00</i>	<i>1,05</i>	<i>1,03</i>	<i>1,08</i>		
	High strain																				
Model 3	Controlled direct effect	1,31	1,24	1,38	1,22	1,15	1,29	1,64	1,52	1,77	1,21	1,04	1,40	1,40	1,16	1,69	1,15	0,90	1,46		
	<i>Natural indirect effect</i>	<i>1,00</i>	<i>0,99</i>	<i>1,01</i>	<i>1,00</i>	<i>1,00</i>	<i>1,00</i>	<i>1,01</i>	<i>1,00</i>	<i>1,02</i>	<i>1,01</i>	<i>1,00</i>	<i>1,01</i>	<i>1,00</i>	<i>0,97</i>	<i>1,03</i>	<i>1,01</i>	<i>1,00</i>	<i>1,01</i>		
Model 4	Passive job																				

Controlled direct effect	1,52	1,45	1,59	1,32	1,28	1,37	1,64	1,54	1,74	1,38	1,28	1,48	1,48	1,28	1,71	1,33	1,20	1,49
<i>Natural indirect effect</i>	<i>0,99</i>	<i>0,99</i>	<i>1,00</i>	<i>1,01</i>	<i>1,01</i>	<i>1,01</i>	<i>1,00</i>	<i>0,99</i>	<i>1,00</i>	<i>1,02</i>	<i>1,01</i>	<i>1,03</i>	<i>0,99</i>	<i>0,99</i>	<i>1,00</i>	<i>1,02</i>	<i>1,01</i>	<i>1,03</i>

6. DISCUSIÓN

Las condiciones de empleo y trabajo en los últimos 20 años en Europa han estado marcadas por las consecuencias de la crisis económica de 2008, y recientemente por la crisis provocada por la pandemia del covid-19, ambas con efectos globales devastadores sobre la calidad de vida y el bienestar de la gran mayoría de la población (Johnstone, 2018; Johnstone et al., 2019). Con una fuerte impronta neoliberal, muchos países han respondido a la crisis mediante la desregulación de las relaciones laborales, realizando cambios en la organización del trabajo, recortes en las políticas públicas y la protección social y un debilitamiento pronunciado de las organizaciones sindicales (Buchholz et al., 2009). En este contexto, se han agudizado muchas de las necesidades y problemas del empleo que vienen desarrollándose desde hace varias décadas en Europa, tales como la flexibilidad laboral, la temporalidad y la inseguridad laboral, la informalidad y el desempleo (especialmente de tipo crónico) y el empeoramiento de las condiciones de trabajo, que tienen un demostrado impacto negativo sobre la salud de la población trabajadora y muy en especial sobre el estrés laboral y la salud mental (Matilla-Santander et al., 2020).

En este marco, surgió en las últimas décadas el concepto de *empleo precario* para definir un fenómeno generalizado de pérdida de calidad del empleo. Desde su surgimiento en la década de 1980 con los estudios pioneros de Rodgers, se han ido alcanzando consensos bastante extendidos sobre su conceptualización, y aunque aún no existe una definición estandarizada internacionalmente, la literatura confluye hacia una definición general de la precariedad laboral como una situación de inseguridad laboral, insuficiencia de ingresos y falta de

derechos y protección (Kreshpaj et al., 2020), que es transversal a todos los tipos de contratos y categorías ocupacionales (Julià et al., 2017b).

Al mismo tiempo, y como consecuencia de estos avances conceptuales, se perfeccionó notablemente la medición de la precariedad laboral con el desarrollo de instrumentos que permiten captar la multidimensionalidad del fenómeno superando los primeros abordajes unidimensionales en la capacidad de medirlo en toda su extensión.

Una creciente cantidad de evidencia empírica permite ver con claridad la estrecha relación entre la precarización de las condiciones de empleo con diversos resultados de salud, tanto física como mental, lo que ha llevado al reconocimiento ampliamente extendido de la precariedad laboral como un destacado determinante social de la salud (Benach et al., 2014).

Sin embargo, la investigación acerca de los mecanismos causales que permiten vehicular el efecto de la precariedad laboral sobre la salud es aún muy escasa. Así, con el fin de contribuir a llenar este vacío de conocimiento, en esta tesis se retoman algunos marcos conceptuales que señalan la organización del trabajo como uno de estos mecanismos (Martikainen et al., 2002; Rugulies, 2019) y se aborda el posible papel mediador del entorno psicosocial laboral en la relación de la precariedad laboral y diversos resultados de salud. Con este objetivo, se estimó la proporción del efecto de la precariedad laboral sobre la salud que pasa a través de un conjunto de riesgos psicosociales laborales, como las altas demandas de trabajo, el bajo control, un apoyo

social insuficiente por parte de superiores y colegas en el lugar de trabajo o la existencia de conflicto entre la vida laboral y familiar.

Considerando que en este trabajo se presenta una aproximación inicial al estudio de los riesgos psicosociales como mecanismos causales del efecto de la precariedad sobre la salud, se procuró dar robustez y consistencia a los resultados de los distintos artículos, evaluando la hipótesis de mediación bajo distintos enfoques analíticos y metodológicos. Primero, se utilizaron distintas aproximaciones del análisis de mediación, de manera que el segundo y tercer artículo utilizan el enfoque clásico de Baron and Kenny con innovaciones que permiten la comparación insesgada de los coeficientes de regresión entre modelos anidados y la descomposición de los efectos de mediación. Concretamente, el método Karlson-Holm-Breen (KHB) permite comparar un modelo reducido con un modelo completo ajustando los coeficientes de reescalado para fijar la varianza residual del resultado latente (Karlson et al., 2012; Kohler et al., 2019). En el cuarto artículo, se tomaron en consideración desarrollos más recientes del análisis de mediación basado en definiciones contrafactuales de los efectos tanto directos como indirectos, con el fin de controlar la interacción entre la variable de exposición y las variables mediadoras (Richiardi et al., 2013; Valeri and VanderWeele, 2013).

En segundo lugar, se utilizaron diferentes muestras de trabajadores con el fin de analizar la relación entre las variables de interés en distintos contextos socioeconómicos y políticos. Concretamente, se utilizó una muestra de trabajadores de la ciudad de Barcelona, una muestra de trabajadores de 23 países europeos y una cohorte de

trabajadores suecos construida a partir de la vinculación de varios registros administrativos sobre empleo y salud.

En tercer lugar, se usaron distintas medidas de las tres dimensiones centrales de estudio, es decir, la precariedad laboral, los riesgos psicosociales laborales y la salud de los trabajadores, que han sido detalladas en cada artículo y en el capítulo metodológico.

Finalmente, se utilizaron distintos diseños de investigación. Tres estudios están basados en un diseño transversal y uno de ellos en un estudio de cohorte.

6.1. Principales resultados

a) Precariedad laboral, estrés crónico y salud mental

Los resultados obtenidos de los estudios que componen esta tesis reafirman la relación entre la precariedad laboral y los distintos resultados de salud considerados, tanto en hombres como en mujeres. Concretamente, se encontró que los trabajadores de ambos sexos con mayores niveles de precariedad laboral tienen mayor probabilidad de tener una mala salud mental percibida (medida con el índice WHO5) en comparación con los trabajadores menos precarizados. Este resultado parece confirmarse para el diagnóstico de enfermedades mentales, en el que se encontró que los trabajadores precarizados tienen mayor probabilidad de ser diagnosticados con trastornos mentales comunes, trastorno por consumo de sustancias e intentos de suicidio con respecto a los no precarizados, en ambos sexos.

En el marco del proyecto PRESSED, cuyo principal objetivo fue estudiar la relación de la precariedad laboral y el estrés crónico, así como los mecanismos causales que subyacen a ella, se encontró que el empleo precario podría ser un factor de riesgo tanto a nivel percibido como hormonal. A nivel de estrés percibido, se observó una asociación consistente entre la EPRES y el PSS en ambos sexos, mientras que a nivel hormonal el empleo precario se asoció con un aumento del metabolismo del Cortisol (20α DHF/cortisol, 20β DHF/cortisol), especialmente entre las mujeres.

La asociación del empleo precario con el PSS es más consistente que con los marcadores biológicos, lo que sugiere que la vivencia de eventos estresantes y la autopercepción del estrés no tiene necesariamente un correlato a nivel hormonal (específicamente en la producción de glucocorticoides suprarrenales).

Cabe señalar que este resultado podría tener implicancias metodológicas considerando que a menudo las medidas objetivas y subjetivas del estrés se presentan como sustitutas o intercambiables, es decir, se suele partir del supuesto de que usando una u otra se obtendrán resultados similares. Sin embargo, es posible que sean complementarias y que arrojen luz sobre distintos aspectos de un mismo fenómeno.

A propósito, la descomposición de la escala EPRES en sus dimensiones (salarios, temporalidad, derechos, ejercicio de derechos, vulnerabilidad y desempoderamiento) permitió observar con mayor claridad la dinámica de la relación entre la precariedad laboral y el estrés. Los resultados obtenidos muestran que la dimensión de la precariedad laboral que más influye sobre el estrés percibido es la vulnerabilidad,

que refiere a la falta de apoyo frente al trato autoritario de los superiores en la empresa. Sin embargo, esta dimensión no mostró asociación con ninguno de los marcadores esteroideos considerados, ni en hombres ni en mujeres. Al mismo tiempo, las dimensiones de la EPRES que se asociaron con los marcadores (salarios, temporalidad, derechos, ejercicio de derechos y desempoderamiento) no tuvieron asociaciones con el PSS (excepto la dimensión de los salarios en los hombres). Estos resultados podrían indicar que los procesos fisiológicos por los que el empleo precario genera respuestas hormonales no son, en sí mismos, conscientes, sino que la precariedad laboral puede expresarse biológicamente con independencia de la conciencia de los individuos (Krieger et al., 2011).

A su vez, la perspectiva de género tuvo un lugar central en esta tesis en la que se desagregó por sexo el análisis estadístico de todos los estudios que la componen y, como era de esperar, los resultados varían según el sexo. La asociación de la precariedad laboral con la mala salud mental percibida fue mayor entre las mujeres en comparación con los hombres, pero fue menor con la mala salud mental diagnosticada (trastornos mentales comunes, trastorno por uso de sustancias e intentos de suicidio). Con respecto al estrés crónico, se encontró una asociación mayor entre las mujeres, tanto a nivel percibido como hormonal. A propósito de esto último, al considerar las distintas dimensiones de la EPRES por separado, entre las mujeres se encontró una fuerte asociación entre la temporalidad y la activación del eje HPA, tanto con el cortisol como con varios de sus metabolitos. Otros marcadores relacionados con el metabolismo del cortisol (20α DHF/cortisol, 20β DHF/cortisol, cortisol/cortisona) se asociaron

con dimensiones como el desempoderamiento y el ejercicio de derechos, que refieren principalmente a la dimensión contractual del empleo precario. En cuanto a los hombres, la sobreactivación del eje HPA se produce fundamentalmente con los salarios precarios, una dimensión muy vinculada al estereotipo del “hombre sustentador” que remite a un modelo tradicional de articulación de la vida laboral y familiar según el cual el hombre cabeza de familia actúa como principal proveedor de su esposa e hijos dependientes (Crompton et al., 2007). En este marco, los resultados hallados sugieren que, entre los hombres, la respuesta psicofisiológica a la precariedad laboral podría estar relacionada con la percepción de no cumplir con las expectativas sociales asociadas a su rol (Sánchez-Mira, 2021).

Las diferencias entre hombres y mujeres en la relación de la precariedad laboral con el estrés crónico es uno de los resultados más destacables de esta tesis, ya que podrían estar mostrando un complejo proceso de interacción entre las características bioquímicas propias del sexo biológico con los estereotipos asociados a los roles de género y su relación con la inserción de los individuos en el mercado de trabajo.

b) Riesgos psicosociales laborales, estrés crónico y salud mental

En consonancia con la literatura, todos los estudios confirman que el entorno psicosocial laboral impacta sobre la salud de los trabajadores. Se observó que las altas demandas psicológicas y el bajo control y

apoyo social aumentan las probabilidades de tener mala salud mental percibida, tanto en hombres como en mujeres.

A su vez, al considerar la mala salud mental diagnosticada se encontró que el bajo control es un factor de riesgo para los trastornos mentales comunes, los trastornos por consumo de sustancias y para los intentos de suicidio, para ambos sexos. Sin embargo, contrariamente a lo esperado de acuerdo con el modelo de Demanda-Control (Karasek, 1979) y con la mayor parte de la evidencia acumulada (Stansfeld and Candy, 2006), se encontró que las altas demandas tienen un efecto protector de la salud mental de los trabajadores. Esta divergencia ha sido constatada en estudios previos que utilizan JEM u otras medidas agregadas de riesgos psicosociales (Samuelsson et al., 2013; Wieclaw et al., 2008), entre ellos uno reciente sobre depresión, basado en la misma cohorte de trabajadores. En este último, los autores sugieren que los trabajos clasificados como de alta demanda podrían beneficiar a las personas a través de desafíos y oportunidades y, por lo tanto, estar relacionados con un menor riesgo de depresión (Almroth et al., 2021). También argumentan que los estudios basados en la experiencia personal de las demandas psicosociales, que son la mayoría, han demostrado incluir sesgos de reporte que sobreestiman las asociaciones con los resultados de salud mental (Kolstad et al., 2011). Por lo tanto, lo que se capta a nivel individual puede reflejar diferencias de personalidad, estilo de trabajo y disposición a los trastornos mentales (Almroth et al., 2021).

Por otra parte, con relación al estrés crónico, se encontró que las altas demandas y el bajo apoyo social son los dos factores psicosociales

que se asociaron con la mayor cantidad de los esteroides considerados, tanto en hombres como en mujeres, lo que sugiere que son los dos factores psicosociales que más influyen en la respuesta fisiológica al entorno psicosocial laboral.

Mediación de los riesgos psicosociales en la relación entre la precariedad laboral y la salud

Como se ha dicho antes, la existencia de efectos mediadores de los riesgos psicosociales en la relación de la precariedad laboral y los distintos resultados de salud analizados aportan evidencia a favor de la hipótesis principal de esta tesis, según la cual el entorno psicosocial laboral puede ser un mecanismo causal en esta relación.

En uno de los estudios se encontró que las altas demandas, el bajo control y el bajo apoyo social considerados en conjunto tienen un efecto mediador total en la asociación entre la precariedad laboral y la salud mental percibida entre las mujeres y un efecto mediador parcial entre los hombres. Esto supone que, para las mujeres, todo el efecto de la precariedad laboral sobre la salud mental percibida se canalizó a través de los riesgos psicosociales. Por su parte, los resultados para el estrés crónico presentan un patrón de género similar; se observaron efectos indirectos de las altas demandas, el bajo control, el bajo apoyo social y el conflicto familia-trabajo en la relación entre la precariedad laboral y la producción de esteroides solamente entre las mujeres.

Sin embargo, para las enfermedades mentales diagnosticadas en la cohorte de trabajadores suecos no se encontraron efectos mediadores

de los riesgos psicosociales. No obstante, este resultado podría explicarse en parte porque las medidas de riesgos psicosociales utilizadas no son individuales, sino que refieren a ocupaciones y por tanto podrían no estar captando con suficiencia la heterogeneidad de modelos de organización del trabajo y de entornos psicosociales laborales en el mercado de empleo sueco.

En términos generales, los análisis de mediación confirman las diferencias entre hombres y mujeres en la respuesta psicológica y fisiológica a la precariedad laboral señaladas en los párrafos precedentes. Concretamente, los resultados muestran que la proporción de la precariedad laboral sobre la salud que se expresa a través de los riesgos psicosociales es mayor entre las mujeres. En otras palabras, las mujeres parecen reaccionar más a factores proximales como el entorno psicosocial que a factores distales como la precariedad laboral, mientras que entre los hombres ocurre precisamente lo contrario. Este es uno de los resultados más destacados de esta tesis y deja planteadas varias hipótesis complementarias para su explicación.

En primer lugar, podría tratarse del efecto combinado de la segregación ocupacional de género vertical y horizontal por el cual las mujeres acceden a empleos más precarios y dentro de ellos a puestos de trabajo con peores condiciones laborales, como un entorno psicosocial más riesgoso (Charles, 2016; Menéndez et al., 2007). Es decir, la asociación de la precariedad laboral con los riesgos psicosociales es mayor entre las ocupaciones y puestos de trabajo a los que acceden las mujeres en comparación con aquellos a los que acceden los hombres. En definitiva, para las mujeres, la precariedad de las

condiciones de empleo podría expresarse en entornos psicosociales riesgosos para la salud en mayor medida que para los hombres como resultado de su posición desventajosa en el mercado laboral.

En segundo lugar, es posible que, aunque las medidas de los riesgos psicosociales no expresen diferencias significativas para hombres y mujeres, la vivencia cotidiana del entorno laboral sea cualitativamente peor para las mujeres que para los hombres, tal como sugieren algunos estudios (Michael et al., 2009; Vermeulen and Mustard, 2000; Whittock, 2010). Esto supone reconocer que la percepción del riesgo puede ser diferente para ambos sexos y que, al socializarse en entornos laborales más precarios, las mujeres tiendan a normalizar situaciones o condiciones psicosociales riesgosas. También puede tratarse de una respuesta adaptativa a situaciones de restricción de oportunidades laborales, por la que se ajustan las expectativas a las posibilidades que ofrece el mercado de trabajo (Kaiser, 2007; Kiessling et al., 2019).

Finalmente, estos resultados contribuyen a mostrar la importancia de las condiciones laborales en la configuración del entorno psicosocial de trabajo. La mayoría de los modelos de riesgo psicosocial asumen teóricamente una causalidad social, donde la organización del trabajo determina el entorno laboral psicosocial, pero no explican la relación del individuo con el entorno (Muntaner and O'Campo, 1993). Además, asimilar lo "social" a lo "psicológico" hace que los modelos no puedan explicar cómo la estructura social determina el entorno psicosocial del trabajo (Martikainen et al., 2002). Es fundamental que los modelos de riesgo psicosocial incluyan información sobre la

precarización de las condiciones de empleo para explicar cómo el contexto político y las relaciones laborales determinan la organización del trabajo en un complejo proceso que afecta la salud de los trabajadores. Por tanto, avances empíricos como los ofrecidos en este artículo estimulan el desarrollo de nuevos marcos teóricos y metodológicos que relacionen los riesgos psicosociales con determinantes estructurales del empleo para explicar el impacto global de la esfera laboral sobre la salud.

6.2. Limitaciones y fortalezas

a) Limitaciones

Esta tesis tiene algunas limitaciones que deben ser consideradas para interpretar correctamente los resultados que ofrece. Primero, los estudios basados en diseños transversales no permiten establecer relaciones causales directas entre la precariedad y los resultados de salud analizados. Así, los artículos 1, 2 y 3 no permiten concluir que la mala salud mental y el estrés crónico, respectivamente, son consecuencia de la precariedad laboral. A su vez, para el artículo 2 se agrega la limitación de que no se resuelve la posible causalidad inversa dada porque una mala salud mental previa puede aumentar las probabilidades de tener un trabajo precario o un entorno psicosocial desfavorable. Además, para ninguno de los tres estudios hay información sobre el periodo durante el cual los sujetos han estado expuestos al empleo precario, lo que podría alterar los resultados. Sin embargo, el diseño longitudinal del artículo 4 permite superar algunas de estas limitaciones, principalmente la posible causalidad inversa, ya que, al

tratarse de una cohorte, fue posible excluir a los individuos con trastornos mentales en el año de base.

Por otra parte, una limitación común a todos los estudios es que refieren solamente a la población asalariada en situación de formalidad laboral y excluye una parte del trabajo no estándar, como el autoempleo o el trabajo informal. En la próxima sección sobre futuras líneas de investigación se hace referencia a algunas alternativas metodológicas para superar esta limitación.

b) Fortalezas

Por otro lado, los estudios tienen un conjunto de fortalezas destacables. Primero, los artículos del proyecto PRESSED se destacan por el uso de marcadores biológicos, y son una novedad no solo en el estudio del empleo precario sino también en el campo de la epidemiología social en general, donde se suelen utilizar medidas de salud subjetivas o autoinformadas. El uso de medidas biológicas permite controlar mejor los posibles sesgos propios de la percepción subjetiva que son inherentes a las medidas autoinformadas, también evaluar la correlación entre ambos tipos de medidas y así discutir su uso en la investigación epidemiológica como medidas complementarias o sustitutas.

A su vez, el enfoque interdisciplinar del proyecto PRESSED también es una fortaleza para los estudios que lo componen, en la medida que, al combinar aspectos sociales y bioquímicos, aporta evidencia novedosa sobre la respuesta psicofisiológica del empleo precario multidimensional. Además, el estudio simultáneo de los ejes gonadal y

suprarrenal, mediante la determinación tanto de hormonas como de metabolitos en el cabello, es una novedad en la investigación bioquímica, dado que en estudios anteriores solo se han estudiado los esteroides del eje suprarrenal.

Finalmente, se incluyen resultados basados en un estudio de cohorte, lo que permite medir la exposición y el resultado en distintos momentos.

6.3. Futuras líneas de investigación

Los estudios desarrollados en esta tesis dejan planteadas futuras líneas de investigación, tanto por las limitaciones que se deberá intentar superar en próximos estudios como por los hallazgos que requieren ser profundizados.

En primer lugar, deberá retomarse la cuestión del impacto de la precariedad laboral sobre la organización del trabajo. Esta tesis contribuye a mostrar que los riesgos psicosociales no dependen solamente de la organización del trabajo, sino que tienen como trasfondo procesos más amplios de precarización de las relaciones laborales y las condiciones de empleo. Para una mejor comprensión de estos procesos, es necesario poner el foco de análisis en el plano de las políticas de empleo y bienestar y su relación con la precariedad laboral (Padrosa et al., 2022). No es nuevo en la literatura que el empleo está determinado por el sistema político, económico y cultural en el que está inserto y que configura los diversos formatos que pueden tomar las relaciones y la legislación laboral en cada contexto nacional (Benach and Muntaner, 2011) También es conocido que los países

que disponen de sistemas de bienestar más desarrollados tienen sistemas de protección social y regulaciones del mercado laboral que protegen a los trabajadores de las peores consecuencias del desempleo y el empleo no estándar (Kim et al., 2012; Shahidi et al., 2016a, 2016b). En este marco, estudios de caso en países con distintos niveles de desarrollo de sus regímenes de bienestar podrían contribuir a identificar las debilidades de los Estados en materia de políticas de empleo, como factores de vulnerabilidad de la población trabajadora para la precariedad laboral (Chung and Muntaner, 2006).

En segundo lugar, las diferencias de género en el efecto mediador de los riesgos psicosociales deben ser profundizadas. Considerando las desigualdades de género en el mercado de empleo y su relación con la división sexual del trabajo, es plausible relacionar este resultado con una inserción laboral más precaria en puestos de trabajo de peor calidad. Sin embargo, se trata de una hipótesis que deberá ser evaluada a partir de diseños de investigación e instrumentos que permitan conocer la dinámica cotidiana de la organización del trabajo y cómo se producen los factores psicosociales que ponen en riesgo la salud de las trabajadoras. Así, son necesarios estudios basados en diseños cualitativos que permitan reconstruir las experiencias individuales con relación al entorno psicosocial laboral, y alcanzar mayor profundidad analítica con relación a los mecanismos a través de los cuales acaba impactando sobre la salud y el bienestar de los trabajadores.

Por otra parte, la perspectiva de género es fundamental para comprender la dinámica de la precariedad en el mercado laboral y su

impacto en la salud de la población trabajadora, especialmente considerando que la división sexual del trabajo es un determinante de la inserción de las mujeres en la esfera del trabajo remunerado. Sin embargo, una revisión sistemática reciente encontró que muy pocos estudios que investigan el trabajo remunerado y la salud mental incluyen una perspectiva de género, lo cual implica necesariamente una interpretación sesgada de la realidad del empleo precario y su impacto en la salud (Valero et al., 2021).

En esta tesis se hizo un avance importante en este sentido, ya que se desagregó por sexo el análisis estadístico en los cuatro artículos que la componen. Esto permitió identificar diferencias entre hombres y mujeres en la relación entre la precariedad laboral, los riesgos psicosociales y la salud que son potencialmente atribuibles a desigualdades de género en varios niveles. No obstante, la desagregación por sexo no es suficiente para asegurar la plena incorporación de la perspectiva de género, sino que se requiere incorporar información sobre el tamaño y la composición familiar, el estado civil, la distribución del trabajo no remunerado, etcétera (Valero et al., 2021).

Otra línea de investigación que queda abierta a partir de estos resultados refiere a los procesos de precarización que afectan a formas de empleo no estándar, como el trabajo autónomo. Se trata de un segmento de la población trabajadora muy heterogéneo con relación a la calidad de las condiciones de empleo y trabajo; sin embargo, la evidencia sugiere que son trabajos que en su mayoría tienden a la precariedad laboral (Reuschke and Zhang, 2022). Por otra parte, su medición requiere de instrumentos multidimensionales que consideren las

particularidades del empleo autónomo, que no se ajustan al esquema contractual basado en el binomio empleador-empleado.

En la misma línea, cabe mencionar el trabajo que se realiza en condiciones de informalidad, una problemática que se mantiene en Europa, aunque con diferencias entre países (Williams and Horodnic, 2019) y con niveles mucho más bajos que en otras regiones del mundo (Charmes, 2012). La precariedad en el empleo informal no puede ser medida a partir de instrumentos como la EPRES porque la relación laboral no está basada en un contrato ni se ajusta al derecho laboral.

Finalmente, cabe mencionar que los datos generados en el marco del proyecto PRESSED permiten estudiar el estrés laboral como factor de riesgo para la salud de los trabajadores. Como se mencionó en los artículos 1 y 2, está ampliamente demostrado que el estrés se asocia con una salud mental y física deficiente a través de mecanismos psicofisiológicos (Brunner, 1997) y puede ser un factor de riesgo para diferentes problemas de salud, tales como enfermedades cardiovasculares, síndrome metabólico, osteoporosis y depresión (Schneiderman et al., 2004; Sparrenberger et al., 2009). A su vez, es conocida la relación de las condiciones de trabajo y empleo con el estrés crónico, que esta tesis contribuye a reafirmar, de modo que es plausible la hipótesis de que el estrés sea un mecanismo a través del cual la precariedad laboral acaba impactando sobre la salud de la población trabajadora. Se deberá explorar en profundidad esta hipótesis, estimando la proporción del efecto de la precariedad laboral sobre

diversos resultados de salud física y mental que puede ser atribuida al estrés laboral.

6.4. Implicancias para las políticas públicas

Por último, los resultados alcanzados tienen algunas implicaciones para las políticas públicas, en diferentes niveles de acción.

a) Políticas de empleo integrales

Conviene empezar señalando que, si bien en esta tesis se ha remarcado la distinción entre condiciones de empleo y condiciones de trabajo con fines analíticos, en la práctica ambas dimensiones ocurren de manera concomitante y la política de empleo debe considerarlas como un binomio. De hecho, los resultados sugieren que la precariedad de las condiciones de empleo y de trabajo se implican mutuamente, de manera que las políticas para mejorar las condiciones de trabajo, entre ellas la organización del trabajo y el entorno psicosocial que emerge de esta, tendrán un éxito limitado si no van acompañadas de políticas que reduzcan la precariedad laboral. A la inversa, una reducción de la precariedad laboral no implica una mejora automática de las condiciones de trabajo. De este modo, es importante que la política tenga un enfoque integral de la esfera laboral y combine acciones sobre ambos componentes.

b) Considerar la precariedad laboral como un riesgo para la salud en las intervenciones y políticas de salud ocupacional

Las intervenciones y las políticas de salud ocupacional suelen centrarse en los comportamientos individuales, los riesgos físicos y los factores de riesgo psicosocial derivados de la organización del

trabajo. Sin embargo, se ha demostrado que las condiciones de empleo precarias también son un factor de riesgo para la salud de la población trabajadora. Así pues, el empleo precario se reafirma como un destacado determinante social de la salud que puede ser afrontado a través de políticas públicas en al menos tres sentidos posibles. En primer lugar, midiendo regularmente la magnitud del fenómeno, lo que implica su inclusión en las estadísticas oficiales de los países. En segundo lugar, promoviendo que las prácticas de salud y seguridad ocupacional de las empresas tengan en cuenta las condiciones de empleo y las características de la relación laboral y no se centren únicamente en las condiciones físicas y psicosociales del trabajo. Complementariamente, los sistemas de gestión de la seguridad y salud en el trabajo (SGSST) deben evaluar también las características de la relación laboral, y no solo los riesgos psicosociales, para lograr mejoras en las condiciones laborales de aquellos trabajadores en situación de precariedad.

En tercer lugar, los gobiernos deberían actuar sobre las causas profundas de la precariedad laboral, implementando políticas que mejoren las condiciones de empleo, tales como asegurar los niveles salariales, garantizar los derechos laborales y su ejercicio, reducir la temporalidad y la inseguridad laboral, entre otras.

c) La sindicalización como herramienta de promoción de la salud ocupacional

Por otra parte, los sindicatos han demostrado tener un papel importante en la promoción de las condiciones de trabajo al interior de las compañías (Hagedorn et al., 2016). En este sentido, es fundamental

que los estados aseguren y protejan activamente el derecho a la sindicalización que a menudo aparece vulnerado en muchos países. Al mismo tiempo, los sindicatos deben promover la incorporación de trabajadores empleados en sectores de la economía que permanecen por fuera de los convenios colectivos.

Por otra parte, también son necesarias acciones y políticas públicas que contribuyan a mejorar el entorno psicosocial laboral. En primer lugar, es necesario reforzar la gestión de los riesgos psicosociales en la práctica de los SGSST por parte de las compañías. Se ha observado que la mayoría de las organizaciones tienen dificultades para abordar adecuadamente este tipo de riesgos, tanto por la falta de instrumentos adecuados como de recursos humanos calificados para su gestión. La falta de priorización de la gestión de los riesgos psicosociales a la interna de las compañías también se ha destacado como una barrera para su abordaje. En cualquier caso, las agencias de salud pública de los países (o de unidades territoriales menores) deben tener un rol activo para que las empresas mejoren su capacidad de identificar y controlar este tipo de riesgos.

d) El género como un eje transversal en las políticas de empleo

Finalmente, los resultados de este trabajo sugieren que el empleo precario no impacta de la misma manera en la salud de hombres y mujeres, lo que alerta sobre la importancia de acciones orientadas a revertir la segregación ocupacional de género en el mercado laboral. Este tipo de acciones han sido desarrolladas en varios países de Europa aunque con diferentes enfoques y niveles de compromiso político según sean nórdicos, continentales, mediterráneos o de Europa

del Este (Bettio et al., 2009). Sin embargo, la persistencia de esta problemática en el continente europeo (aunque con distintos niveles) exige reforzar estas políticas, tanto las de corte “social” como las de mercado laboral estrictamente. Las primeras incluyen disposiciones generales para concienciar sobre la segregación de género y programas educativos para contrarrestar los estereotipos en la escuela, en los medios de comunicación y entre el público general. Las segundas, en tanto, incluyen la formación y la lucha contra la escasez de competencias y de mano de obra; también engloban los programas para identificar y oponerse a los prejuicios en los procedimientos de evaluación de los puestos de trabajo, en los sistemas de remuneración y en otras prácticas organizativas relativas a la selección, la contratación, los ascensos profesionales y la asignación de puestos.

Al mismo tiempo, se ha destacado que la distribución desigual de la carga de cuidados es una de las causas fundamentales de la segregación ocupacional de género (Bettio et al., 2009). En este marco, debe ser una prioridad para los gobiernos asegurar la conciliación entre la vida familiar y laboral a través de políticas de cuidados que a la vez promuevan la corresponsabilidad entre hombres y mujeres en la distribución del trabajo no remunerado al interior de las familias y los hogares.

7. CONCLUSIONS

The results analyzed in this thesis allow several conclusions to be drawn regarding the relationship between precarious employment, the psychosocial work environment, and worker's health:

- 1- Precarious employment was associated with more poorly perceived mental health in a sample of workers from 22 European countries, on the one hand, and with the diagnosis of mental disorders, substance use disorders and suicide attempts in a cohort of Swedish workers, on the other hand. Thus, precarious employment was confirmed as a risk factor for mental health and widely spread in the European context, as has been shown in previous studies.
- 2- Studies included in this thesis are the first one analyzing the relationship of multidimensional precarious employment with biological markers of chronic stress (i.e. cortisol and other steroid biomarkers related to the HPA axis and HPG axis). Temporari-ness and Wages were the dimensions associated with the largest number of steroids, both for men and women.
- 3- Furthermore, precarious employment showed a strong relationship with psychosocial risk factors such as high psychological demands, low control, low social support, and work-life conflict, suggesting that precarious jobs are more likely to produce hazardous psychosocial work environments. Therefore, it is evident that precarious employment is also expressed in the work organization, affecting the immediate context in which people carry out their daily work.
- 4- The results of mediation analysis varied according to the sample, the health outcome analyzed, and the psychosocial risk measures

- used. Despite this heterogeneity, the evidence showed that a significant proportion of the association between precarious employment and both physical and mental health passes through the psychosocial work environment, especially for women. These results warn about the need to change how psychosocial risk models are used in the epidemiological literature, as they alone fail to capture the full influence of the work environment on workers' health. Consequently, the psychosocial work environment should be considered as part of structural employment conditions related to labour relations and the labour market dynamic. In other words, in the current political and economic context in Europe, psychosocial risk factors are expressing the precarization of employment conditions generalized in the European labour market.
- 5- The gender perspective was fundamental in this thesis, which involved disaggregating by sex the statistical analysis of all the studies that comprise it. As was to be expected, the multiple results analyzed showed that precarious employment affects the health of men and women in different ways, with the direct effect of precarious employment on health being greater among men, while the indirect effect through the psychosocial work environment was greater among women. This difference could be partly explained by the fact that women access jobs with poorer working conditions than men (including the psychosocial environment) as a result of persistent gender occupational segregation in the European labour markets.
 - 6- Finally, this thesis emphasises the importance of public policies to reverse this problem. Firstly, the management of psychosocial

risks in organizations should be incorporated with more emphasis in OSH systems, despite the difficulties involved, and information on employment conditions (and not only working conditions) should be incorporated into the OSH management system. Secondly, labor precariousness as a social determinant of health requires an inter-institutional approach at all levels of government, generating actions both to mitigate it and to alleviate its impact on the health and well-being of the working population. These actions should incorporate companies and unions, whose participation is essential to ensure the viability of these policies.

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