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Self-employment, perceived ageism, and stress among older adults

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ABSTRACT

We draw on the Conservation of Resources Theory of work and four studies based on self-reports and biomarkers to assess differences in psychological well-being between employed and self-employed senior individuals. Results of our study indicated that self-employed individuals over 50 report lower stress during work-related activity and lower biomarker-based stress levels at bedtime. Furthermore, we show that when compared to employed senior individuals, perceived ageism leads to less psychological distress among self-employed senior individuals. Additionally, we find that work enjoyment, but not work absorption or intrinsic work motivation, buffered the negative relationship between perceived ageism and psychological distress. The protective effect of work enjoyment was stronger among self-employed senior individuals compared to employed senior individuals. Our research holds implications for the development of interventions and work engagements that can help to promote mental health and well-being in senior working individuals.

1. Introduction

Given the rise in worker's desire for greater levels of control and autonomy (Bresiger, 2018), combined with motivational forces such as the "Great Resignation" (Klotz & Bolino, 2016) as well as the COVID-19 pandemic, self-employment continues to gain popularity as an alternative occupation to organizational employment. Coinciding with this shift towards self-employment, there has been a growing level of interest in the relationship between self-employment and individual well-being, defined as an individual's perception of their happiness, life satisfaction, and fulfillment (Hmieleski & Carr, 2007; Stephan, 2018). While there has been considerable recent interest in the association between self-employment and well-being, there has yet to be a consensus regarding the shape and nature of this relationship. Some findings suggest that transitioning into self-employment can improve well-being (Kautonen et al., 2017), whereas other studies indicate that such increases in well-being are contingent upon contextual factors (Binder & Coad, 2013). Furthermore, additional evidence suggests that there might be no substantial difference in perceived quality of life between individuals who are self-employed and those with wage-earning occupations (Saarni et al., 2007) (see Fig. 1).

While several factors could influence the overall well-being that individuals who are self-employed experience, a growing level of scholarly attention has focused on age as a critical factor in this relationship (Zissimopoulos & Karoly, 2007; Zissimopoulos et al., 2009). Indeed, according to the U.S. Small Business Administration, self-employment has increased more among seniors, defined as individuals age 50 and over, than in any other age segment over the last three decades (Wilmoth, 2016). There are several factors contributing to the rise in self-employment among senior individuals, including improvements in overall life quality that are often associated with late-career transitions into self-employment (Kautonen et al., 2017), as well as government policies specifically aimed at delaying retirement (Hess et al., 2021; Street & Ní, 2020). Furthermore, while conditions such as depression and anxiety are more common in senior individuals (Wolitzky-Taylor et al., 2010), because self-employed individuals experience lower levels of such conditions in general (Bradley & Roberts, 2004), senior workers may leverage self-employment to improve their overall mental health and well-being. Concurrently, with recent entrepreneurship studies suggesting elevated levels of mental health conditions or symptoms in

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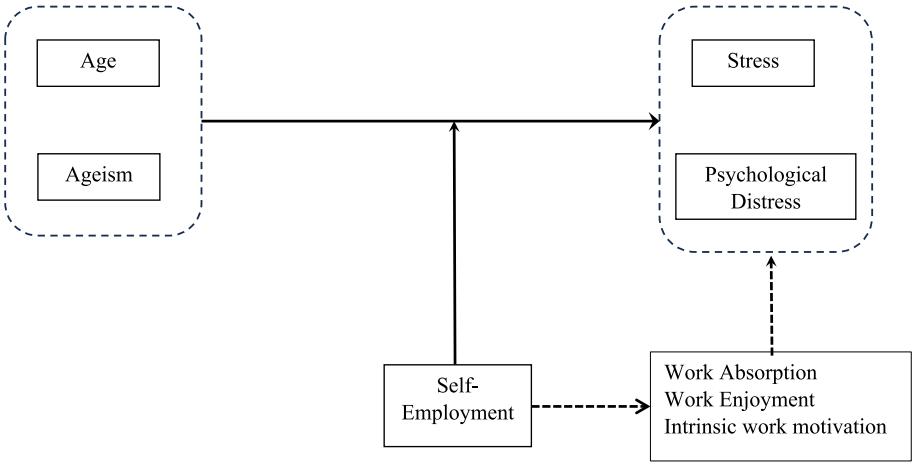

Fig. 1. Conceptual model.

entrepreneurs in general (Freeman et al., 2019; Hunt et al., 2022), follow-on inquiry is needed.[3]

However, although there is a growing body of literature focusing on the link between work and physical and mental health (Belkic et al., 2004; Ganster & Rosen, 2013), there remains a relative paucity of research into the relationship between self-employment and mental well-being in senior individuals. Given the continuing rise in self-employment as a prominent form of work among seniors (Karoly & Zissimopoulos, 2004; Zissimopoulos & Karoly, 2007), coupled with established concerns regarding work-related ageism – the discrimination, prejudice, and stereotyping of individuals based on their age – that could negatively impact the well-being of senior individuals in organizational settings (Roscigno et al., 2007; Roscigno et al., 2022), it is imperative and theoretically meaningful that we develop a better understanding of the relationship of self-employment with mental well-being for senior individuals. To address this lack of understanding, our study explicitly examines the following research questions: *What is the relationship between self-employment and well-being for senior individuals? What role does perceived ageism play regarding the well-being of senior self-employed individuals? Do "workflow"*[4] *characteristics buffer self-employed individuals more than employed individuals against the effects of ageism on well-being?*

To examine these research questions, we draw on the Conservation of Resources (COR) theory. COR theory posits that stress – a general condition in which perceived demands tax or exceed an individual's resources to cope (Lazarus, 1966) – is a function of events that threaten or erode the resources necessary for survival and self-integrity (Hobfoll, 2011; Hobfoll et al., 2016). From this perspective, individuals endeavor to obtain, retain, and protect resources that they believe to be of particular value and leverage such resources to help them succeed at work pursuits (Hobfoll et al., 2018). We contend that as individuals grow older, they accumulate greater resources, in the form of experience, social capital, and autonomy, allowing them distinct advantages when presented with the challenges of self-employment compared to organizational occupations.

Across four studies, we test the association between self-employment and well-being for senior individuals (50–65 years). The usage of the term senior can vary. However, *age 50 and above* is often considered an appropriate threshold for defining senior adults in many geriatric studies because individuals in this age group may begin to experience some age-related health changes and may also face challenges related to aging, such as retirement, reduced income, or increased social isolation (Bytheway, 2005; Daoust, 2020; Kooij et al., 2008).[5] After 50, individuals are at an increased risk for chronic conditions such as heart disease, diabetes, or osteoporosis, as well as cognitive decline or depression. (Hayflick, 2007; Togha et al., 2022). Additionally, senior adults may face changes in their social roles or relationships, such as becoming grandparents, experiencing the loss of friends or family members, or transitioning out of the workforce (Gilleard & Higgs, 2016; Roseneil & Ketokivi, 2016). Thus, based on the above definitions from labor economics, biology, and sociology, we refer to individuals older than 50 as *senior individuals*. This approach is also supported in a variety of studies on senior individuals where the cutoff for participation is 50 years or above (a selection of these can be found at the Gateway to Global Ageing[6]).

In Study 1, using a sample from the American Time Use Survey (ATUS) Well-being Module, we find that among senior individuals, as age increases stress declines more for the self-employed than for the employed. In Study 2, using the Midlife in the United States 3 (MIDUS 3) MIDUS 3 (2013–2014) combined with The National Study of Daily Experiences (NSDE; 2016–2020) daily diary study of respondents providing their saliva samples, we found that senior self-employed individuals had lower stress at bedtime. In Study 3, data from respondents in the National Health and Aging Trends Study (NHPA), we find that self-employed individuals reported lower age-related distress despite higher perceived ageism. Study 4, using a focused primary-data collection, examines how work-related factors influence the relationship between perceived ageism and psychological distress in employed and self-employed individuals (N = 378). Drawing on workflow theory, we investigate whether work absorption, work enjoyment, and intrinsic work motivation mediate this relationship differently across employment types. We find that work enjoyment uniquely buffers against the negative effects of perceived ageism on psychological distress, with this

[3] Here, and throughout, the authors acknowledge the paper has benefited greatly from the many peer-review and editorial comments.

[4] Based on "flow" in the psychological literature (Csikszentmihalyi, 2013), "workflow" (defined and elaborated later), in essence to refers to *work-related flow*. As such, the term *workflow* (Bakker, 2008) in this paper should not be mistaken with managerial or operational usage (e.g. as the steps in completing a process).

[5] It is important to note that chronological age is just one factor that may be relevant in defining seniors and assessing health outcomes in senior adults. Other factors such as functional status (i.e., the ability to carry out daily activities), comorbidities (the presence of multiple health conditions), and social support (e.g., access to family or community resources) may also be important considerations. Therefore, in geriatric studies, researchers often take a multidimensional approach to understanding the health and well-being of senior adults, taking into account a variety of factors that may impact their quality of life.

[6] Source: https://g2aging.org/survey-overview.

protective effect being notably stronger among self-employed individuals (estimate = 0.209) compared to employed individuals (estimate = 0.071). Results suggest that employment type plays a crucial role in how work-related experiences can protect against the psychological impact of perceived ageism. Results revealed that work enjoyment, but not work absorption or intrinsic work motivation, buffered the negative relationship between perceived ageism and psychological distress. Taken together, these studies offer consistent evidence of an important overall association and begin to unravel mechanisms through which senior self-employed realize lower stress.

In completing our studies, we make important theoretical as well as practical contributions. Theoretically, we expand COR theory into the relatively unexplored area of senior self-employment and illustrate its usefulness for explaining how older self-employed individuals navigate workplace demands. This underscores the versatility and explanatory power of COR theory across varied work-related settings. Specifically, we show that, while previous research has revealed important insights into the manner in which late-career transitions into self-employment can benefit senior individuals' well-being (Kautonen et al., 2017), our results specifically suggest that self-employment could reduce the overall levels of psychological distress and stress that senior individuals experience. While certain age-related factors could negatively impact senior individuals' motivation and ability to continue to work (Kooij et al., 2008), self-employment seemingly presents an opportunity to avoid such factors. Indeed, self-employment affords senior workers the ability to remain mentally and physically engaged, allowing them to maintain vital social connections that can enhance mental health and well-being (Taylor et al., 2018).

We further examine the nuances of the association between self-employment and mental well-being by exploring several potential underlying mechanisms for this relationship. Specifically, our results indicate that self-employment could help to alleviate the negative consequences that senior individuals experience as a result of general ageism, as senior self-employed individuals report lower levels of age-related psychological distress, despite experiencing higher levels of perceived ageism.

2. Theory and hypotheses

2.1. Conservation of resources theory of work

While several perspectives have been developed to help better conceptualize and understand the relationship between work and individual well-being, ranging from person-environment fit (Caplan, 1987; Van Vianen, 2018) to the job demands-resources perspective (Demerouti et al., 2001; Schaufeli & Bakker, 2004), theoretical lenses often focus on the relationship between external factors and internal characteristics as a key foundation for determining how work is associated with well-being. Building on the work of Hobfoll (2011), we draw upon the Conservation of Resources (COR) perspective as the basis of our conceptual framework to provide insight into the unique relationship between senior individuals, self-employment, and stress. COR theory revolves around the notion that stress is a function of events that threaten and erode key resources necessary for self-integrity and survival (Hobfoll, 2011). From this perspective, individuals are ultimately motivated to secure, retain, foster, and protect those resources that they view as valuable, and an inability to do so will likely result in elevated levels of stress (Örtqvist & Wincent, 2010; Westman et al., 2004). COR is particularly advantageous for our study because it has provided the basis for prior research focused on better understanding optimal aging across various perspectives (Baltes & Smith, 2003; Marsiske et al., 1995).

In terms of how COR functions from an occupational perspective, when individuals find themselves in workplace settings that diminish their valuable resources or alternative environments that do not allow them to fully leverage the resources they have accumulated, they will likely experience higher levels of stress. Indeed, considerable evidence highlights the negative impact that resource threat or loss within the workplace can have on individual mental (Topa & Valero, 2017) and physical (De Vente et al., 2003; Melamed et al., 2006) well-being. To that end, a loss of vital resources has been linked with work burnout (Park et al., 2014) and turnover (Rubenstein et al., 2020; Zhang et al., 2019). These factors are particularly salient for senior workers, as they are apt to be more vulnerable to experiencing greater stress as a result of low work-related resources (Yaldiz et al., 2018). Furthermore, older workers are at greater risk of losing critical social and psychological resources within organizational settings, further contributing to elevated levels of stress and impaired individual well-being (Roscigno et al., 2007; Roscigno et al., 2022).

2.2. Self-employment and healthy ageing

Societies across the globe are continuing to confront the increasing existence of ageing populations (Kulik et al., 2014). While ageing populations present imperative issues that must be addressed from a diverse set of perspectives ranging from macroeconomic policies (Bloom et al., 2015) to healthcare concerns (Tavares et al., 2021), there is a growing interest in how to manage the growing level of seniors in the workforce (Kautonen et al., 2014). Given that seniors are rapidly becoming one of the most represented segments of the self-employment workforce (Zissimopoulos & Karoly, 2007; Zissimopoulos et al., 2009), there is an increasing interest in how self-employment can present marked benefits as an occupational choice for those who are 50 years of age or older (Karoly & Zissimopoulos, 2004; Matos et al., 2018).

While there are several aspects of interest concerning the relationship between self-employment and senior individuals, one facet of particular interest is how this relationship can promote *active ageing*. For the purposes of this study, we define active ageing as the process of maximizing prospects for health, activity, and stability as a means of increasing an individual's quality of life as they age (Gardiner et al., 2024). Active ageing involves individuals remaining active on individual, social, cultural, and economic levels, so as to promote healthy living, extend life expectancy, and enhance the overall quality of life (Rojo-Pérez et al., 2021). Additionally, active ageing also ensures that as individuals age, they continue to maintain their independence and remain viable members of their communities (Bowling, 2008). To that end, there is growing interested in further understanding the role that self-employment might play as an important component of active ageing for senior individuals (Römer-Paakkanen & Suonpää, 2023).

From an active ageing perspective, self-employment can present important potential benefits for senior individuals. Prior evidence indicates that senior individuals who are self-employed can experience benefits in overall quality of life (Kautonen et al., 2017) and greater subjective life satisfaction (Kautonen & Minniti, 2014). Furthermore, Kupiainen and colleagues (2023) suggest that participation in self-employment could potentially create an environment conducive to senior individuals thriving; one in which autonomy, financial security, and the ability to remain engaged both mentally and physically is maximized. Indeed, recent efforts provide additional support for the potential benefits that self-employment have for active ageing, while still highlighting the importance for continued research into these relationships (Gardiner et al., 2024; Zhu et al., 2022).

To emphasize the need for additional investigation into the relationship between self-employment and active ageing for senior individuals, it is imperative to note that such activities do not come without definitive risks. Given that self-employment is inherently associated with high failure rates (Patzelt & Shepherd, 2011; Ucbasaran et al., 2013), lower levels of income (Hamilton, 2000), increased amounts of financial pressure (Gorgievski et al., 2014; Gorgievski et al., 2010), and elevated levels of work-family conflict (Parasuraman & Simmers, 2001) it is possible that senior individuals, who are more susceptible to conditions such as anxiety and depression (Wolitzky-Taylor et al., 2010), could face particularly challenging environments

when choosing to pursue self-employment as an occupation. Indeed, considering the potential for increased experiences of short-term psychological distress associated with self-employment (Reid et al., 2018), there are considerable risks that must be considered in light of the role that self-employment might play in determining successful active ageing in senior individuals.

2.3. Age, self-employment, and stress

Stress is an inherent aspect of any job, but self-employed individuals often face distinct challenges, such as juggling multiple responsibilities and uncertainty about their business's future. This can lead to heightened stress levels (Harris et al., 1999; Oren, 2012; Prottas & Thompson, 2006). Although research on self-employment and stress has progressed, findings remain inconsistent. Some studies suggest that being self-employed can lead to higher stress (Cardon & Patel, 2015; Jamal, 1997), while others indicate that self-employed individuals may experience lower stress overall (Baron et al., 2016). Additionally, some research has found no significant difference in stress levels between self-employed and traditionally employed individuals (Parslow et al., 2004). To that end, a recent meta-analysis by Lerman and colleagues (2021) highlights the differential experiences that self-employed individuals can face in terms of the various forms of stress they encounter, as well as the outcomes related to such stress as they pertain to both individual well-being and venture performance. These findings highlight that self-employment can be both a blessing and a curse, reinforcing the need to further our understanding of the factors that can enhance and inhibit self-employed individuals' well-being.

Although recent evidence indicates the potential benefits of self-employment for an individual's well-being (Stephan, 2018; Stephan et al., 2020), we posit that there are several reasons why seniors are likely to experience distinct psychological benefits from self-employment. It is important to note that we are not claiming that all senior self-employed individuals are likely to have homogeneously positive experiences. Indeed, for older individuals who are pursuing self-employment out of necessity rather than opportunity, it is possible that such benefits will likely be greatly reduced or eliminated completely (Moulton & Scott, 2016). However, for those senior individuals who have acquired specific forms of valuable resources, which we describe subsequently, self-employment could represent a particularly benevolent occupation (Chang et al., 2023). While self-employed individuals generally report higher levels of satisfaction due to greater freedom and flexibility (Hundley, 2000), the autonomy and control that self-employment affords could be especially advantageous for senior individuals. Previous evidence underscores the fact that it is easier for senior individuals to make accommodations in their self-employment work environment (Zissimopoulos & Karoly, 2007) which could prove particularly salient in terms of ensuring their mental health and well-being. Furthermore, the fact that senior workers are more often motivated by non-pecuniary considerations (Haider & Loughran, 2001) suggests that factors that relate to their satisfaction and well-being are especially important when considering their work environments.

In reality, self-employment has become an increasingly popular occupation of choice for senior individuals, and senior workers comprise one of the fastest-growing segments of individuals who decide to pursue self-employment (Karoly & Zissimopoulos, 2004; Zissimopoulos & Karoly, 2007; Zissimopoulos et al., 2009). To that end, there are several benefits that self-employment can offer senior individuals. For instance, late-career transitions into self-employment can be positively associated with overall quality of life (Kautonen et al., 2017), and self-employed individuals often experience lower levels of depression than their wage-earning counterparts (Bradley & Roberts, 2004). Considering the obstacles that senior workers can experience in the workplace in the form of potential discrimination and job loss (Chan & Stevens, 2001), self-employment may represent a career choice with distinct advantages for senior individuals.

The benefits of self-employment for more senior individuals are particularly salient in light of the vulnerability of senior individuals to experience higher levels of depression and anxiety-related disorders (Wolitzky-Taylor et al., 2010). One of the most common pathways to depression in senior individuals is a reduction in their overall daily activities (Fiske et al., 2009). While many age-related factors can negatively impact the motivation of senior individuals to continue to work (Kooij et al., 2008), the distinct characteristics of self-employment could make it a more attractive alternative for senior individuals. Specifically, the increased level of autonomy and control associated with self-employment (Hessels et al., 2017) could provide senior individuals with greater oversight and control of their daily routines, affording them the ability to maintain their mental, physical, and social activities. Moreover, the increased engagement in self-realization promoting experiences associated with self-employment can help to alleviate depression symptoms (Hinterlong et al., 2007), which are exacerbated for senior individuals (Blazer, 2002).

From a COR perspective, senior workers may have amassed valuable levels of critical resources that afford them the ability to navigate the obstacles associated with self-employment. For example, senior individuals likely have high levels of human capital in the form of prior experience and expertise, which can translate into improved venture performance (Lu et al., 2023; Williams &Shepherd, 2016). Moreover, senior individuals have better internal resources geared towards regulating work-related emotions (Scheibe et al., 2016), which could allow them to better cope with the intense emotions associated with self-employment (Cardon et al., 2009; Patzelt & Shepherd, 2011). Additionally, senior individuals often have access to larger social networks (Gayen et al., 2019), which can positively impact both venture performance (Stam et al., 2014) as well as individual well-being (Marshall et al., 2020). To that end, social connections can also improve senior individual's alertness (De Carolis et al., 2009; De Carolis & Saparito, 2006), which can aid in their ability to search for (Fiet et al., 2005), discover (Foss & Klein, 2017), and create (Alvarez & Barney, 2007) successful new ventures. This unique ability to leverage their considerable resources to engage in activities that they perceive as fulfilling is a benefit of self-employment that is unique to senior individuals, as younger individuals lack the deep reservoirs of resources that would afford them such opportunities. This is likely to result in higher levels of work fulfillment, which in turn can reduce perceptions of stress. Indeed, perceived fulfillment is a key component to mitigating the risk of psychological stress associated with work (Lazarus, 2020), and prior evidence has highlighted the link between fulfillment and reduced job-related stress (Zhao et al., 2016). Based upon this reasoning, we propose the following:

Hypothesis 1 Among senior individuals (aged 50–65), stress declines at a greater rate for the self-employed than for the employed.

2.4. Ageism, self-employment, and psychological distress

In addition to the relationship that self-employment has with stress for senior workers, it is also important to consider how the context of self-employment can potentially moderate other factors that might result in stress for senior workers. Specifically, considerable research has underscored the prevalence of ageism – the discrimination of individuals based on their perceived age – within the workplace (McCann & Giles, 2002; Shore & Goldberg, 2013; Walker, 1999). Ageism has been shown to influence key outcomes such as job satisfaction, commitment, and engagement (Bayl-Smith & Griffin, 2014; Macdonald & Levy, 2016), which can negatively influence psychological health. Furthermore, ageism has been linked with work-related stress and lower mental health and well-being (Roscigno et al., 2022). Indeed, evidence highlights that ageism can often be one of the most salient sources of work-related stress that individuals can experience, which can often be a contributing factor to lower overall health and well-being (Allen, 2016; Yeung et al., 2021).

While age discrimination within organizational settings is relatively

prevalent, self-employment may offer senior individuals an opportunity to combat the adverse outcomes that are associated with discrimination based on their age. Indeed, previous research suggests that self-employment could represent a means by which senior individuals can combat ageism that is experienced in organizational settings (Johnson, 2009; Sargeant, 2016). Self-employment allows individuals to create their social environments, which allows them to maximize their mental health and well-being (Stirzaker et al., 2019). While this ability to be the master of their fate can result in a greater overall fulfillment from work for senior individuals who are self-employed, the flexibility that self-employment affords senior individuals can also impart a greater sense of enjoyment and fulfillment from work (Choi et al., 2018), which can serve to mitigate any potential psychological distress that senior individuals might experience as a result of perceived ageism within their work environment.

Self-employment allows senior individuals to tailor their work experience in a manner that helps them to maximize the inherent benefits of their considerable resources, while also helping to mitigate the negative effects associated with perceived ageism. As a result of this ability to control their work conditions, senior self-employed individuals are apt to experience greater levels of psychological empowerment, which in turn can increase the overall fulfillment that they receive from work (Schermuly et al., 2014). Furthermore, the increased empowerment and fulfillment that senior individuals experience in self-employment can increase their overall level of engagement in their work, which can also reduce the negative psychological outcomes associated with perceived ageism (Bayl-Smith & Griffin, 2014). So, from a COR perspective, self-employment provides senior individuals with the capability to leverage their unique resources to enhance the fulfillment they obtain from their work, which can in turn assist in alleviating the negative psychological consequence associated with experiencing ageism in the workplace. Based on this reasoning, we predict the following:

Hypothesis 2: Among senior individuals (aged 50–65), self-employment will attenuate the relationship between perceived ageism and psychological distress, such that perceived ageism will result in less psychological distress for those who are self-employed than for those who are employed.

2.5. Self-employment, workflow, and psychological distress

Although physical activity is likely to play a vital role in the relationship between self-employment and mental health and well-being for senior individuals, there are certainly other factors that potentially affect the mental health of senior, self-employed individuals. In particular, *workflow* – defined as an experience of high interest and enjoyment related to work absorption, work enjoyment, and intrinsic work motivation (Bakker, 2008) – is a factor that serves as an additional mediator between self-employment and perceived stress for senior individuals. Workflow is a state wherein individuals are completely immersed in their work, resulting in intense pleasure when engaging in work (Demerouti et al., 2012). To that end, the characteristics of workflow (i.e., work absorption, work enjoyment, and intrinsic motivation) can serve as additional mechanisms through which self-employment is related to stress for senior individuals. From a COR theory perspective, workflow has been characterized as a resource that improves an individual's ability to manage their work demands successfully (Russell et al., 2005).

Work absorption refers to a state of intense concentration, where individuals are completely engrossed in their work (Csikszentmihalyi, 2013). Absorption in work could represent a key form of mental engagement for senior individuals, which has been shown to positively influence mental health and well-being (Phillips, 2017). This increased engagement is likely to enhance the meaningfulness that senior individuals assign to their work, which can have marked benefits for psychological well-being (Dich et al., 2019). As it relates to COR theory, work absorption can be viewed as an important cognitive resource that can facilitate alternative resource allocation for successful task completion (Juyumaya et al., 2024). Additionally, prior work has demonstrated how work absorption as a key resource can relate to a more relaxed state, allowing individuals to better cope with work-related challenges and improve their work performance (Léger et al., 2014).

Moreover, work enjoyment has been shown to result in individuals experiencing increased levels of happiness and having positive overall perceptions of their work lives (Graves et al., 2012). Because self-employment offers senior individuals higher levels of autonomy and control (Hessels et al., 2017), it is likely that they will experience higher levels of work enjoyment, as they have the ability to choose which activities they will engage in on a daily basis. This increased level of enjoyment has been linked not only with enhanced performance but more importantly to improved mental well-being (Graves et al., 2012). As a result of the increased enjoyment that they experience in self-employment, senior individuals are apt to perceive lower levels of stress related to their work. Work enjoyment represents an important positive psychological resource that can buffer against occupational demands, and is particularly useful for older workers (Stynen et al., 2017). Moreover, previous evidence indicates that work enjoyment can contribute to upward spirals of beneficial workplace outcomes (Salanova et al., 2006), further emphasizing its importance as a resource that contributes to positive well-being.

Finally, intrinsic work motivation – which refers to completing work-related activities for the purpose of experiencing pleasure in the activities themselves (Thomas, 2009) – is an additional aspect of workflow that could provide a mechanism to explain the relationship between self-employment and stress for senior individuals. Intrinsic motivation has been linked with improved psychological well-being (Froiland et al., 2012), with evidence specifically highlighting the influence that intrinsic motivation can have in combating the negative consequences of work-related stress (Keaveney & Nelson, 1993; Richer et al., 2002). From a self-employment perspective, intrinsic motivation has been inherently linked with well-being (Ryff, 2019), an association that is likely to be highlighted in senior individuals. Indeed, intrinsic motivation has been demonstrated to be one of the primary influences that motivate an individual's attitudes and behaviors later in life (Vallerand et al., 1995). Higher levels of intrinsic motivation can impart an increased sense of meaning for work, which in turn can enhance the fulfillment that senior individuals experience as a result of being self-employed. As such, it is possible that the intrinsic motivation aspect of workflow could also serve to mediate the relationship between self-employment and psychological stress for senior individuals. Specifically related to COR theory, intrinsic motivation is a resource that can actually enhance the positive impact of other key resources (e.g., autonomy, control, etc.), thereby increasing the benefits individuals receive from such resources (Van den Broeck et al., 2011). Furthermore, intrinsic motivation can provide a key mediating mechanism via which certain job demands can actually promote favorable work behaviors and alleviate detrimental health outcomes (Kim & Beehr, 2018). Based upon this reasoning we propose the following:

Hypothesis 3a: Among senior individuals (aged 50–65), work absorption will mediate the relationship between perceived ageism and psychological distress, with the mediation effect being stronger for self-employed individuals compared to employed individuals.

Hypothesis 3b: Among senior individuals (aged 50–65), work enjoyment will mediate the relationship between perceived ageism and psychological distress, with the mediation effect being stronger for self-employed individuals compared to employed individuals.

Hypothesis 3c: Among senior individuals (aged 50–65), intrinsic work motivation will mediate the relationship between perceived ageism and psychological distress, with the mediation effect being stronger for self-employed individuals compared to employed individuals.

3. Study 1 – American time use survey

3.1. Sample

We use all the available well-being modules for cross-sections (2012, 2013, 2021) of the American Time Use Survey (ATUS) (Flood et al., 2022). ATUS, a survey of how non-institutionalized US residents allocate their time to a wide range of activities, is an annual nationally representative survey. The respondents were drawn from the US Current Population Survey (CPS) and interviewed again between two and five months after their CPS interview. ATUS asks respondents to provide a detailed diary of what they did during the day preceding the interview. In the waves 2012, 2013, and 2021, ATUS included a well-being module where respondents also reported the strength of their emotional experiences for three random episodes of their time-use diary. On a scale from 0 to 6, they have to rate how happy, meaningful, sad, stressed, in pain, and tired they felt during these activities.

For our analysis, we only focus on reported well-being during work activity and control for well-being during non-work activities. We only include those reporting as working full-time and over the age of 50 and below 65. Based on case-wise deletion our sample includes well-being reports of 11,258 during work well-being events.

3.2. Measures

Our outcome variables are reports of stress during the reported work events. Each scale ranges from 0 (not at all) to 6 (very). Our predictor variable is whether an individual is self-employed full-time (=1) or employed full-time (=0). Our moderator variable is the continuous measure of age.

Following prior research, we include a variety of controls. Related to demographic controls, we include sex (1-male; 2-female), white (1-white; 0-non-white), partnered (0-not partnered; 1-partnered), number of adults household, years of education, family income,[7] hourly wage, life satisfaction ladder (0-worst possible life to 10-best possible life), whether the respondent had high blood pressure in the past five years (1-yes; 2-no), and orthogonalized reports of stress in non-work activities. Additionally, we control for industry (2-digit) dummies[8] and year dummies.

[7] 001: Less than $5,000; 002: $5,000 to $7,499; 003: $7,500 to $9,999; 004: $10,000 to $12,499; 005: $12,500 to $14,999; 006: $15,000 to $19,999; 007: $20,000 to $24,999; 008: $25,000 to $29,999; 009: $30,000 to $34,999; 010: $35,000 to $39,999; 011: $40,000 to $49,999; 012: $50,000 to $59,999; 013: $60,000 to $74,999; 014: $75,000 to $99,999; 015: $100,000 to $149,999; 016: $150,000 and over.

[8] Agriculture; Forestry, logging, fishing, hunting, an; Mining; Construction; Nonmetallic mineral product manufacturing; Primary metals and fabricated metal pro; Machinery manufacturing; Computer and electronic product mfg; Electrical equipment, appliance mfg; Transportation equipment manufacturing; Wood product manufacturing; Furniture and fixtures manufacturing; Miscellaneous and not specified mfg; Food manufacturing; Beverage and tobacco product mfg; Textile, apparel, and leather manufacturing; Paper manufacturing and printing; Petroleum and coal products manufacturing; Chemical manufacturing; Plastics and rubber products manufacturing; Wholesale trade; Retail trade; Transportation and warehousing; Utilities; Publishing industries (except internet); Motion picture and sound recording industries; Broadcasting (except internet); Telecommunications; Internet svc providers and data process; Other information services; Finance; Insurance; Real estate; Rental and leasing services; Professional, scientific, and technical; Management of companies and enterprises; Administrative and support services; Waste management and remediation service; Educational services; Hospitals; Health care services, except hospitals; Social assistance; Arts, entertainment, and recreation; Traveler accommodation; Food services and drinking places; Private households; Repair and maintenance; Personal and laundry services; Membership associations and organization; Public administration

3.3. Results

Table 1 presents the descriptive Statistics, and Table 2 presents the OLS estimates based on the sample weighting variable *wbwt* (well-being module final statistical weight, person-level) and robust standard errors. The effects are significant for the stress scale (model 1). In Fig. 2, self-employed experience declining stress with increasing age (the slope of the dashed line is much steeper than the slope of the solid line). Overall, self-employed individuals over 50 report more declining stress than employed individuals under 50, providing support for Hypothesis 1.

We further consider if the effects might be non-linear. The squared term of age has very small effects (0.0008511) and its interaction with self-employment is small and non-significant (−0.0013). Similarly, family income did not moderate these relationships. These results are available in Table A1 (Appendix). Study 1 provides self-reports of stress. To further test Hypothesis 1, using a biomarker of stress based on daily work, we use the MIDUS daily diary sample.

4. Study 2—MIDUS daily diary sample, descriptive

4.1. Sample

We merge data from MIDUS 3 (2013–2014) and The National Study of Daily Experiences (NSDE; 2016–2020), including the measure of bedtime stress using a saliva-based measure of alpha-analyze. This allows us to examine an objective, biological measure associated with stress, providing a complementary perspective to Study 1. The University of Wisconsin Institute on Aging (UW-IOA) conducted the third wave of the Midlife in the United States (MIDUS) study. This comprehensive investigation, which involves researchers from across the United States, is focused on understanding how various factors in the lives of American adults, such as working conditions, relationships, health, finances, personal outlooks, and individual choices, impact health and well-being as individuals age from early adulthood to later life. For the MIDUS 3 study, participants were recruited through a telephone interview and invited to complete a mail questionnaire and a cognitive interview via telephone. From May 2013 to November 2014, a total of 3294 participants completed the initial telephone interviews, 2732 returned self-administered questionnaires, and 2693 participated in the cognitive interviews. Additionally, family members of 33 deceased respondents participated in a brief mortality cognitive closeout interview. The response rates for the telephone interview, self-administered questionnaire, and cognitive interview were 77 %, 83 %, and 83 %, respectively.

The National Study of Daily Experiences (NSDE) is an in-depth study that examines the day-to-day stressful experiences of a subsample of MIDUS respondents. Although studies focusing on diary research have measured stress processes, such data focus on small and often unrepresentative samples, whereas the NSDE uses a large national sample of adults in the United States. The NSDE collects data on a wide array of sociodemographic and psychosocial variables and collects saliva samples. The third wave of the National Study of Daily Experiences (NSDE 3) that we use in this study consists of an 8-day telephone diary study protocol combined with multiple assessments of daily salivary cortisol (4 occasions × 4 days). The daily diary completion rates among NSDE 3 participants were as follows: 75.5 % of the respondents completed all eight interview days, 88.8 % completed at least seven interview days, and 93.3 % completed at least six interview days. In total, the data set is comprised of 9301 days out of a possible 9,888 (N = 1236 * 8 days) yielding a completion rate of 94.0 %. Based on the case-wise deletion and dropping individuals below 50 and over 65, our analysis sample includes 1366 participants, of whom 65 are self-employed with 202 observations and 930 are employed with 1132 observations.

4.2. Measures

Salivary alpha-amylase—bedtime. Our outcome measure for stress is

Table 1
Study 1 – American Time Use Survey, Descriptives.

Summary statistics				
	Mean	SD	Min	Max
Stress scale	1.21	1.661	0	6
Self-employed	0.102	0.303	0	1
Age	56.291	4.314	50	65
Sex	1.476	0.499	1	2
White	0.803	0.398	0	1
Partnered	0.557	0.497	0	1
Number of adults in household	1.936	0.868	1	7
Years of education	207.25	77.757	101	321
Family income	12.443	3.126	1	16
Hourly earnings	570.995	485.848	0	999.99
Life satisfaction ladder	7.284	1.809	0	10
High blood pressure in last five	1.601	0.490	1	2
Stress from non-work (orthogonalized)	0.01	0.993	−6.829	5.236

Pairwise correlations

	Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1	Stress scale	1.000											
2	Self-employed	0.030*	1.000										
3	Age	−0.040*	0.036*	1.000									
4	Sex	0.053*	−0.102*	0.006	1.000								
5	White	0.013	0.050*	−0.007	−0.067*	1.000							
6	Partnered	−0.046*	0.050*	−0.023*	−0.156*	0.098*	1.000						
7	Number of adults in household	−0.004	0.020*	−0.107*	−0.068*	0.017	0.562*	1.000					
8	Years of education	0.055*	0.008	0.004	0.053*	0.051*	0.048*	−0.019*	1.000				
9	Family income	−0.018	−0.004	−0.039*	−0.068*	0.140*	0.322*	0.222*	0.374*	1.000			
10	Hourly earnings	0.035*	0.298*	−0.009	−0.040*	0.078*	0.102*	0.032*	0.359*	0.309*	1.000		
11	Life satisfaction ladder	−0.248*	−0.006	0.030*	0.005	−0.045*	0.148*	0.078*	0.022*	0.116*	0.059*	1.000	
12	High blood pressure in last five	−0.046*	0.084*	−0.112*	0.041*	0.102*	0.021*	−0.001	0.076*	0.058*	0.064*	0.064*	1.000
13	Stress from non-work (orthogonalized)	0.004	−0.019*	0.024*	−0.035*	0.003	0.030*	−0.003	−0.018	0.027*	−0.003	0.143*	0.016

Notes.
11,258 during work well-being events reports from American Time Use Survey Well-being Module.
The remaining controls are included but not reported.

alpha-amylase at bedtime. Under stress, the body's physiological and psychological responses help individuals adapt to and cope with the stressor. The central nervous system (CNS) and the peripheral nervous system (PNS) drive the stress response. The CNS response involves activation of the hypothalamus and brainstem, triggering the release of hormones that stimulate the PNS and HPA axis. The PNS comprises the sympathetic and parasympathetic nervous systems, which help regulate various bodily functions. The sympathetic nervous system (SNS) responsible for the "fight or flight" response is activated in response to stress. In contrast, the parasympathetic nervous system (PNS) helps the body return to a state of calm after the stressor has passed. Cortisol is often used as a biomarker to evaluate systemic fluctuations of the HPA axis, as it is a widely studied neuroendocrine stress system.

While cortisol and Heart rate variability (HRV) are widely used to assess the autonomic nervous system (ANS) response to stress. HRV reflects the input of both the sympathetic and parasympathetic control of the heart; however, measuring HRV can be complex and may not be feasible in certain settings or populations. Other markers, such as catecholamines (e.g., norepinephrine and epinephrine), can also be informative; however, measuring these markers often requires invasive blood or spinal fluid draws, which can limit their utility in certain settings or populations. Salivary alpha-amylase (sAA) has recently emerged as a valid and reliable marker over the past 15 years. Alpha-amylase is a salivary enzyme making it a useful proxy measure of sympathetic arousal in acute stress studies.

We use bedtime sAA data as Salivary alpha-amylase (sAA) has a distinct diurnal profile, which is different from cortisol. While cortisol reaches peak values within a half hour of awakening, sAA levels drop sharply in the first 30 min of awakening and then steadily rise for the day. The amylase awakening response (AAR) and/or the total diurnal output are used to evaluate ANS dysregulation. A blunted AAR (i.e., less of a decline 30 min after awakening) and higher sAA output throughout the day can serve as indices of pathological dysregulation of the ANS, as seen in conditions associated with chronic stress. Overall, sAA can provide valuable insights into the functioning of the ANS and its role in stress-related diseases. Studies have shown that office workers report high levels of distress and low levels of professional efficacy office workers report high levels of distress and low levels of professional efficacy (Shoji et al., 2016). Lower sAA levels at awakening and higher values later in the day, as well as blunted diurnal profiles of sAA, may be indicative of ANS dysregulation in response to chronic stress. This underscores the potential utility of sAA as a biomarker in behavioral medicine research, as it can provide insight into the physiological effects of chronic stress on the body.

For the NSDE 3 study participants were asked to provide four saliva samples on days 2 through 5, collected at waking (before getting out of bed), 30 min after getting out of bed, before lunch, and before bed. They were instructed not to consume any caffeinated products before collecting samples and to record any medications taken during the collection period. The exact time of collection for each sample was recorded in nightly telephone interviews and a paper–pencil log. The saliva samples were shipped to the MIDUS Biological Core at the University of Wisconsin, where they were stored in an ultracold freezer. Cortisol concentrations were quantified using a commercially available luminescence immunoassay with coefficients of variation below 5 %. The raw alpha-amylase values for the four occasions are represented by *C2DAAW* (alpha-amylase at waking), *C2DAAA* (30 min after waking), *C2DAAL* (before lunch), and *C2DAAB* (before bed). Our outcome variable is winsorized (at 1 % on each tail) the saliva-based measure of 'Alpha-Amylase Raw – Bedtime' (*C2DAAB*).

Self-employed. We use the variable c1pb3b, which indicates whether the individual is self-employed (1-self-employed and 0 = employed). We

Table 2
Study 1 – American Time Use Survey, OLS Estimates.

Variables	(1) Stress scale	(2) Stress scale
Self-employed	0.151**	2.539***
	(0.0734)	(0.781)
Age	−0.00472	−6.48e-05
	(0.00455)	(0.00483)
Self-employed × Age		−0.0422***
		(0.0136)
Sex	0.0837**	0.0823*
	(0.0425)	(0.0425)
White	0.0420	0.0395
	(0.0536)	(0.0536)
Partnered	−0.0861*	−0.0821
	(0.0504)	(0.0504)
Number of adults in household	0.0540**	0.0520*
	(0.0266)	(0.0266)
Years of education	0.00133***	0.00134***
	(0.000295)	(0.000295)
Family income	−0.00452	−0.00471
	(0.00783)	(0.00781)
Hourly earnings	7.23e-05	7.17e-05
	(4.68e-05)	(4.67e-05)
Life satisfaction ladder	−0.232***	−0.231***
	(0.0124)	(0.0124)
High blood pressure in last five years	−0.215***	−0.217***
	(0.0412)	(0.0411)
Stress from non-work (orthogonalized)	0.0994***	0.101***
	(0.0262)	(0.0261)
Industry dummies	Included	Included
Year dummies	Included	Included
sample weight	*wbwt*	*wbwt*
Standard errors	*robust*	*robust*
Constant	3.113***	2.859***
	(0.307)	(0.318)
Observations	11,258	11,258
R-squared	0.092	0.093

Notes.
Standard errors in parentheses.
*** p < 0.01, ** p < 0.05, * p < 0.1.

use the continuous age measure as the data focuses on individuals in their mid-life, after 50.

Control variables. In line with common conventions to limit the influence of potential extreme outliers when examining biomarker data (Ritchie et al., 2023; Sumner et al., 2017) for controls, we use winsorized (at 1 % and 99 %) values of Alpha-Amylase Raw at lunch, 30 min after waking up, and at waking time. We also include winsorized cortisol measures at the wake, 30 min after waking, and lunch cortisol. The cortisol measures are derived from the same saliva sample used to measure sAA. The cortisol four collection time variables, at waking, 30 min after waking, after lunch, and at bedtime (variable names *C2DCORWT*, *C2DCORAT*, *C2DCORLT*, and *C2DCORBT*, respectively).

We include sex (1 male; 2 female), education, number of living children, and day of participation (2, 3, 4, and 5th day). To control for socioeconomic conditions, we control for the log of household wages, log of respondent income from all sources, log of pre-tax income from the last calendar year, and change in pre-tax income compared to 2007 (more, less, and the same). Additionally, we control for industry dummies × occupation dummies (*c1pocc* dummies × *c1pind* dummies). Due to multiple observations of the same individual, we cluster standard errors by an individual (*m2id*).

4.3. Results

Table 3 presents the descriptive and Table 4 presents the estimates. In Model 2 and Fig. 3, with increasing age, self-employment is associated with lower Alpha-Amylase Raw—Bedtime, indicating lower stress levels for self-employed at bedtime. This provides further support for Hypothesis 1.

We further consider if the effects are non-linear or influenced by the log of household income from wages, the log of respondent income from all sources, or the Log of Pre-tax income from the last calendar year. We do not find support for moderation effects for these effects (Table A2). Next, we confirm Hypothesis 1 and test Hypothesis 2 in Study 3.

5. Study 3 – NPHA survey

5.1. Sample

The University of Michigan National Poll on Healthy Aging (NPHA) is a recurring, nationally representative household survey of adults aged

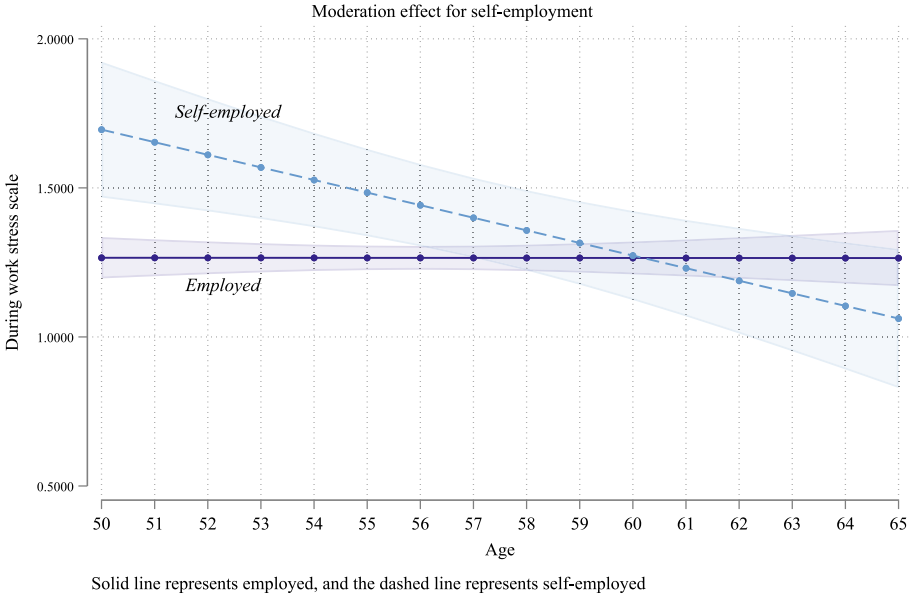

Fig. 2. Study 1 – American Time Use Survey, moderation plot.

50–80 on health-related issues. The NPHA is directed by the University of Michigan Institute for Healthcare Policy and Innovation and is sponsored by AARP and Michigan Medicine, the University of Michigan's academic medical center. By tapping into the perspectives of senior adults and their caregivers, the NPHA helps inform the public, healthcare providers, policymakers, and advocates on issues related to health, healthcare, and health policy affecting U.S. adults aged 50–80 and their families. NPHA results are shared widely to elevate the voices of the public, inspire future research, and inform the national dialogue. NPHA surveys are conducted using the KnowledgePanel® (Ipsos Public Affairs, LLC, formerly the GfK Group), a nationally representative probability-sample panel of U.S. households, NPHA surveys are fielded 2–3 times per year with a sample of approximately 2000 KnowledgePanel® members ages 50–80. Each wave of the survey is a unique sample of KnowledgePanel® participants, and data may not be merged across waves.

Wave 6 of the National Poll on Healthy Aging contains five sections of data on the following topics: health and household, dental health (ages 65–80), food and food security, and ageism. The NPHA team developed the questions over 6 months in 2019 in consultation with subject-area experts at the Institute for Healthcare Policy and Innovation at the University of Michigan. A pretest of 100 respondents was conducted in October 2019 to assess survey length question comprehension and skip patterns. Data for Wave 6 of the National Poll on Healthy Aging were collected through an internet survey in December 2019. Participants completed the main survey in 15 min (median). Email reminders to non-responders were sent on days 3 (standard) and 6 of the fielding period, as well as additional reminders to those ages 50–64 on days 8, 10, 12, 14, and 16 of the fielding period. A total of 2048 respondents completed the survey. We restrict our sample to those between the ages of 50 and 65, and our sample based on case-wise deletion includes 698 respondents.

5.2. Measures

Our outcome variable of psychological distress is a 2-item. The first item is "Over the past two weeks, including today, how often have you been bothered by having little interest or pleasure in doing things?". The second item is "Over the past two weeks, including today, how often have you been bothered by feeling down, depressed, or hopeless?" The rating scale for both items is (1-not at all; 2-several days; 3-more than half the days; 4-nearly every day). The Cronbach's alpha was 0.87.

Perceived ageism is measured as "In your day-to-day life, how often do the following things happen to you?" (1-often – 4-never): (i) I hear, see, and/or read jokes about old age, aging, or senior people [r]; (ii) I hear, see, and/or read things suggesting that senior adults and aging are unattractive or undesirable [r]; (iii) People insist on helping me with things I can do on my own [r], and (iv) People seek my guidance because of my wisdom and experience. The Cronbach's alpha was 0.59.

We code those reporting "Working – as a paid employee" as 0 and those reporting "Working – as self-employed" as 1. We control for two ageism-related measures. Age is a continuous measure in years.

Our control variables include ageism in interpersonal interactions based on "In your day-to-day life, how often do the following things happen to you?" (1-often to 4-rarely): (i) People assume I have difficulty hearing and/or seeing things [r]; (ii) People assume I have difficulty remembering and/or understanding things [r]; (iii) People assume that I have difficulty with cell phones and computers [r], and (iv) People assume I do not do anything important or valuable [r]. The Cronbach's alpha was 0.78.

We also control for perceived ageism based on a 5-item scale (1-strongly agree to 4-strongly disagree): (i) As I get senior, my life is better than I thought it would be [r]; (ii) My feelings about aging have become more positive as I've gotten senior [r]; (iii) I have a strong sense of purpose [r]; (iv) I feel more comfortable being myself as I've gotten senior [r]; and (v) I am concerned about the future of the planet [r]. The Cronbach's alpha was 0.67.

We also control for sex (1-male; 2-female), education category (less than high school; high school; some college; Bachelor's degree or higher), white (0-non-white; 1-white), partnered (0-not partnered; 1-partnered), household size, household income (1-Less than $5000 to 21- $250,000 or more), and relative health (1-better; 2-worse; 3-same). We control for state and MSA dummies.

5.3. Results

Table 5 presents the descriptives. In Table 6 we present the OLS estimates with state and Metropolitan Statistical Area (MSA). The estimates are weighted by the provided sampling weight variable (*weight1*), and the standard errors are clustered by state. Confirming the findings in the previous two studies, Hypothesis 1 is supported (model 1) and Fig. 4 (a). Similar to previous studies we confirm that squared terms of age or household income are not associated with the outcome variable (Table A3).

Related to Hypothesis 2, in Model 2 and Fig. 4(b), the self-employed realize lower psychological distress under both higher and lower levels of ageism. In terms of the relative effects, under lower ageism the intensity of decline in psychological distress is higher for the self-employed (steeper slope of the dashed line in the left panel) relative to no effects for the employed (solid line in the left panel). Under higher perceived ageism, the self-employed consistently have lower psychological distress (the dashed line is generally below the solid line in the right panel). However, the employed realize faster decline in psychological distress (steeper slope of the solid line in the right panel).

6. Study 4–Primary data collection

To further focus on and unpack the relationship between perceived ageism and stress levels, we conducted a primary data collection study to assess the process of work-related differences among employed and self-employed. Though internalization of ageing can set early on, depending on the person and the context, we do not use a hard cutoff of 50 years, but use age and squared term of age as a control, and use the predictor of perceived ageing. On Prolific, an online survey platform, we choose a pool of individuals between the age of 18 and 65 and those working full-time as employed or self-employed. We aimed to recruit 250 self-employed individuals and 250 individuals who are employed. The ethical approval for the study has the exempt status from the University of North Texas. We winsorized the duration of response in seconds at 1 % and 99 %. We received complete responses from 250 employed and 128 self-employed.

Our outcome variable is psychological distress from Kessler and colleagues (Kessler et al., 2002). The scale asked the respondents "recently, about how often did you feel …" (1-All of the time; 2-Most of the time; 3-Some of the time; 4-A little of the time; 5-None of the time): nervous, hopeless, restless or fidgety; so depressed that nothing could cheer you up; that everything was an effort; and worthless. The Cronbach's alpha was 0.90. Higher values represent lower psychological distress.

Our main predictor variable is perceived ageism, which is the same scale used in the previous study; higher values indicate less perceived ageism. The Cronbach's alpha was 0.57. Our moderator variable is self-employed (=1) or employed (=0).

Our mediator variables are the three constructs from the Work Flow Inventory. The respondents were asked to provide assessments based on the following statements: "The following statements refer to how you experienced your work during the last two weeks. Please indicate how often you experienced each of the statements (1 = never, 2 = almost never, 3 = sometimes, 4 = regularly, 5 = often, 6 = very often, 7 = always). The work absorption scale includes four items: 1. When I am working, I think about nothing else; 2. I get carried away by my work; 3. When I am working, I forget everything else around me; and 4. I am

Table 3
Study 2 – MIDUS Daily Diary Sample, Descriptive.

		Mean	SD	Min	Max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1	Alpha-Amylase Raw – Bedtime	89.594	79.985	2.305	431.172	1												
2	Self-employed	0.178	0.383	0	1	0.005	1											
3	Age	57.331	4.470	50	65	0.007	0.015	1										
4	Alpha-Amylase Raw – Lunch	97.463	78.957	3.828	406.203	0.577*	−0.016	0.056	1									
5	Alpha-Amylase Raw – 30 min a	49.157	44.000	1.131	297.584	0.472*	−0.004	0.090*	0.522*	1								
6	Alpha-Amylase Raw – Wake	86.037	82.110	1.392	436.957	0.348*	−0.045	0.078*	0.426*	0.348*	1							
7	Wake cortisol	22.421	12.725	4.017	77.26	0.089*	0.005	0.080*	0.096*	0.080*	−0.023	1						
8	30 min after wake cortisol	29.186	15.271	4.555	85.486	0.083*	−0.003	0.090*	0.108*	0.01	0.029	0.633*	1					
9	Lunch cortisol	13.966	8.721	3.208	50.967	0.088*	−0.019	0.048	0.110*	0.032	0.043	0.435*	0.477*	1				
10	Respondent's sex	1.498	0.500	1	2	0.044	−0.049	−0.011	0.02	0.022	0.045	−0.111*	−0.044	−0.115*	1			
11	GED (ref. some high school (9–12 no diploma/no GED)	0.141	0.349	0	1	0.024	−0.090*	0.001	−0.001	0.025	0.047	−0.080*	−0.074*	0.008	0.108*	1		
12	Graduated from high school	0.136	0.343	0	1	0.017	−0.05	0.005	−0.018	−0.021	−0.03	0.024	0.091*	0.036	−0.097*	−0.161*	1	
13	1 to 2 years of college, no degree yet	0.034	0.182	0	1	−0.075*	0.165*	0.007	−0.016	−0.049	−0.044	−0.009	0.02	−0.018	−0.043	−0.077*	−0.075*	1
14	3 or more years of college, no degree y	0.124	0.329	0	1	−0.001	−0.049	0.014	−0.003	−0.026	0.057	0.014	−0.012	−0.049	0.060*	−0.152*	−0.149*	−0.071*
15	Grad. From 2-year college, vocational s	0.309	0.462	0	1	−0.087*	0.013	−0.042	−0.097*	−0.117*	−0.087*	0.001	−0.016	−0.011	−0.001	−0.271*	−0.265*	−0.126*
16	Graduated from a 4- or 5-year college,	0.009	0.094	0	1	0.003	−0.044	0.01	0.006	0.035	−0.014	0.045	−0.031	−0.013	−0.094*	−0.038	−0.037	−0.018
17	Some graduate school	0.172	0.378	0	1	0.075*	−0.005	−0.031	0.126*	0.117*	0.053	−0.032	−0.037	−0.018	0.046	−0.185*	−0.181*	−0.086*
18	Master's degree	0.068	0.252	0	1	0.027	0.112*	0.077*	0.026	0.046	0.003	0.095*	0.059*	0.070*	−0.094*	−0.110*	−0.107*	−0.051
20	Number of living children	2.208	1.659	0	12	0.008	0.007	0.011	−0.017	0.028	0.008	−0.01	0.005	−0.003	0.006	0.005	0.002	0.002
21	Day 3 (ref. Day 2)	0.251	0.434	0	1	−0.008	−0.001	−0.011	0.01	−0.027	−0.018	−0.04	−0.017	0.005	−0.004	0.002	−0.001	0.004
22	Day 4	0.248	0.432	0	1	−0.01	−0.004	0.003	−0.015	−0.017	0.008	0.013	−0.03	0.007	−0.008	−0.003	0.006	−0.007
23	Day 5	0.246	0.431	0	1	−0.013	−0.032	−0.248*	−0.034	−0.055	−0.052	−0.018	−0.047	−0.056	−0.121*	−0.196*	−0.064*	0.032
24	Log of household income from wages	11.197	0.954	6.908	12.612	0.04	−0.102*	−0.038	0.028	−0.004	0.028	0.035	−0.032	0.001	−0.336*	−0.224*	−0.051	−0.054
25	Log of respondent income from all sources	10.951	0.830	6.908	12.612	0.004	0.013	−0.061*	−0.013	−0.065*	−0.018	0.069*	0.03	0.029	−0.322*	−0.266*	−0.02	0.001
26	Log of Pre-tax income last calendar year	10.912	0.898	3.689	12.612	−0.004	0.138*	0.067*	−0.005	0.033	0.022	0.002	0.041	0.011	0.021	0.037	0.016	−0.014
27	Pre-tax income prior to 2007 – Less (ref. More)	0.236	0.425	0	1	−0.024	0.127*	0.081*	−0.058	−0.031	−0.059*	0.015	−0.018	0.04	−0.078*	−0.092*	−0.067*	0.149*
28	Pre-tax income prior to 2007 – The same	0.248	0.432	0	1	1												

		(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)
14	3 or more years of college, no degree y	1												
15	Grad. From 2-year college, vocational s	−0.251*	1											
16	Graduated from a 4- or 5-year college,	−0.035	−0.063*	1										
17	Some graduate school	−0.171*	−0.305*	−0.043	1									
18	Master's degree	−0.101*	−0.181*	−0.026	−0.123*	1								
20	Number of living children	−0.007	−0.004	−0.011	0.011	−0.011	1							
21	Day 3 (ref. Day 2)	−0.017	0.001	0.011	0.009	0.007	−0.333*	1						
22	Day 4	0.016	0.003	−0.01	−0.017	0	−0.331*	−0.329*	1					
23	Day 5	0.022	0.110*	−0.117*	0.054	0.095*	0.003	0.009	−0.002	1				
24	Log of household income from wages	−0.074*	0.02	0.060*	0.161*	0.241*	−0.008	0.014	0.001	0.482*	1			
25	Log of respondent income from all sources	−0.100*	0.056	0.038	0.124*	0.246*	−0.014	0.011	0.016	0.436*	0.803*	1		
26	Log of Pre-tax income last calendar year	0.025	−0.061*	0.036	0.033	−0.059*	0.014	−0.021	−0.009	−0.263*	−0.303*	−0.300*	1	
27	Pre-tax income prior to 2007 – - Less (ref. More)	−0.098*	0.054	0.033	0.014	0.088*	−0.002	0.001	0.008	0.064*	0.008	0.056	−0.319*	1

Notes.
1132 respondents. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4
Study 2 – MIDUS Daily Diary Sample, OLS.

	DV = Alpha-Amylase Raw – Bedtime	
	(1)	(2)
Self-employed	29.27	539.0**
	(21.21)	(269.5)
Age	−0.542	1.225
	(1.692)	(1.570)
Self-employed × Age		−8.741*
		(4.617)
Alpha-Amylase Raw – Lunch	0.292***	0.277***
	(0.0604)	(0.0596)
Alpha-Amylase Raw – 30 min after wake	0.260*	0.241*
	(0.135)	(0.132)
Alpha-Amylase Raw – Wake	0.0543	0.0496
	(0.0414)	(0.0414)
Wake cortisol	0.276	0.187
	(0.245)	(0.247)
30 min after wake cortisol	0.234	0.241
	(0.263)	(0.266)
Lunch cortisol	−0.351	−0.309
	(0.406)	(0.403)
Respondent's sex	−5.908	−12.54
	(20.71)	(20.36)
Graduated from high school	43.33	45.34
	(58.13)	(53.62)
1 to 2 years of college, no degree yet	34.71	38.85
	(41.48)	(37.10)
3 or more years of college, no degree	8.829	−3.288
	(48.17)	(48.83)
Grad. From 2-year college, vocational s	39.88	51.83
	(53.04)	(51.99)
Graduated from a 4- or 5-year college,	−30.93	−24.43
	(35.13)	(32.86)
Some graduate school	−64.35	−65.48
	(76.67)	(68.48)
Master's degree	−30.78	−25.88
	(37.18)	(35.31)
Day 3 (ref. Day 2)	0.748	2.586
	(2.797)	(3.237)
Day 4	2.584	2.591
	(5.155)	(5.144)
Day 5	1.185	1.074
	(5.458)	(5.460)
Log of household income from wages	0.812	0.856
	(4.970)	(4.991)
Log of respondent income from all sources	−9.004	−12.81*
	(7.960)	(6.676)
Log of Pre-tax income last calendar year	−9.656	−0.0723
	(29.46)	(26.75)
Pre-tax income prior to 2007 – Less (ref. More)	35.43	29.93
	(42.08)	(37.00)
Pre-tax income prior to 2007 – The same	−18.10	−12.59
	(22.75)	(22.61)
Fixed effects by industry × occupational dummies	Included	Included
Standard errors clustered by individual id (*m2id*)	Included	Included
Constant	−101.1	−199.2
	(263.2)	(227.0)
Observations	1,132	1,132
R-squared	0.626	0.633

Notes.
Standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

totally immersed in my work. The Cronbach's alpha was 0.90. The work enjoyment scale is a four-item scale: 1. My work gives me a good feeling; 2. I do my work with a lot of enjoyment; 3. I feel happy during my work; and 4. I feel cheerful when I am working. The Cronbach's alpha was 0.96. Finally, the intrinsic work motivation scale includes five items: 1. I would still do this work, even if I received less pay; 2. I find that I also want to work in my free time; 3. I work because I enjoy it; 4. When I am working on something, I am doing it for myself; and 5. I get my motivation from the work itself, and not from the reward for it. The Cronbach's alpha was 0.88.

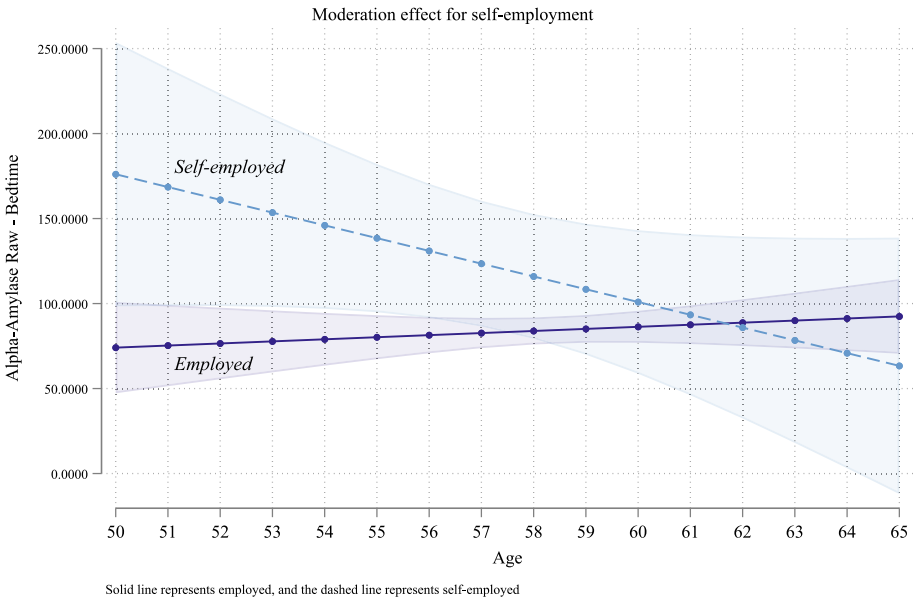

Fig. 3. Study 2 – MIDUS Daily Diary Sample, moderation plot.

We control for age, sex (female/male), education (doctorate degree; graduate degree; high-school/A-levels; no formal qualifications; secondary education; technical/community college; or undergraduate degree whether the respondent has management experience (Yes/No), and duration of completing the survey in seconds (winsorized at 1 % and 99 %).

Table 7 presents the descriptives, and Table 9 presents the estimates for the moderated mediation model. In Table 8 the effects of self-employed × perceived ageing interactions is not significant for work absorption (model 2), significant for work enjoyment (model 3: estimate = 0.490; $p < 0.01$), and not significant for intrinsic work motivation (model 4). Therefore, while we did not find support for Hypothesis 3a or 3c, however Hypothesis 3b was supported. Among the three workflow estimates work enjoyment seems to be a strong moderated-mediation effect. The moderated-mediation estimates are in Table 9. This protective effect of work enjoyment was stronger among self-employed individuals (estimate = 0.209, 95 % CI [0.109, 0.344]) compared to employed individuals (estimate = 0.071, 95 % CI [0.004, 0.143]).

Table 10 synthesizes our four studies through the lens of Conservation of Resources (COR) theory, revealing how self-employment enables unique resource optimization strategies for senior workers. The progression from Study 1′s self-reported stress to Study 2′s biological validation demonstrates how self-employment facilitates both psychological and physiological resource conservation. Study 3 extends these findings by showing how self-employment acts as a protective resource buffer against ageism-related resource threats. Finally, Study 4 identifies work enjoyment as a critical resource-generating mechanism, suggesting that self-employed seniors can better leverage their accumulated resources to create positive gain spirals.

Collectively, these studies advance COR theory by demonstrating how employment type (wage vs. self-employment) appears to fundamentally alter resource conservation patterns, with self-employment enabling more effective resource utilization and protection strategies for senior workers. The findings suggest that the autonomy and control inherent in self-employment allow senior individuals to better capitalize on their accumulated experiential resources while simultaneously protecting against age-related resource threats.

7. Discussion

The world's population is experiencing an increase in aging greater than in any other historical period (Kanasi et al., 2000). The overall aging of the population has important consequences for society, ranging from an increase in healthcare costs (De Meijer et al., 2013) related to higher levels of chronic disease prevalence (Tonelli & Riella, 2014) to the rapidly changing needs of the workforce population in general (Silverstein, 2008), management scholars have increasingly focused their attention on how age relates to a host of important individual and organizational outcomes (Kulik et al., 2014). In this paper, we build upon previous work related to ageism and the mental well-being of senior individuals within the workforce and examine how alternative occupational settings (i.e., self-employment) can prove beneficial in reducing the stress that senior individuals experience as a result of work. Specifically, building on COR, we demonstrate that differences in work enjoyment associated with different employment types significantly influence how work-related factors protect against psychological distress. While previous studies have shown that self-employed individuals generally report higher job satisfaction and autonomy (Benz & Frey, 2008), our findings reveal the importance of work enjoyment and workflow as part of the underlying mechanism.

To accomplish our investigation, we employ multiple studies that investigate the relationship between self-employment and psychological well-being (e.g., lower psychological distress) in senior individuals. In Study 1, using the American Time Use Survey (ATUS) Well-being Module, self-employed individuals over 50 reported lower stress than employed individuals over 50 when engaged in work-related activity. In Study 2, using biological data from the MIDUS study, we find that senior self-employed individuals have lower stress. In Study 3, using data from the National Health and Aging Trends Study (NHPA) despite higher perceived ageism, self-employed individuals reported lower age-related distress. Our moderated mediation analyses revealed that employment status (self-employed versus employed) significantly influenced how work-related factors mediate the relationship between perceived ageism and psychological distress. Specifically, work enjoyment emerged as a crucial protective mechanism, with its buffering effect being substantially stronger for self-employed individuals (estimate = 0.209, 95 % CI [0.109, 0.344]) compared to employed individuals (estimate = 0.071, 95 % CI [0.004, 0.143]). Contrary to our expectations, neither work absorption nor intrinsic work motivation demonstrated significant moderated mediation effects. These findings suggest that the capacity to derive enjoyment from work may be particularly important for self-employed individuals in mitigating the negative psychological impact

Table 5
Study 3 – NPHA Survey, Descriptives.

	Mean	SD	Min	Max
Psychological distress	0.024	0.869	−0.455	3.668
Perceived ageism	2.13	0.458	1	3.75
Self-employed	0.135	0.342	0	1
Age	57.224	4.255	50	65
Ageism in interpersonal interaction	1.503	0.577	1	4
Normative (perceived) ageism	2.92	0.473	1	4
Female	0.486	0.500	0	1
High-school (ref. less than high school)	0.261	0.439	0	1
Some college	0.315	0.465	0	1
Bachelor's degree or higher	0.385	0.487	0	1
White	0.719	0.450	0	1
Partnered	0.672	0.470	0	1
Household size	2.392	1.353	1	11
Household Income (1-Less than $5,000 to 21-$250,000 or more)	14.847	4.093	1	21
Relative health	0.081	0.273	0	1

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Psychological distress	1.000														
Perceived ageism	0.169*	1.000													
Self-employed	0.028	0.037	1.000												
Age	−0.066	0.042	0.055	1.000											
Ageism in interpersonal interaction	0.191*	0.398*	0.020	0.140*	1.000										
Perceived ageism	−0.386*	−0.088*	−0.003	0.103*	−0.113*	1.000									
Female	0.018	0.111*	0.042	0.038	0.014	0.075*	1.000								
High-school (ref. less than high school)	0.023	0.065	−0.046	0.084*	0.140*	−0.010	0.075*	1.000							
Some college	0.021	0.014	0.038	−0.046	−0.022	−0.046	−0.020	−0.403*	1.000						
Bachelor's degree or higher	−0.056	−0.038	−0.020	−0.003	−0.128*	0.061	−0.015	−0.470*	−0.537*	1.000					
White	0.051	0.158*	0.045	0.046	0.065	−0.166*	−0.011	−0.046	0.029	0.050	1.000				
Partnered	−0.136*	0.003	0.049	−0.012	−0.024	0.061	−0.102*	−0.011	−0.053	0.074*	0.190*	1.000			
Household size	−0.117*	0.006	−0.018	−0.158*	0.035	0.021	−0.086*	−0.067	−0.039	0.091*	0.037	0.267*	1.000		
Household Income (1-Less than $5,000 to 21-$250,000 or more)	−0.140*	−0.052	−0.008	−0.011	−0.198*	0.112*	−0.142*	−0.299*	−0.032	0.369*	0.119*	0.343*	0.178*	1.000	
Relative health	0.235*	0.059	0.042	−0.056	0.129*	−0.217*	−0.012	0.038	0.012	−0.032	0.032	−0.077*	−0.009	−0.049	1.000

Notes.
N = 698 respondents. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6
Study 3 – NPHA Survey, OLS estimates.

	DV = Psychological distress	
Variables	(1)	(2)
Age	−0.0125	0.0684**
	(0.0124)	(0.0331)
Self-employed	2.430**	12.70**
	(0.964)	(6.095)
Age × Self-employed	−0.0408**	−0.208*
	(0.0165)	(0.104)
Perceived ageism		2.414**
		(0.950)
Age × Perceived ageism		−0.0383**
		(0.0164)
Self-employed × Perceived ageism		−5.237**
		(2.556)
Self-employed × Age × Perceived ageism		0.0858*
		(0.0436)
Ageism in interpersonal interactions		0.192***
		(0.0535)
Normative (perceived) ageism		−0.555***
		(0.114)
Female	0.0299	0.0444
	(0.0859)	(0.0847)
High school	−0.0856	−0.0861
	(0.148)	(0.125)
Some college	−0.141	−0.126
	(0.172)	(0.158)
Bachelor's degree or higher	−0.124	−0.0726
	(0.171)	(0.163)
White	0.249***	0.0719
	(0.0854)	(0.0785)
partnered	−0.152*	−0.114
	(0.0789)	(0.0719)
Household size	−0.0605**	−0.0707***
	(0.0233)	(0.0248)
Household Income	−0.0183	−0.00853
	(0.0128)	(0.0110)
Relative health	0.691***	0.393**
	(0.210)	(0.173)
State dummies	Included	Included
MSA dummies	Included	Included
Standard errors clustered by state	Included	Included
Sample weighting variable	*weight1*	*weight1*
Constant	1.061	−2.685
	(0.818)	(1.951)
Observations	698	698
R-squared	0.197	0.307

Notes.
Standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

of perceived ageism.

Throughout the four studies presented here, we find that in general self-employment is associated with lower levels of stress for senior individuals. Furthermore, we demonstrate that self-employment is potentially beneficial in buffering against the effects that ageism might produce, and lowers psychological distress related to experienced ageism. In completing our study, we make important contributions to several literatures. First, we extend upon recent research indicating that self-employment could provide some benefits for the mental well-being of senior individuals (Patel et al., 2020) and give more insight into how self-employment might relate to improved mental well-being. Specifically, we leverage recent insights from clinical psychology highlighting the relationship between psychological stress and mental health (Yang et al., 2015) and provide evidence that mental well-being improvements for senior individuals who are self-employed are in part due to lower levels of stress experienced as a result of their work. To that end, self-employment may offer senior individuals an opportunity to remain engaged in work that they find fulfilling without the obstacles and discrimination commonly faced within organizational settings (McCann & Giles, 2002; Shore & Goldberg, 2013). This could be one of the factors that have led to senior individuals representing the fastest-growing category of individuals who are pursuing self-employment as an occupational alternative (Karoly & Zissimopoulos, 2004; Zissimopoulos et al., 2009).

Furthermore, our studies also make an important contribution to previous work, leveraging conservation of resources theory (COR) as a useful theoretical lens to understand key relationships within work environments. Specifically, our findings help extend COR theory by highlighting that a key element of workflow (i.e., work enjoyment) represents a vital resource that assists senior individuals in coping with certain work-related stressors (i.e., perceived ageism) within the context of self-employment. Therefore, our study extends the scope of COR theory into the novel domain of senior self-employment, and establishes the potential value of this perspective for understanding how senior self-employed individuals address the demands associated with their work. As such, we demonstrate the robustness of COR theory as a means to understand a wide array of diverse, work-related relationships.

Additionally, our findings help to provide some understanding of the potential nuances of the mechanisms underlying the association between self-employment and stress for senior individuals. In line with previous work on the importance of remaining active for quality of life (Acree et al., 2006) and mental well-being (Lee & Kim, 2016) for senior individuals, our findings suggest that self-employment could offer a manner in which such activity can be maintained. Continuing to be active is likely to result in greater levels of fulfillment from work for senior individuals, which can lower the psychological distress that is often associated with aging (Epel & Lithgow, 2014). These findings also have meaningful implications for ongoing research related to the "health-wealth" tradeoffs that are often associated with entrepreneurial pursuits (Cardon & Patel, 2015; Mmbaga et al., 2023). Specifically, building upon research indicating that factors such as positive affect can help mitigate the health risks associated with self-employment (Cardon & Patel, 2015), our findings indicate that work enjoyment can also prove beneficial from this perspective for senior individuals who are self-employed. This further reinforces that although self-employment can coincide with inherent risks from a health perspective, there are positive factors that can be gained from being self-employed that help to mitigate the detrimental effects that self-employment might have on individual well-being.

While previous research has established the detrimental effects of perceived ageism on psychological well-being (Levy et al., 2020), we extend this work by identifying a crucial protective mechanism – work enjoyment – that can buffer against these adverse effects. The findings advance our understanding beyond simple direct relationships to reveal how workplace experiences can modify the impact of age-related stereotypes. We contribute to the growing literature on self-employment and well-being by demonstrating that employment type significantly influences how work-related factors protect against psychological distress. While previous studies have shown that self-employed individuals generally report higher job satisfaction and autonomy (Benz & Frey, 2008), our findings reveal that they also benefit more strongly from work enjoyment as a protective mechanism against perceived ageism and extend work by Stephan (2018) on entrepreneurial well-being by identifying specific pathways through which self-employment might promote psychological resilience. Our research advances the theoretical understanding of workflow components by demonstrating their differential effects. Contrary to previous research suggesting that all components of workflow contribute equally to positive outcomes (Bakker, 2008), we find that work enjoyment plays a uniquely important role in buffering against psychological distress, while work absorption and intrinsic motivation do not show similar effects the findings add to our understanding of workflow theory in the

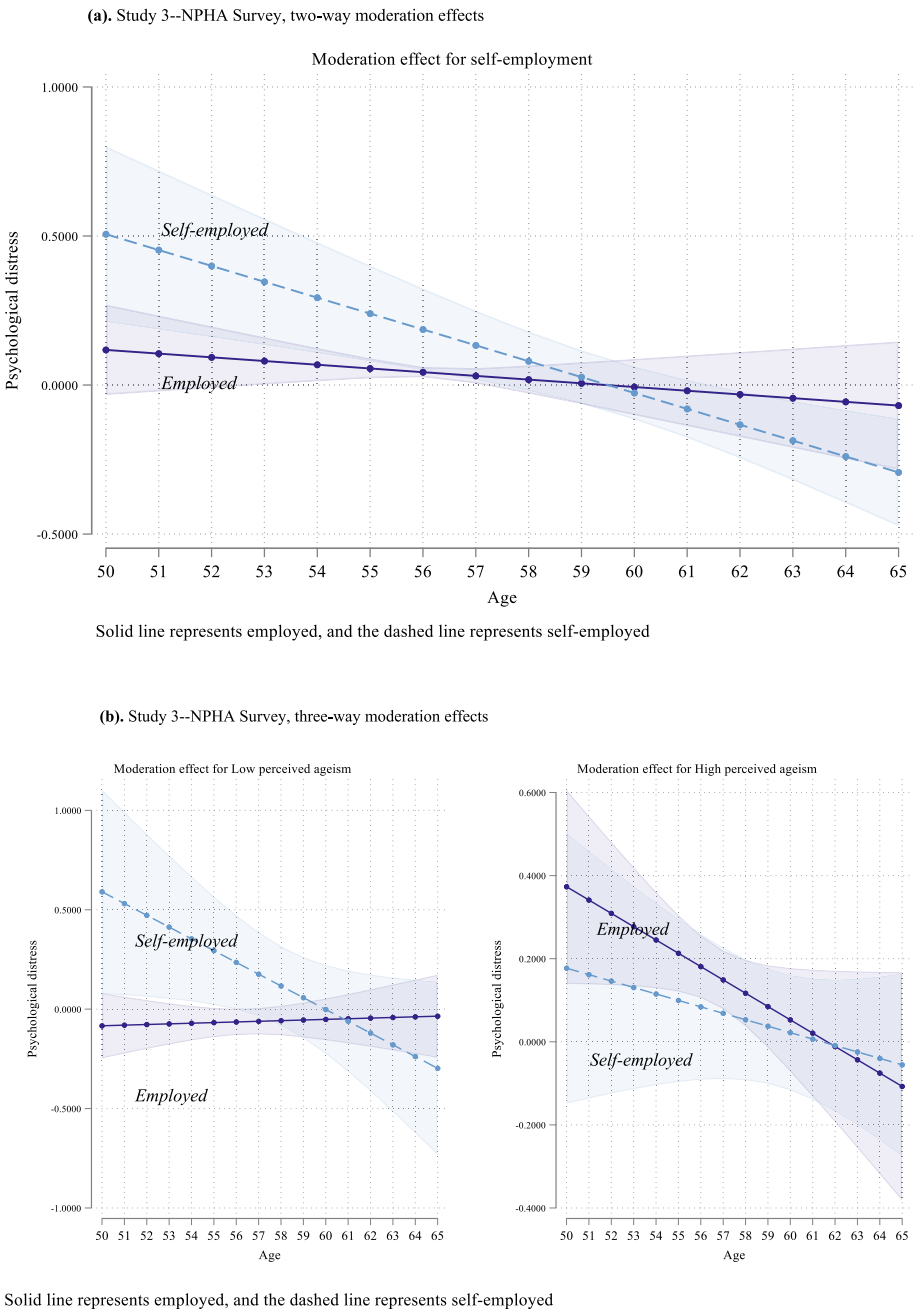

Fig. 4. Study 3 – NPHA Survey, moderation effects (two-way and three-way). (a) Study 3 – NPHA Survey, two-way moderation effects. (b) Study 3 – NPHA Survey, three-way moderation effects.

context of ageism and employment type (Bakker, 2008; Benz & Frey, 2008; Levy et al., 2020; Stephan, 2018).

Finally, our study provides important practical insight into the relationship between aging, self-employment, and mental well-being. Considering the trend with regard to aging in the population, combined with the increased interest in mental health and well-being in general, our findings suggest that self-employment could be a viable alternative for senior individuals to consider as a means to improve and maintain their mental well-being. Moreover, our findings highlight the importance of finding enjoyable work, as two factors that play prominent roles in ensuring that senior individuals who are self-employed minimize the stress they experience. From a policy perspective, our findings emphasize the need for policymakers to continue support and refine systems and processes that facilitate the ability of senior individuals to pursue self-employment opportunities. Efforts ranging from increased access to resources and capital for senior self-employed individuals to training programs geared towards assisting senior individuals to remain savvy in the ever-shifting technological landscape could all help enhance senior individuals' ability to pursue self-employment, thereby improving their mental health and well-being.

7.1. Limitations and directions for future research

The present research acknowledges several limitations that should be considered when interpreting its findings. First, all four studies were cross-sectional in design, which means that it is not possible to establish a direct causal relationship between self-employment and psychological distress in senior individuals. Though not all of our measures are self-report measures, and one out of four studies relies on biomarkers, future studies could use longitudinal designs to examine the temporal

Table 7
Study 4 – prolific sample, descriptives.

		Mean	SD	Min	Max	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	Psychological distress	4.112	0.797	1	5	1								
2	Work absorption	3.905	1.189	1	7	0.103*	1							
3	Work enjoyment	4.205	1.384	1	7	0.380*	0.633*	1						
4	Intrinsic work motivation	3.316	1.321	1	7	0.207*	0.509*	0.758*	1					
5	Self-employed	0.339	0.474	0	1	−0.026	0.137*	0.197*	0.321*	1				
6	Perceived ageism	4.315	0.673	2	6	0.488*	0.05	0.252*	0.177*	0.092	1			
7	Age-square	41.84	9.962	22	65	0.182*	0.162*	0.164*	0.160*	0.173*	0.094	1		
8	Age-square	1849.557	881.686	484	4225	0.181*	0.155*	0.161*	0.153*	0.169*	0.091	0.993*	1	
9	Male	0.533	0.5	0	1	0.004	−0.002	−0.118*	−0.037	−0.099	−0.041	0.054	0.058	1
10	Graduate degree (MA/MSc/MPhil/other) (ref. Doctorate degree)	0.205	0.404	0	1	0.048	0.107*	0.129*	0.146*	0.041	0.066	−0.036	−0.047	−0.001
11	High school diploma/A-levels	0.139	0.346	0	1	−0.145*	−0.099	−0.160*	−0.161*	−0.075	−0.144*	−0.067	−0.056	0.051
12	No formal qualifications	0.005	0.073	0	1	−0.018	0.014	0.029	0.06	0.102*	−0.012	−0.095	−0.08	0.068
13	Secondary education (e.g. GED/GCSE)	0.04	0.196	0	1	0.120*	0.048	0.093	0.005	−0.002	0.058	0.106*	0.107*	−0.027
14	Technical/community college	0.147	0.354	0	1	−0.034	0.041	−0.01	0.01	0.117*	0.019	0.121*	0.117*	0.025
15	Undergraduate degree (BA/BSc/other)	0.435	0.496	0	1	0.035	−0.063	−0.033	−0.019	−0.093	0.017	−0.068	−0.072	−0.042
16	Management experience	0.699	0.459	0	1	0.045	0.083	0.046	0.027	−0.07	0.026	0.159*	0.158*	0.085
17	Survey completion period in seconds	284.424	154.533	96	973	−0.003	0.1	0.094	0.081	0.015	0.006	−0.044	−0.042	−0.002

		(10)	(11)	(12)	(13)	(14)	(15)	(16)
10	Graduate degree (MA/MSc/MPhil/other) (ref. Doctorate degree)	1						
11	High school diploma/A-levels	−0.204*	1					
12	No formal qualifications	−0.037	−0.029	1				
13	Secondary education (e.g. GED/GCSE)	−0.104*	−0.082	−0.015	1			
14	Technical/community college	−0.211*	−0.166*	−0.03	−0.085	1		
15	Undergraduate degree (BA/BSc/other)	−0.446*	−0.352*	−0.064	−0.179*	−0.364*	1	
16	Management experience	0.017	−0.039	0.048	0.015	−0.04	0.001	1
17	Survey completion period in seconds	0.085	−0.012	−0.034	−0.024	0.056	−0.096	0.037

N = 375; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

relationship between self-employment and psychological distress over time. However, past causal studies relied, for example, on natural experiments such as disasters or factors such as distance from volcanos as a proxy for change in well-being (Donovan & Oppenheimer, 2014; Yang et al., 2018), and causal attributions from path-dependent self-employment outcomes on distress are not readily tractable.

Second, the sample used in some of the studies was limited to individuals over the age of 50, which may limit the generalizability of the findings to younger populations – including middle-aged people (e.g. those in their 40 s) potentially subject to agism (especially in some vocations). The relationship between self-employment and psychological distress may differ among younger individuals, and future studies could examine this relationship across different age groups to determine if the findings hold across the lifespan.

Third, the measures of psychological distress were limited to self-reported measures of stress and age-related distress, which may not capture the full range of psychological distress experienced by senior individuals. Future studies could use a broader range of measures, including clinical assessments, to provide a more comprehensive assessment of psychological distress in this population.

Fourth, the self-employment status of participants was based on self-reported measures, which may be subject to biases. Future studies could use more objective measures, such as tax records or business registrations, to confirm self-employment status. In addition, although we control for factors that could distinguish between necessity and opportunity self-employment, such as income levels, we do not specifically examine how various forms of self-employment could present boundary conditions to the relationships we report. Because necessity and opportunity self-employment have distinct connotations on factors such as perceived control, flexibility, and autonomy, it is possible that our results could vary depending upon the specific form of self-employment individuals pursue. Future research will need to specifically examine our conceptual model under conditions of either necessity or opportunity self-employment to better understand the nuances present under different self-employment contexts.

Fifth, due to data constraints, we could not control for prior entrepreneurial experience or the length of tenure as an entrepreneur. The observed relationship between stress and entrepreneurship among senior individuals may be influenced by their previous entrepreneurial success or the duration of their entrepreneurial careers. Future research should aim to collect and incorporate data on these factors to provide a more nuanced understanding of the relationship between stress and entrepreneurship for senior individuals. Our study also was not able to consider several potential moderators that may condition the relationship between stress and entrepreneurship for those advanced in age. These moderators include industry tenure, the ability to self-insure (or insurance via a spouse/domestic partner), and the size of the venture itself. It is plausible that senior individuals who enter entrepreneurship for the first time may experience higher levels of stress compared to well-established entrepreneurs who have successfully run their businesses for decades. Additionally, an individual's financial status and the size of their venture may also influence the stress levels associated with entrepreneurship. Future research should empirically examine these potential moderators to provide a more comprehensive understanding of the factors that shape the relationship between stress and entrepreneurship for senior individuals.

Finally, an important consideration in interpreting our findings concerns the pattern of moderation effects observed across our studies.

Table 8
Study 4 – Prolific sample, Path analysis results.

Variables	(1) Psychological distress	(2) Work Absorption	(3) Work Enjoyment	(4) Intrinsic work motivation
Work Absorption	−0.109***			
	(0.0393)			
Work Enjoyment	0.282***			
	(0.0473)			
Intrinsic work motivation	−0.0838**			
	(0.0378)			
Self-employed	0.0432	−0.893	−1.737**	−0.506
	(0.456)	(0.795)	(0.842)	(0.859)
Perceived ageism	0.477***	−0.0724	0.252**	0.138
	(0.0605)	(0.0979)	(0.116)	(0.120)
Self-employed × Perceived ageism	−0.0511	0.264	0.490**	0.295
	(0.0986)	(0.183)	(0.194)	(0.197)
Age	0.00979	0.0486	0.0104	0.0333
	(0.0284)	(0.0529)	(0.0553)	(0.0481)
Age-square	3.84e-06	−0.000373	7.27e-05	−0.000214
	(0.000316)	(0.000605)	(0.000627)	(0.000547)
Male	0.0958	−0.00316	−0.277**	−0.0233
	(0.0687)	(0.118)	(0.130)	(0.125)
Graduate degree (MA/MSc/ MPhil/other) (ref. Doctorate degree)	−0.0277	0.403	0.223	0.549
	(0.155)	(0.336)	(0.393)	(0.375)
High school diploma/A-levels	−0.141	−0.0455	−0.439	−0.140
	(0.182)	(0.343)	(0.411)	(0.387)
No formal qualifications	−0.0225	0.535	0.687	1.127
	(0.539)	(0.832)	(1.113)	(0.813)
Secondary education (e.g. GED/GCSE)	0.149	0.380	0.379	0.148
	(0.181)	(0.489)	(0.522)	(0.464)
Technical/ community college	−0.104	0.223	−0.191	0.115
	(0.161)	(0.361)	(0.411)	(0.389)
Undergraduate degree (BA/ BSc/other)	−0.00756	0.120	−0.104	0.246
	(0.147)	(0.324)	(0.385)	(0.363)
Management experience	−0.0130	0.164	0.0827	0.0523
	(0.0744)	(0.126)	(0.148)	(0.138)
Survey completion period in seconds	−6.10e-05	0.000705**	0.000761*	0.000621
	(0.000264)	(0.000316)	(0.000395)	(0.000389)
Constant	1.227*	2.290*	2.350*	1.025
	(0.697)	(1.178)	(1.287)	(1.202)
Observations	375	375	375	375

Robust standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

While our analyses show statistically significant interactions between employment type and age ($p < 0.05$), the confidence intervals in our moderation plots demonstrate substantial overlap, particularly around ages 58–63. This overlap warrants careful interpretation, especially given that in our sample, with a mean age of approximately 57 and standard deviation of 4 years, age 61 represents a standard point estimate (+1 SD) commonly used for interpreting moderation effects with continuous variables. The convergence of confidence intervals around age 61 is theoretically meaningful within our framework. Drawing on COR theory's resource acquisition and preservation principles (Hobfoll et al., 2018), this specific age point appears to represent a critical transition where the distinctive advantages of self-employment in resource management begin to equalize with those of traditional employment. Several mechanisms may explain why we observe this convergence at this particular age.

First, by age 61, both self-employed and traditionally employed individuals have typically developed sophisticated resource conservation strategies. The early advantage that self-employed individuals enjoy through greater autonomy and control over their work environment may diminish as employed individuals accumulate experience, achieve positions with greater autonomy through seniority, or successfully negotiate flexible work arrangements. This interpretation aligns with recent findings on late-career resource optimization (Zacher et al., 2019) and workplace adaptation strategies (Wang et al., 2020). Second, age 61 falls within what retirement researchers term the "retirement preparation zone" (Wang & Shi, 2014). During this period, individuals across employment types begin shifting their focus from career advancement to retirement planning, potentially leading to more homogeneous patterns of stress response. This transition often involves reduced investment in work-related resource acquisition and increased attention to resource preservation for post-career life, regardless of employment type. These patterns suggest that the protective effects of self-employment against stress and psychological distress are most pronounced during the initial transition into senior status (ages 50–57), where individuals are actively negotiating age-related workplace challenges while maintaining strong career engagement. The subsequent convergence of effects at age 61 does not diminish the importance of our findings but rather highlights how the benefits of self-employment may be temporally bounded within the senior career trajectory.

The overlap in confidence intervals around age 61 also suggests that other factors may become more salient at this age point. As noted in our limitations, this age range introduces additional complexity as retirement considerations and health issues often become more prominent concerns. These factors may create more noise in the relationship between employment type and psychological well-being, potentially explaining the diminished differentiation between employed and self-employed individuals at this age point.

A methodological consideration concerns our ageism measures from the national probability samples, which showed Cronbach's alphas below the heuristic threshold of 0.7 (0.59 for perceived ageism and 0.57 for internalized ageism). While having additional items would be ideal, several factors support the validity and reliability of these measures in our context. When measuring multidimensional psychological constructs like ageism through secondary data, lower alphas often reflect the inherent complexity of capturing diverse manifestations – from interpersonal discrimination to internalized stereotypes – that may not necessarily correlate highly despite reflecting the same underlying construct (Cho & Kim, 2015). Recent methodological work suggests that useful scales measuring broad social constructs in large population studies often have alphas between 0.50–0.70 (Lance et al., 2006; Schmitt, 1996).

More importantly, the confidence in these measures is bolstered by their strong nomological validity, demonstrated through theoretically consistent relationships with established biomarkers of stress (Study 2), psychological distress (Study 3), and work-related constructs (Study 4). The robustness of our findings across four independent studies with different ageism operationalizations suggests the results are not artifacts of measurement error. On the contrary, if the measurement were poor (not reliable), it would increase the likelihood of inconsistent or null results (rather than the coherent pattern observed). When working with secondary data from national probability samples like NPHA, researchers face inherent tradeoffs between measurement precision and sample representativeness. Here, the benefits of nationally representative sampling frames, high response rates, and rigorous data collection

Table 9
Study 4 – Prolific sample, Moderated-mediation estimates.

	Observed coefficient	Bootstrap Bias	std. err.	95 % C.I.		
				Low C.I.	High C.I.	
Employed	0.0710	−0.0043	0.0367	−0.0005	0.1396	(P)
				0.0044	0.1428	(BC)
Self-employed	0.2092	−0.0022	0.0582	0.1044	0.3349	(P)
				0.1095	0.3443	(BC)

Table 10
Integration of Studies with Conservation of Resources Theory.

Study & Sample	Hypotheses Tested	Key Findings	COR Theory Implications
Study 1: American Time Use Survey (N = 11,258)	H1: Among senior individuals, as age increases, stress declines more for the self-employed than for the employed	Self-employed individuals over 50 reported lower work-related stress; interaction between age and self-employment significant ($\beta = -0.0422$, $p < 0.01$)	Demonstrates how accumulated resources (experience, skills) in self-employment create positive resource gain spirals with age, leading to better stress management capabilities
Study 2: MIDUS Daily Diary Sample (N = 1,366)	H1: Extended test using biomarker data	Lower bedtime alpha-amylase levels (stress biomarker) for senior self-employed individuals; significant age × self-employment interaction ($\beta = -8.741$, $p < 0.05$)	Biological validation of resource conservation benefits; shows how self-employment enables better resource recovery through autonomy in work scheduling
Study 3: National Poll on Healthy Aging (N = 698)	H2: Self-employment will attenuate the relationship between perceived ageism and psychological distress for senior individuals	Self-employed individuals showed lower psychological distress despite higher perceived ageism; significant three-way interaction between age, self-employment, and ageism	Demonstrates how self-employment acts as a resource-protective buffer against age-related resource threats (ageism), enabling better psychological resilience
Study 4: Prolific Sample (N = 378)	H3a-c: Work flow components (absorption, enjoyment, motivation) will mediate the relationship between perceived ageism and psychological distress differently for self-employed vs. employed	Only work enjoyment showed significant moderated mediation (estimate = 0.490, $p < 0.01$); stronger protective effect for self-employed (0.209) vs. employed (0.071)	Identifies work enjoyment as a critical resource-generating mechanism that amplifies resource gains, particularly for self-employed; suggests not all work-related resources are equally effective in resource conservation

protocols help minimize selection biases that often plague primary data collection on sensitive topics like ageism. Nevertheless, future research using primary data collection could include more extensive ageism measures.

Despite these limitations, the present research provides important implications for future work. One direction for future research could be to investigate the mechanisms underlying the relationship between self-employment and psychological distress in senior individuals in more detail. For example, future studies could examine the role of social support, work autonomy, and financial security in this relationship, which could help to identify the specific factors that contribute to the relationship between self-employment and psychological distress. Another direction for future research could be to investigate the boundary conditions of the relationship between self-employment and psychological distress. For example, future studies could examine whether the relationship between self-employment and psychological distress differs among individuals with different levels of education, income, or health status. This could help to identify specific populations that may benefit most from self-employment as a means of reducing psychological distress. Finally, the findings of this study suggest that interventions aimed at increasing work enjoyment, even among employed individuals, may be effective in reducing psychological distress. Future studies could examine the effectiveness of interventions designed to increase work enjoyment, such as job crafting or skills training, among self-employed individuals. This could help to identify specific strategies that could be used to reduce psychological distress among self-employed individuals.

In conclusion, our studies provide evidence of the relationship between self-employment and lower psychological distress in senior individuals. Despite differences in methods and data sources, all studies showed a consistent pattern of results, with self-employed individuals reporting lower stress and psychological distress compared to their employed counterparts. As such, these findings have important implications for promoting well-being in senior adults and suggest that self-employment may be a viable alternative to traditional employment for those seeking to reduce stress and improve mental health.

Concurrently, self-employment is no panacea – but rather is generally associated with high failure rates (Patzelt & Shepherd, 2011; Ucbasaran et al., 2013), lower levels of income (Hamilton, 2000), increased financial pressure (Gorgievski et al., 2014; Gorgievski et al., 2010), and work-family conflict (Parasuraman & Simmers, 2001). Furthermore, as seniors have fewer years remaining for potential earnings – their capacity to later make up for lost earnings or financial losses is diminished, and serious failure may be catastrophic. Accordingly, in the context of our findings, this highlights the need and potential of further research on, for example, interventions aimed at the effective use and support for self-employment as not only an effective tool for economic benefits but also in reducing psychological distress in senior adults.

CRediT authorship contribution statement

Pankaj C. Patel: Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Marcus T. Wolfe:** Writing – original draft, Investigation, Conceptualization. **Daniel A. Lerner:** Writing – original draft, Conceptualization. **Markus Fitza:** Writing – original draft, Conceptualization.

Appendix A

Table A1
Study 1—Additional analysis.

	(1)	(2)
Self-employed	−6.080*	−3.467*
	(3.267)	(1.785)
Age	−0.0919**	0.00470
	(0.0437)	(0.0144)
Self-employed × Age	0.179*	0.0528*
	(0.105)	(0.0292)
Family income	0.00553	−0.0228
	(0.00723)	(0.0628)
Hourly earnings	−4.94e-05	−4.02e-05
	(4.42e-05)	(4.42e-05)
Age-square	0.000851**	
	(0.000360)	
Self-employed × Age-square	−0.00131	
	(0.000841)	
Self-employed × Family income		0.177
		(0.138)
Age × Family income		0.000452
		(0.00109)
Self-employed × Age × Family income		−0.00274
		(0.00227)
Controls	Included	Included
Industry dummies	Included	Included
year dummies	Included	Included
sample weight	*wbwt*	*wbwt*
Standard errors	*robust*	*robust*
Constant	6.637***	3.955***
	(1.328)	(0.839)
Observations	12,489	12,489
R-squared	0.096	0.096

Notes.
Standard errors in parentheses.
*** p < 0.01, ** p < 0.05, * p < 0.1.

Table A2
Study 2—MIDUS additional moderators.

	DV = Alpha-Amylase Raw − Bedtime			
	(1)	(2)	(3)	(4)
Self-employed	1,130	−2,917	−4,400	3,587
	(2,694)	(4,326)	(5,396)	(3,999)
Age	−48.35	−10.89	−66.93**	−59.44*
	(43.19)	(27.76)	(32.72)	(31.61)
Self-employed × Age	−30.93	44.47	74.66	−60.14
	(93.58)	(73.35)	(92.37)	(67.73)
Age-square	0.428			
	(0.377)			
Self-employed × Age-square	0.207			
	(0.809)			
Log of household income from wages	−12.81**	−80.23	−14.40*	−12.26*
	(6.412)	(149.5)	(7.522)	(6.993)
Log of respondent income from all sources	−6.566	−2.330	−360.4**	22.75
	(26.40)	(30.92)	(168.1)	(24.42)
Log of Pre-tax income last calendar year	40.37	30.75	25.94	−324.7*
	(36.27)	(41.62)	(41.88)	(177.2)
Self-employed × Log of household income from wages		282.4		
		(382.5)		
Age × Log of household income from wages		1.035		
		(2.372)		
Self-employed × Age × Log of household income from wages		−4.326		
		(6.496)		
Self-employed × Log of respondent income from all sources			442.7	
			(487.2)	
Age × Log of respondent income from all sources			6.139**	
			(2.913)	

(*continued on next page*)

Table A2 (*continued*)

	DV = Alpha-Amylase Raw – Bedtime			
	(1)	(2)	(3)	(4)
Self-employed × Age × Log of respondent income from all sources			−7.478	
			(8.338)	
Self-employed × Log of Pre-tax income last calendar year				−273.0
				(353.0)
Age × Log of Pre-tax income last calendar year				5.432*
				(2.819)
Self-employed × Age × Log of Pre-tax income last calendar year				4.618
				(5.982)
Fixed effects by industry × occupational dummies	Included	Included	Included	Included
Standard errors clustered by individual id (*m2id*)	Included	Included	Included	Included
Constant	1,170	601.9	3,886*	3,531*
	(1,239)	(1,817)	(1,993)	(1,900)
Observations	1,132	1,132	1,132	1,132
R-squared	0.635	0.635	0.638	0.640

Notes.
Standard errors in parentheses.
*** p < 0.01, ** p < 0.05, * p < 0.1.

Table A3
Study 3—NPHA additional moderators.

	DV = Psychological distress	
Variables	(1)	(2)
Age	−0.232	−0.0329
	(0.305)	(0.0423)
Self-employed	−21.97	6.754
	(19.42)	(5.667)
Age-square	0.00193	
	(0.00267)	
Self-employed × Age-square	−0.00758	
	(0.00600)	
Self-employed × Age × Household income		−0.112
		(0.0952)
Household Income		−0.0941
		(0.153)
Age × Household income		0.00141
		(0.00265)
Self-employed × Household income		−0.313
		(0.348)
Self-employed × Age × Household income		0.00517
		(0.00586)
Controls	Included	Included
State dummies	Included	Included
MSA dummies	Included	Included
Standard errors clustered by state	Included	Included
Sample weighting variable	*weight1*	*weight1*
Constant	7.234	2.165
	(8.677)	(2.448)
Observations	698	698
R-squared	0.200	0.201

Notes.
Standard errors in parentheses.
*** p < 0.01, ** p < 0.05, * p < 0.1.

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