Loneliness influences avoidable absenteeism and turnover intention reported by adult workers in the United States

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Abstract

Purpose – Loneliness is known to adversely impact employee health, performance and affective commitment. This study involves a quantitative cross-sectional analysis of online survey data reported by adults employed in the United States ($n = 5,927$) to explore how loneliness and other related factors may influence avoidable absenteeism and turnover intention.

Design/methodology/approach – Worker loneliness was assessed using the UCLA Loneliness Scale (Version 3). Composite variables were constructed as proxy measures of worker job and personal resources. Structural equation modeling (SEM) was used to examine independent variable effects on dependent outcomes of (a) work days missed in the last month due to stress (stress-related absenteeism) and (b) likelihood to quit within the next year (turnover intention).

Findings – The job resources of social companionship, work-life balance and satisfaction with communication had significant negative relationships to loneliness in the SEM, as did the personal resources of resilience and less perceived alienation. Results further show lonely workers have significantly greater stress-related absenteeism ($p = 0.000$) and higher turnover intention ratings ($p = 0.000$) compared to workers who are not lonely. Respondent demographics (age, race and gender) and other occupational characteristics also produced significant outcomes.

Practical implications – Study findings underscore the importance of proactively addressing loneliness among workers and facilitating job and personal resource development as an employee engagement and retention strategy.

Originality/value – Loneliness substantially contributes to worker job withdrawal and has negative implications for organizational effectiveness and costs.

Keywords Loneliness, Absenteeism, Turnover, Social health, Survey research, UCLA Loneliness Scale, Engagement

Paper type Research paper

Introduction

In recent years, loneliness has become more widely recognized as a significant workplace stressor adversely affecting employee health and occupational outcomes (Wang *et al.*, 2018;

Leigh-Hunt *et al.*, 2017; Rico-Uribe *et al.*, 2016; Hawkley and Cacioppo, 2010; Cacioppo *et al.*, 2006). Loneliness is a multidimensional concept that generally indicates a subjective state of emotional distress from lacking desired interpersonal relationships (Heinrich and Gullone, 2006). Loneliness is not only harmful to individual physical health and mental well-being, but can also reduce job engagement, performance and continuance commitment among workers (Jung *et al.*, 2021; Amarat *et al.*, 2019; Deniz, 2019; Ozcelik and Barsade, 2018; Wang *et al.*, 2018; Leigh-Hunt *et al.*, 2017; Rico-Uribe *et al.*, 2016; Ayazlar and Güzel, 2014; Aykan, 2014; Hawkley and Cacioppo, 2010; Cacioppo *et al.*, 2006). This evidence suggests that lonely workers are at risk of withdrawing from their job. Frameworks for the progression of job withdrawal state that unengaged and discontented workers will, over time, physically withdraw and psychologically divest from their job (Hulin, 1991; Farrell and Petersen, 1984). Worker job withdrawal behavior, such as avoidable absenteeism and voluntary unplanned separation, remains a persistent issue for many organizations (Holtom *et al.*, 2008). Along such lines, dynamics of employee presenteeism and commitment could be shaped by job withdrawal caused by loneliness in the workplace (Johns, 2009). Loneliness is linked to decreased worker engagement (Jung *et al.*, 2021), and less engaged workers have higher rates of absenteeism (Soane *et al.*, 2013; Hoxsey, 2010). Other investigations show negative associations between worker loneliness and organizational commitment (Jung *et al.*, 2021; Ayazlar and Güzel, 2014; Aykan, 2014). Summarily, loneliness may produce worker job withdrawal behavior, generating undesirable consequences for employers (Jung *et al.*, 2021; Amarat *et al.*, 2019; Deniz, 2019; Ozcelik and Barsade, 2018; Ayazlar and Güzel, 2014; Aykan, 2014). Avoidable stress-related absenteeism and unplanned turnover invite negative costs and inefficiencies at the organizational level (Holtom *et al.*, 2008).

While previous studies have mainly established loneliness' adverse effects on employee health and occupational outcomes (Jung *et al.*, 2021; Amarat *et al.*, 2019; Deniz, 2019; Ozcelik and Barsade, 2018; Wang *et al.*, 2018; Leigh-Hunt *et al.*, 2017; Rico-Uribe *et al.*, 2016; Ayazlar and Güzel, 2014; Aykan, 2014; Hawkley and Cacioppo, 2010; Cacioppo *et al.*, 2006), the job conditions and personal factors that manifest workplace loneliness remain unclear (Wright and Silard, 2021). Likewise, the job and personal resources which may attenuate worker loneliness have not been comparatively studied. Without understanding what external and internal factors mitigate worker loneliness, employer interventions targeting loneliness' influence on well-being and job withdrawal could have limited success. The priority factors that preclude workplace loneliness need to be articulated so that employers can implement more effective solutions to prevent loneliness-related job withdrawal behavior and its costs to the organization.

This research moves forward on this issue by providing a multilevel examination of workplace loneliness, focusing on both its precluding factors and negative consequences. Integrating conceptual frameworks of job withdrawal and job demands-resources (JD-R) theory, this study analyzes worker-reported survey data to understand whether a variety of job and personal resources influence the occurrence of loneliness in the workplace. Further, we investigate if workplace loneliness contributes to greater employee job withdrawal behavior as measured by stress-related absenteeism and turnover intention. Examining workplace loneliness, the factors mitigating it and its relationship to job withdrawal outcomes can reveal its costly impact and help guide organizations in developing optimal workforce engagement and retention strategies.

Background
The JD-R model of occupational stress management posits that having adequate job and personal resources can offset the strain from a high burden of job demands (Schaufeli and Taris, 2013). In JD-R theory, "job resources" are generally defined as any physical, social or

organizational aspects of work that help alleviate job stressors and increase motivation (Schaufeli and Taris, 2013). "Personal resources" are dispositional aspects of personality and cognition (such as one's personal beliefs about the self) that can frame how individuals handle adversity and interpret their life experiences (Schaufeli and Taris, 2013; van den Heuvel *et al.*, 2010). Research shows that job resources and personal resources boost worker well-being, engagement and performance (Kühnel *et al.*, 2012; van den Heuvel *et al.*, 2010; Xanthopoulou *et al.*, 2009; Bakker *et al.*, 2007).

The present study incorporates a JD-R theory approach (Demerouti *et al.*, 2001) to consider how a variety of job and personal resources may together mitigate the likelihood of loneliness among workers. Similar to JD-R theory, we propose that having adequate job and personal resources will offset the potential likelihood of experiencing workplace loneliness by reducing social and emotional strain and enhancing employee well-being and engagement. Five kinds of job resources [(1) *social companionship*; (2) *work-life balance*; (3) *satisfaction with communication*; (4) *supportive work environment*; (5) *technology enables connection with others*] and two kinds of personal resources [(6) *resilience*; (7) *less perceived alienation*] were selected for study as factors that may help protect workers from loneliness and its job withdrawal consequences.

Resources mitigating worker loneliness

When workers experience loneliness, they may draw on their available job and personal resources for support. Job resources are individuals (i.e. co-workers), tools or organizational policies that can help engage workers dealing with social isolation or emotional strain due to loneliness. On the other hand, personal resources represent a person's internal strategies for approaching and coping with loneliness-related stress in the workplace.

Job resources

Social companionship. Having social companionship is often considered the antithesis of being lonely. Social companionship is a job resource that refers to workers who feel they have satisfactory friendships, social connections or comradery with others in the workplace. Having meaningful daily interactions with others is significantly associated with being less lonely (Bruce *et al.*, 2019), and social relationships are reported to increase worker engagement (Mann, 2018). Studies further suggest that an individual's perception of the quality of their social relationships is a major determinant of loneliness (Chan and Qiu, 2011; Hawkley and Cacioppo, 2010; Hawkley *et al.*, 2008). Socialization difficulties or lacking opportunities for meaningful interactions could result in professional isolation or workplace loneliness (Duru, 2008). Low quality of relational exchange is a key reason that lonely employees have poor job performance (Lam and Lau, 2012).

Work-life balance. Work-life balance is a job resource that specifies an employee has a reasonable equilibrium between their time spent working and their time not working. A poor work-life balance is a significant work-related stressor (Parent-Lamarche and Boulet, 2021). Work-life balance can positively impact an employee's well-being and psychological stress, leading to better job performance and organizational commitment (Parent-Lamarche and Boulet, 2021; Hofmann and Stokburger-Sauer, 2017). Notably, Aytaç and Basol (2018) found that loneliness mediated the effect that being overworked had on worker turnover intention. Some employees may be working excessively to the extent that it impedes their personal time and opportunities to engage in social life at work. This aligns with findings from Bruce *et al.* (2019), who found that being less lonely was significantly associated with the capability to balance one's daily time. In other words,

work-life imbalance may increase a worker's likelihood of being lonely by contributing to burnout and limiting their free time to access supportive job resources, such as professional and personal social networks. Conversely, supportive organizations and policies that promote work-life balance may help reduce job strain and improve employee morale (Forsyth and Polzer-Debruyne, 2007).

Satisfaction with communication. Effective internal communications are an important job resource, whether an exchange is in-person, telephonic or digitally based. A study of university students found loneliness predicted individuals reporting more difficulty in their experience of communication (Edwards *et al.*, 2001). Consistent with theories of social exchange, a study of teachers shows a negative correlation between loneliness and the quality of teacher-supervisor exchange and with perceived relation to the organization as a whole (Lam and Lau, 2012). Delays in informational exchange can damage trust in otherwise functional workplace relationships (Guenter *et al.*, 2014). Research by Ammari *et al.* (2017) found a positive association between satisfaction with workplace communication and levels of organizational commitment. Satisfaction with internal communications indicates that employees have adequate resources for effective interpersonal exchange, which may reduce their likelihood of being socially lonely at work. Being dissatisfied with workplace communication may contribute to social loneliness in that quality interpersonal communication is necessary to build social relationships.

Supportive work environment. A good relational climate in the workplace is a job resource that can impact employee subjective well-being (Erdil and Ertosun, 2011). Having a supportive work environment reduces loneliness and the perception of psychological strain (Erdil and Ertosun, 2011; O'Driscoll *et al.*, 2003). Survey research shows decreased loneliness is strongly associated with having adequate social support (Bruce *et al.*, 2019). Another survey study of adults found that loneliness mediated the relationship between social support and better health (Segrin and Passalacqua, 2010). Support at work might also enhance motivation and performance, with research linking it to lower rates of employee burnout and increased productivity (Baruch-Feldman *et al.*, 2002). These findings collectively suggest that supportive managers, co-workers and work environments may lessen the likelihood of employees experiencing loneliness.

Technology enables connection with others. Organizations have undergone fundamental technological and structural changes in recent decades, transforming the ways employees communicate and socially interact with one another at work (Lent, 2018; Pillemer and Rothbard, 2018; Leonardi and Vaast, 2017). Workers' use of communication technology has both advantages (e.g. increased accessibility and efficiency) and disadvantages (e.g. more interruptions) (Ter Hoeven *et al.*, 2016). Modern communication modalities, such as instant messaging and digital video conferencing, attempt to recreate the instantaneous dynamic of in-person exchange. This accelerates the rate of interaction and can allow individuals to connect from opposite sides of the globe. However, increased use of technologies like some social media has been associated with greater loneliness in the general population (Bruce *et al.*, 2019). Different kinds of communication technology may positively or negatively influence social relationships in the workplace, depending on an employee's perspective. Employees assessing workplace technology as a job resource that enables more meaningful connections with others could be less prone to becoming lonely because, in their experience, using communication technology enhances social relationships at work.

Personal resources
Resilience. Resilience is a personal resource characterized as the "capacity to maintain psychological well-being under conditions of adversity" (Robertson *et al.*, 2018, p. 2). Resilient

workers are highly resourceful, can adapt to change and are able to recover from setbacks (Kašpárková *et al.*, 2018; Robertson *et al.*, 2018). Resilience can buffer the perceived acuteness of mental burden when coping with environmental stressors (Robertson *et al.*, 2018) and promotes better work engagement (Villavicencio-Ayub *et al.*, 2014). Employees with greater psychological resilience may be more adept at finding and mobilizing all their available resources (job-related or otherwise) to gain meaningful interpersonal exchange and social support. In this way, resilience could buffer an employee's likelihood of experiencing workplace loneliness or help employees endure the social and emotional strain of loneliness when job resources are scarce.

Less perceived alienation. Another personal resource possibly influencing workplace loneliness is perceived alienation. Alienation essentially reflects when a person feels disconnected from their work or estranged from themselves or others in the context of the work setting (Nair and Vohra, 2009; Wright, 2009). Employees with higher perceived alienation may feel like they do not belong in their social world, deterring their overall social initiative and generating loneliness (Wright, 2009). Social alienation is linked to higher social anxiety, a feature strongly associated with greater loneliness (Bruce *et al.*, 2019; Lim *et al.*, 2016). An alienated employee may feel as though they cannot be their authentic self at work, for whatever reason. Such a disposition can result in a worker feeling unattached to their job due to a sense of powerlessness or meaninglessness (Amarat *et al.*, 2019). Recent studies show workplace alienation mediates loneliness by magnifying its negative effects on job performance (Amarat *et al.*, 2019) and turnover intention (Gozukara *et al.*, 2017). A less alienated worker may feel more comfortable reaching out to others and mobilizing their supportive job resources, reducing the likelihood of loneliness and job withdrawal.

Conceptual model and hypotheses

Earlier research suggests that various job and personal resources mitigate loneliness and positively influence work engagement. Figure 1 depicts our conceptual model of the expected relationships among worker resources, loneliness and job withdrawal. Using JD-R theory as a basis, we hypothesize that having greater job and personal resources will reduce worker likelihood of being lonely, because such job and personal resources are negatively correlated with loneliness or are shown to support better worker outcomes. Resources that help shield workers from the social and emotional strain of loneliness may prevent its consequences, while a shortage of such resources may invite loneliness, disengagement and job withdrawal (Demerouti *et al.*, 2001).

H1a-e. Workers reporting higher ratings of their job resources (social companionship [H1a]; work-life balance [H1b]; satisfaction with communication [H1c]; supportive work environment [H1d]; technology enables connection with others [H1e]) are significantly less lonely compared to workers with lower job resources ratings.

H2a-b. Workers reporting higher ratings of their personal resources (resilience [H2a]; less perceived alienation [H2b]) are significantly less lonely compared to workers with lower personal resources ratings.

H3. When modeled together, higher job and personal resources ratings are significantly and negatively associated with loneliness among workers.

Under a basic job withdrawal progression sequence, we also assume that when loneliness does occur, the broad adverse impacts on workers' physical, cognitive, emotional and social well-being will compel employees to physically disengage and psychologically divest from their occupational role. This is evaluated by measuring indicators of employee job withdrawal, such as unplanned avoidable absenteeism and intention to quit. Demographic
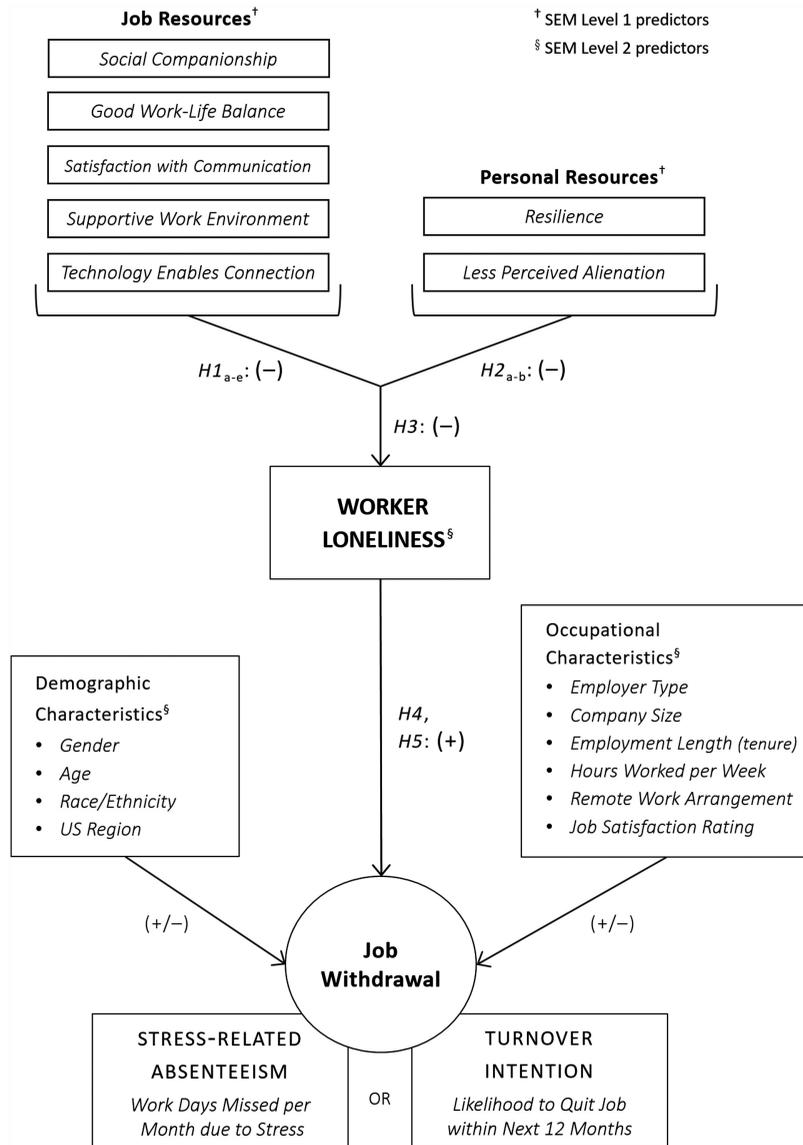
Job Resources[†]

Social Companionship

Good Work-Life Balance

Satisfaction with Communication

Supportive Work Environment

Technology Enables Connection

Personal Resources[†]

Resilience

Less Perceived Alienation

[†] SEM Level 1 predictors
[§] SEM Level 2 predictors

$H1_{a-e}$: (−)

$H2_{a-b}$: (−)

$H3$: (−)

WORKER LONELINESS[§]

Demographic Characteristics[§]
• Gender
• Age
• Race/Ethnicity
• US Region

Occupational Characteristics[§]
• Employer Type
• Company Size
• Employment Length (tenure)
• Hours Worked per Week
• Remote Work Arrangement
• Job Satisfaction Rating

$H4$, $H5$: (+)

(+/−)

(+/−)

Job Withdrawal

STRESS-RELATED ABSENTEEISM

Work Days Missed per Month due to Stress

OR

TURNOVER INTENTION

Likelihood to Quit Job within Next 12 Months

Figure 1.
Conceptual model of expected relationships among worker resources, loneliness and job withdrawal

characteristics (e.g. gender, age, race and geographic region), as well as other occupational factors, may also be pertinent to evaluating job withdrawal and the individual response to loneliness (Čikeš *et al.*, 2018; Hawkley *et al.*, 2008; Hom *et al.*, 2008; McKay *et al.*, 2007; Rokach and Neto, 2005). We thus propose that loneliness in the workplace will significantly increase job withdrawal outcomes reported by workers (i.e. greater stress-related absenteeism and turnover intention), in context of other relevant demographic and employment-related characteristics.

H4. Compared to not lonely workers, lonely workers have significantly greater stress-related absenteeism (i.e. more work days missed per month due to stress) in context of other demographic and employment-related characteristics.

H5. Compared to not lonely workers, lonely workers have significantly greater turnover intention (i.e. higher likelihood of quitting their job within the next 12 months) in context of other demographic and employment-related characteristics.

This study investigates the proposed hypotheses through a quantitative, cross-sectional analysis of panel survey data collected online from over 5,900 working adults in the United States (US). We created composite proxy measures of various job and personal resources from select items contained in the survey. Structural equation modeling is then used to analyze how job and personal resource factors are related to loneliness in the workplace, and whether loneliness influences self-reported rates of avoidable absenteeism and turnover intention.

Methodology
This study is a quantitative, cross-sectional analysis of online survey data reported by adult workers in the US. The survey was conducted by Ipsos and managed by Edelman Data x Intelligence on behalf of Cigna (Cigna herein refers to operating subsidiaries of Cigna Corporation including Evernorth and Evernorth Behavioral Health, Inc.), a large US health services company that planned and funded the survey project. The current study is considered a quality improvement initiative and does not constitute human subjects research as outlined by the Office of Human Research Protections guidance on Health and Human Services regulations at 45 CFR 46.102(d). All study-related activities were performed in compliance with the International Chamber of Commerce Code of Conduct on Market, Opinion, and Social Research and Data Analytics, and in accordance with the Marketing Research and Intelligence Association, Marketing Research Association and Council of American Survey Research Organizations Standards for North America.

Recruitment and eligibility
Registered members of Ipsos' online research and marketing survey panel group (called "iSay") were recruited for participation. Recruitment methods included outreach via subscription email lists, banner advertisements, website and text message advertisements, co-registration (for new members joining the group) and search engine marketing. To be eligible for inclusion in the study, registered members were required to be a US resident, be at least 18 years of age and voluntarily consent to participation.

All recruited members from the iSay panel provided their consent through a "double opt-in" process. The first "opt-in" involved confirming their assent to the terms and conditions of panel membership, including acknowledging their understanding of what data are collected, how data may be used and whether data are shared with external partners. The second "opt-in" required clicking a link within a secure email sent to the registered panelist's email address on file. By clicking the link in the email, recruited panel members verified their voluntary consent to participate in the online survey study. Participants received compensation through "iSay" points which they could later apply toward their choice of rewards, like retail gift cards or sweepstakes entries.

Sampling procedure
An omnibus sampling approach was applied, where fixed participant subgroup targets were ascertained based on US Census (2016) American Community Survey data (US Census

Bureau, 2016). Eligible participants must have completed the entire survey to qualify for analysis; incomplete surveys were omitted. The final sample was further calibrated for representativeness to the US adult population using US census demographic targets. Ranking ratio adjustments for gender, age, region, race/ethnicity and income were used for survey weighting purposes utilizing Ipsos' rim weighting methods (Ipsos Media CT, 2010). Online polls administered by Ipsos are evaluated for precision using a credibility interval. The current survey produced a credibility interval of +1.1% percentage points for all sample members reporting.

Data collection
Surveys were collected from July 16, 2019 to August 2, 2019. The survey questionnaire was only available online and in an English language version. In total, surveys from 10,441 respondents were collected. Of those, 5,927 participants (56.8% of total respondents) indicated they were currently employed and were included in the analyzed sample. Employment-specific survey questions were not asked to respondents who indicated they were not currently working.

Survey respondent characteristics
Characteristics of survey respondents are located in Table 1. The analyzed sample of survey respondents was split about evenly between males (52.1%) and females (47.9%), with an average age of 42.7 years. The US region most represented was the South (36.2%), while the remaining respondents were about equally distributed across the West (23.7%), Midwest (21.5%) and Northeast (18.6%) regions. Almost two-thirds (62.9%) of the participants reported their race as White, followed by Hispanic (17.1%), Black (11.7%), Asian (6.6%) and other race (1.7%).

The average number of hours worked per week was 37.4. Over 40% of respondents reported working in a privately owned business, and about 10% indicated they were employed in remote work arrangements (i.e. working from home, not based at a designated worksite). Approximately 61% of all respondents worked at companies with less than 1,000 total employees, and 50.8% reported working for their current employer for at least five years or more. Over 83% of all respondents were either "somewhat" or "very" satisfied with their job when they took the survey.

Dependent measures
Stress-related absenteeism. Survey respondents were asked to report the approximate number of whole work days that they missed or were absent during the past month (the previous 31 calendar days) due to each of the following causes: (1) illness, (2) stress and (3) a family member. Respondents were instructed to select an integer quantity between 0 and 31, indicating their days missed for each stated reason. Only the days missed due to the "stress" reason were considered avoidable absences and counted for the absenteeism variable; days due to illness or a family member were excluded from the analysis. In regression models, absenteeism is measured and presented in days missed per month. In group-level summary tables, absenteeism is presented as days missed per year to aid the interpretation of results.

Turnover intention. Respondents were asked to indicate how likely they were to look for a job outside of their current organization in the next 12 months. Response options were "very likely," "somewhat likely," "not too likely" or "not at all likely." Those answering that they were "very likely" or "somewhat likely" to look for a different job were considered as having

| Worker characteristic | Survey participants | | Job withdrawal outcomes | |
	#	% of Total	Stress-related absenteeism (days missed/ year)	% Intending to turnover in next year
Total sample	5,927	100.0%	4.8	46.2%
UCLA Loneliness Scale				
Lonely *(score ≥ 43)*	3,661	61.8%	7.0	56.6%
Not lonely *(score < 43)*	2,266	38.2%	1.3	29.3%
Loneliness Scale score (mean, SD)	M = 45.6	(SD = 10.9)	–	–
Demographic characteristics				
Age *(mean years, SD)*	M = 42.7	(SD = 13.3)	–	–
Gender				
Male	3,089	52.1%	6.0	50.2%
Female	2,839	47.9%	3.6	41.8%
Race/Ethnicity				
White	3,731	62.9%	3.5	40.8%
Hispanic	1,014	17.1%	8.4	55.5%
Black	693	11.7%	6.2	57.1%
Asian	391	6.6%	5.4	53.4%
Other	98	1.7%	4.9	46.7%
US region				
South	2,145	36.2%	5.4	47.9%
West	1,407	23.7%	4.9	49.9%
Midwest	1,272	21.5%	4.1	43.6%
Northeast	1,103	18.6%	4.5	40.9%
Occupational characteristics				
Hours worked per week (mean, SD)	M = 37.4	(SD = 12.5)	–	–
Remote work arrangement *(yes)*	599	10.1%	5.8	48.9%
Employer type				
Privately-owned business	2,399	40.5%	3.4	48.0%
Family- or self-owned business	1,041	17.6%	8.1	45.9%
Publicly- traded business	852	14.4%	5.0	52.1%
Government-run business	801	13.5%	6.3	43.5%
Nonprofit business	704	11.9%	4.3	43.0%
Employer size (total employees)				
1	399	7.3%	5.3	36.8%
2–100	1,724	31.6%	4.4	44.8%
101–999	1,218	22.3%	5.1	47.3%
1,000–5,000	692	12.7%	6.3	53.9%
5,001 or more	1,425	26.1%	4.3	46.4%
Length of current employment				
Less than 1 year	970	16.4%	8.2	61.6%
1–3 years	1,007	17.0%	5.3	57.1%
3–5 years	936	15.8%	6.2	50.9%
5–10 years	1,209	20.4%	3.7	47.4%
More than 10 years	1,804	30.4%	2.8	28.5%
Job satisfaction rating				
Very satisfied	2,457	41.5%	4.9	28.4%
Somewhat satisfied	2,509	42.3%	3.5	49.9%
Not too satisfied	690	11.6%	7.9	81.2%
Not at all satisfied	271	4.6%	8.9	83.3%

Table 1.
Survey respondent
characteristics

"turnover intention" (coded as 1). Those respondents answering "not too likely" or "not at all likely" were considered not to have the intention of turning over (coded as 0).

Independent variables

UCLA Loneliness Scale. Loneliness among workers was measured using the University of California at Los Angeles (UCLA) Loneliness Scale (Version 3) (Russell, 1996). The UCLA Loneliness Scale is a validated, 20-item survey tool ($\alpha = 0.89$–0.94) that measures the construct of loneliness and social isolation through responses to positively and negatively framed Likert-scale questions (Russell, 1996). Respondents selected one of four answer choices (never, rarely, sometimes or always) to statements such as ""How often do you feel close to people?," "How often do you feel alone?" and "How often do you feel shy?." Per author scoring guidelines, positively framed items are reverse coded prior to analysis so that response choice order is compatible across questions. The twenty survey items are combined to make the scale with scores ranging from 20 points (minimum loneliness) to 80 points (maximum loneliness).

In analysis, loneliness is coded as a dichotomous variable where a participant score of greater than or equal to 43 scale points establishes inclusion in the "Lonely" group (coded as 1) and lower scores are categorized as the "Not Lonely" group (score <43, coded as 0) (Bruce *et al.*, 2019; Russell, 1996). The threshold of 43 scale points was selected based on survey research from Bruce *et al.* (2019), which found an overall mean survey-weighted UCLA Loneliness Scale score of 44.03 (standard error = 0.09) in a representative sample of 20,096 US adults.

Demographic characteristics. Survey items related to the respondent demographics (age, gender, race, US geographic region) with associated response frequencies are outlined in Table 1. In analysis, these variables are coded dichotomously (except for age and hours worked per week), where "1" indicates participant inclusion in the relevant group presented (i.e. group shown in the table row) and "0" indicates the reference group (i.e. all other participants). Geographic region was determined using the state location provided by participants and further recoding states into US census regions (Northeast, South, Midwest and West).

Occupational characteristics. Current occupational characteristics (employer type, remote work arrangement, company size, tenure/length of employment and job satisfaction) are also presented in Table 1. Hours worked per week and respondent age are both continuous variables. Specifically, the variable for hours worked per week was reported as an estimated numeric integer (between 0 and 100) by participants to the question: "In an average week, how many hours do you work at your primary place of employment?." To measure job satisfaction, participants were asked: "Overall, how satisfied are you with your current job?." Respondents could select one of the following answer choices: "very satisfied," "somewhat satisfied," "not too satisfied" or "not at all satisfied." Respondents answering "very satisfied" or "somewhat satisfied" were included in the "higher" job satisfaction group (coded as 1). Those who answered "not too satisfied" or "not at all satisfied" were included in the "lower" job satisfaction group (coded as 0).

Job and personal resources. Seven (7) composite variables measuring various worker job and personal resources were constructed for the analysis using multiple survey items. Participant-reported responses to the individual survey items used to construct the seven composite job and personal resource factors are located in Appendix 1. Each resource variable is a composite of two to six individual survey questions and serves as a proxy measure for the job resource or personal resource represented: (1) social companionship ($\alpha = 0.73$), (2) work-life balance ($\alpha = 0.56$), (3) satisfaction with communication ($\alpha = 0.74$), (4) supportive work environment ($\alpha = 0.72$), (5) technology enables connection with others

(α = 0.76), (6) resilience (α = 0.71) and (7) less perceived alienation (α = 0.72). For each survey item, respondents rated their agreement with the statement on a 4-point Likert scale ranging from "strongly disagree" (1) to "strongly agree" (4). Negatively framed survey items were reverse coded prior to analysis to ensure compatibility of response choice order across questions within the composite variable. Cronbach's alpha levels ranged from 0.56 to 0.76 on the constructed job and personal resource variables, indicating an acceptable level of internal consistency among the items within each composite measure.

In the analysis, job and personal resource variables are coded dichotomously to aid the interpretation of results. Dichotomous factor grouping was performed by coding respondents as either being in the "high" or "low" scoring group for the composite variable. Determining inclusion in the high or low scoring factor group is based on whether the individual respondent's mean score across all items within the composite variable fell above (high group) or below (low group) the overall mean score for the entire sample. Dichotomous factor groups from the composite resource variables are utilized in comparative analyses (Table 2) and structural equation modeling (Tables 3 and 4).

The seven job and personal resource variables used in the analysis were developed specifically for the present study and are not validated elsewhere. Items selected for inclusion in the resilience composite variable were chosen for their similarity to questions contained in the social resource domain of the Resilience Scale for Adults (RSA) (Anyan *et al.*, 2020) and in the Connor-Davidson Resilience Scale (CD-RISC) (e.g. close and secure relationships, knowing where to turn for help) (Connor and Davidson, 2003).

Statistical analysis
Descriptive statistics and reporting frequencies show response rates and participant distributions for independent variables and dependent outcomes of interest. Composite factors representing worker job resources and personal resources were constructed from individual survey items and tested for internal consistency for inclusion in regression modeling. Independent samples *t*-tests were performed to determine significant mean differences between "low" and "high" scoring composite factor groups for the loneliness scale.

We used structural equation modeling (SEM) to examine the effects of the independent variables on the dependent outcomes of interest. Level 1 of the SEMs is a multivariate analysis of the seven composite job and personal resource factors on the binary outcome of worker loneliness. In level 2 of the SEMs, we analyze the effect of loneliness along with demographic and occupational characteristics on worker-reported stress-related absenteeism and turnover intention ratings (Tables 3 and 4 results represent the total effect). An ordinary least square (OLS) regression estimates the number of days missed per month due to stress (stress-related absenteeism). A linear probability regression, with coefficients shown as marginal effects, estimates turnover intention. Some survey measures tested in preliminary rounds of structural equation modeling did not produce meaningful relationships to other variables or outcomes of interest and were excluded from the analysis. Analyses were performed using STATA (Version 14.2) statistical software.

Results
Table 1 shows the average loneliness and job withdrawal outcomes of survey respondents (n = 5,927). Across the total sample, the average number of work days missed per year was 4.8. Less than half of all respondents (46.2%) specified that they intended to leave their current employment position in the next 12 months. The mean UCLA Loneliness Scale score for the sample was 45.6 points (SD = 10.9). Nearly 62% of workers had a score higher than 43 points on the UCLA Loneliness Scale measure, indicating greater than average levels of loneliness. Participants in the "Lonely" group (score >43) also reported higher average days missed per year (7.0 days) and intention to turnover (56.6%) compared to the "Not Lonely"

Response group	Survey participants #	% of Total	% Lonely (score ≥ 43)	UCLA Loneliness Scale outcome Mean score	Mean score difference	Significance[a]
JOB RESOURCES						
Social companionship						
Higher ratings	3,169	53.5%	52.4%	42.58 (SD = 9.99)	6.4	$t = 18.53$; $df = 5{,}868$; $p = 0.000$***
Lower ratings	2,758	46.5%	72.5%	48.98 (SD = 10.95)		
Work-life balance						
Higher ratings	2,763	46.6%	50.7%	43.33 (SD = 11.71)	4.2	$t = 11.70$; $df = 5{,}868$; $p = 0.000$***
Lower ratings	3,164	53.4%	71.5%	47.51 (SD = 9.82)		
Satisfaction with communication						
Higher ratings	3,416	57.6%	54.5%	43.91 (SD = 11.04)	3.9	$t = 11.10$; $df = 5{,}868$; $p = 0.000$***
Lower ratings	2,511	42.4%	71.6%	47.80 (SD = 10.35)		
Supportive work environment						
Higher ratings	4,216	71.1%	54.5%	43.50 (SD = 10.50)	7.1	$t = 19.11$; $df = 5{,}868$; $p = 0.000$***
Lower ratings	1,711	28.9%	79.5%	50.63 (SD = 10.26)		
Technology enables connection						
Higher ratings	3,010	50.8%	56.4%	43.49 (SD = 10.07)	4.2	$t = 11.95$; $df = 5{,}868$; $p = 0.000$***
Lower ratings	2,917	49.2%	67.3%	47.69 (SD = 11.38)		
PERSONAL RESOURCES						
Resilience						
Higher ratings	3,629	61.2%	43.0%	40.73 (SD = 9.18)	12.5	$t = 40.51$; $df = 5{,}868$; $p = 0.000$***
Lower ratings	2,298	38.8%	91.5%	53.19 (SD = 8.91)		
Less perceived alienation						
Higher ratings	3,562	60.1%	46.4%	41.97 (SD = 10.52)	9.0	$t = 27.29$; $df = 5{,}868$; $p = 0.000$***
Lower ratings	2,365	39.9%	84.8%	50.97 (SD = 9.17)		

Note(s): [a]Independent samples *t*-test compares higher ratings group to lower ratings group; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Table 2.
Loneliness outcomes by job and personal resource ratings

group (1.3 days and 29.3%, respectively). Notably, all other race categories had higher mean absenteeism and turnover intention rates than those of the White group.

Worker ratings of job and personal resources
Table 2 presents the loneliness outcomes for respondents rating their resources as "higher" or "lower" within each of the seven (7) composite factors of job and personal resources.

Variables	MODEL 1 (OLS regression)			
	Level 1		Level 2	
	Outcome: Lonely (score ≥43)		*Outcome*: Total work days missed per month due to stress	
	Coeff.	*p-value*	*Coeff.*	*p-value*
Lonely *(score ≥ 43)*	–	–	0.34	0.000***
Job and personal resource factors				
Social companionship [JR]	−0.14	0.000***	−0.05	0.000***
Good work-life Balance [JR]	−0.07	0.000***	−0.02	0.000***
Satisfied with communication [JR]	−0.04	0.003**	−0.01	0.005**
Supportive work environment [JR]	−0.02	0.262	−0.01	0.266
Technology enables connection [JR]	−0.02	0.112	−0.01	0.118
Resilience [PR]	−0.36	0.000***	−0.12	0.000***
Less perceived alienation [PR]	−0.19	0.000***	−0.06	0.000***
Demographic characteristics				
Male	–	–	0.17	0.000***
Age	–	–	−0.01	0.000***
White	–	–	−0.16	0.004**
South region	–	–	0.04	0.398
Occupational characteristics				
Hours worked per week	–	–	−0.01	0.002**
Remote work arrangement	–	–	0.09	0.282
Work for public company	–	–	−0.04	0.578
Company with 1,000+ employees	–	–	0.04	0.452
5 years or more tenure	–	–	−0.05	0.296
Job satisfaction rating	–	–	−0.25	0.002**

Note(s): JR = job resource; PR=personal resource; *p < 0.05; **p < 0.01; ***p < 0.001

Table 3.
Structural equation model (SEM) for stress-related absenteeism

For all the job and personal resources factors, the higher ratings groups included fewer lonely workers compared to the lower ratings groups. In addition, outcomes of the independent samples *t*-tests show significant group differences in mean UCLA Loneliness Scale scores within all job and personal resource factors. For job resources, supportive work environment produced the greatest mean score difference between respondents with higher ratings and lower ratings ($+7.1$ scale points, $p = 0.000$), followed by social companionship ($+6.4$ scale points, $p = 0.000$). Work-life balance ($p = 0.000$), satisfaction with communication ($p = 0.000$) and technology enables connection ($p = 0.000$) had mean score differences ranging from $+3.9$ to $+4.2$ scale points between the higher and lower raters. For personal resources, respondents rating their resilience as lower scored an average of $+12.5$ points more on the loneliness scale than those rating their resilience as higher ($p = 0.000$). Less perceived alienation produced a $+9.0$ mean scale point difference between higher raters and lower raters ($p = 0.000$).

Stress-related absenteeism SEM outcomes
Table 3 shows the total effect outcomes from the first SEM analyzing stress-related absenteeism using an OLS regression. Level 1 of model 1 tested the effects of the composite job and personal resource factors on the endogenous loneliness variable. Social companionship ($p = 0.000$), work-life balance ($p = 0.000$), satisfaction with communication ($p = 0.003$), less perceived alienation ($p = 0.000$) and resilience ($p = 0.000$) significantly predicted loneliness in level 1 of the SEM. In level 2 of model 1, the statistically significant

	MODEL 2 (linear probability regression)			
	Level 1		Level 2	
	Outcome: Lonely (score ≥43)		*Outcome*: Intention to turnover in next year	
Variables	Coeff.	p-value	Coeff.	p-value
Lonely *(score ≥ 43)*	–	–	16.1%	0.000[***]
Job and personal resource factors				
Social companionship [JR]	−0.14	0.000[***]	−2.3%	0.000[***]
Good work-life balance [JR]	−0.07	0.000[***]	−1.1%	0.000[***]
Satisfied with communication [JR]	−0.04	0.003[**]	−0.7%	0.006[**]
Supportive work environment [JR]	−0.02	0.262	−0.3%	0.263
Technology enables connection [JR]	−0.02	0.112	−0.4%	0.115
Resilience [PR]	−0.36	0.000[***]	−5.9%	0.000[***]
Less perceived alienation [PR]	−0.19	0.000[***]	−3.1%	0.000[***]
Demographic characteristics				
Male	–	–	6.7%	0.000[***]
Age	–	–	−0.7%	0.000[***]
White	–	–	−6.7%	0.000[***]
South region	–	–	0.1%	0.935
Occupational characteristics				
Hours worked per week	–	–	−0.1%	0.02[*]
Remote work arrangement	–	–	3.7%	0.111
Work for public company	–	–	1.6%	0.463
Company with 1,000+ employees	–	–	3.9%	0.017[*]
5 years or more tenure	–	–	−8.5%	0.000[***]
Job satisfaction rating	–	–	−37.9%	0.000[***]

Note(s): JR = job resource; PR = personal resource; [*]$p < 0.05$; [**]$p < 0.01$; [***]$p < 0.001$

Table 4.
Structural equation
model (SEM) for
turnover intention

effects of social companionship, work-life balance, communication satisfaction, less perceived alienation and resilience remain significantly and negatively related to loneliness, and being lonely is positively associated with stress-related absenteeism.

Level 2 SEM outcomes (model 1, Table 3) further show that workers with higher-than-average loneliness (UCLA Loneliness Scale score ≥43) are more likely to have a greater number of work days missed per month due to stress, on average ($p = 0.000$). Male respondents were more likely to report more days missed per month ($p = 0.000$) than female respondents. Job satisfaction ($p = 0.002$), participant age ($p = 0.000$) and race ($p = 0.004$) were all also negatively associated with the outcome, indicating that workers who are younger, non-White and less satisfied with their jobs are more likely to have higher rates of stress-related absenteeism compared to those who are older, White and more satisfied. The mean number of hours worked per week was also negatively associated with stress-related absenteeism ($p = 0.002$).

Turnover intention SEM outcomes

Model 2 in Table 4 reports the effects of the independent variables on turnover intention using a linear probability regression. Level 1 analytics for model 2 found social companionship ($p = 0.000$), work-life balance ($p = 0.000$), satisfaction with communication ($p = 0.003$), less perceived alienation ($p = 0.000$) and resilience ($p = 0.000$) were all significant negative predictors of loneliness. The significant relationships of the job and personal resources to loneliness were consistent in level 2 of model 2.

Model 2, level 2 SEM outcomes (Table 4) additionally show that loneliness among workers was significantly and positively associated with turnover intention ($p = 0.000$). Job satisfaction had a significant negative association with turnover intention and the largest marginal effect on the model outcome (-37.9%, $p = 0.000$). Participant age ($p = 0.000$) and being in the White race category ($p = 0.000$) were negatively associated with turnover intention, indicating that younger workers and those who were not White were more likely to report thinking about quitting their job in the next year compared to older and White respondents. Male respondents were more likely to have turnover intention ($p = 0.000$) compared to female respondents. Again, the average number of hours worked per week was negatively associated with the outcome ($p = 0.020$).

Model 2 (Table 4) also finds that the length of employment tenure and company size were significantly related to turnover intention, unlike in the SEM for stress-related absenteeism (model 1, Table 3). Those respondents who had worked at their current job for 5 or more years were less likely to have the intention of turning over ($p = 0.000$), while those who worked at organizations with over 1,000 employees were more likely to have turnover intention ($p = 0.017$).

Additional SEM iterations are included in Appendix 2, which codes loneliness as a continuous variable in SEM levels 1 and 2 (rather than coding as binary). Results of the SEMs in Appendix 2 are very similar to those in Table 3 (model 1) and Table 4 (model 2), with the exceptions being the two communication-related job resources of satisfaction with communication (negative coefficient not significant in Appendix 2 models) and technology enables connection (significant negative coefficient in Appendix 2 models).

Discussion

Job and personal resources mitigate worker loneliness

Alongside the changing nature of work, loneliness has emerged as an important issue that could substantially harm employee health, performance and affective commitment (Amarat et al., 2019; Deniz, 2019; Ozcelik and Barsade, 2018; Ayazlar and Güzel, 2014; Aykan, 2014; Hawkley and Cacioppo, 2010). This study integrated conceptual frameworks of JD-R theory and job withdrawal to explore whether job resources and personal resources influence the likelihood of loneliness among workers and whether worker loneliness significantly contributes to job withdrawal behavior. Outcomes of the study show that individual job and personal resources may help mitigate the occurrence of worker loneliness. Workers with higher ratings of their job resources and personal resources were significantly less likely to be lonely than workers with lower resources ratings, supporting hypotheses H1a-e and H2a-b. It appears that job and personal resources mitigate the conditions causing loneliness in the workplace by promoting employee engagement and psychosocial health. This aligns with previous research showing employee engagement is fostered by job and personal resources that maintain well-being and engender top-notch performance (Schaufeli and Taris, 2013; Kühnel et al., 2012; van den Heuvel et al., 2010; Xanthopoulou et al., 2009; Bakker et al., 2007).

Although the job and personal resource factors we tested were negatively related to worker loneliness in the analysis, two job resource factors (having a supportive work environment and technology that enables connection with others) produced negative but nonsignificant associations with loneliness. We found that the supportive work environment variable had the weakest relationship to loneliness among all the job and personal resources examined, diverging from previous studies (Erdil and Ertosun, 2011; O'Driscoll et al., 2003). Additionally, some employees may experience modern workplace communication technology as being more intrusive or disruptive to their job performance (Ter Hoeven et al., 2016), rather than as a means for relational exchange and developing social connections. Depending on a worker's perspective, technology might not always promote enhanced connection with others in the workplace. The outcomes of our study suggest that some types

of job resources (social companionship, work-life balance, satisfaction with communication) and personal resources (resilience, less perceived alienation) may have greater mitigating effects on worker loneliness.

Loneliness among workers contributes to job withdrawal
Furthermore, worker loneliness was significantly associated with increased job withdrawal outcomes. Lonely workers reported higher rates of absenteeism and turnover intention than those who were not lonely, even when considered in context of other demographic and occupational characteristics. This indicates that a lonely member of the workforce is more likely to be absent due to stress and more likely to think about leaving their current employment position. The findings support hypotheses H4 and H5 and corroborate much previous research on loneliness' adverse influence on employee engagement, performance and commitment (Jung *et al.*, 2021; Deniz, 2019; Ozcelik and Barsade, 2018; Wang *et al.*, 2018; Ayazlar and Güzel, 2014; Aykan, 2014).

Other occupational characteristics (job satisfaction, tenure and company size) performed as expected, with significant associations consistent with earlier research (Oslund, 2019; Smokrović *et al.*, 2019; Čikeš *et al.*, 2018; Swider *et al.*, 2011). Indeed, job satisfaction had a significant negative relationship with stress-related absenteeism and turnover intention, and was also the strongest predictor of turnover intention among all model variables (including worker loneliness). This supports previous studies showing that workers less satisfied with their jobs have increased absenteeism (Čikeš *et al.*, 2018; Steel *et al.*, 2002) and intention to quit (Smokrović *et al.*, 2019; Swider *et al.*, 2011).

Implications
Loneliness should be considered a serious risk to employee health and work engagement, and its influence on job withdrawal can also have financial implications for organizations. For instance, Table 5 shows the annual estimated costs to US employers from avoidable absenteeism due to loneliness as reported by survey participants. Loneliness has an estimated annual cost to employers of over $154B, accounting for approximately 5.7 additional days missed by lonely employees compared to those who are not lonely. Given this forecast of lost productivity, it is in the interest of employers to discontinue passively absorbing the secondary costs of loneliness and instead attend to the issue directly. Reducing the potential for worker loneliness could help manage stress-related absenteeism and recover sizable losses incurred by employers.

Employing organizations can mitigate worker loneliness by promoting the development of job and personal resources. Highly developed worker resources can motivate employee

Variable	Mean work days missed per year due to stress	Diff.	Cost[a]/ Employee[b]	Total annual costs of avoidable absenteeism
Loneliness among workers				
Lonely (score ≥43)	7.0 days	5.7 days	$1,590	$154,461,491,970.56
Not lonely (score <43)	1.3 days			

Note(s): [a]Productivity Cost per Day: 8-h work day X $278.16 [mean private industry compensation per US Bureau of Labor Statistics (BLS), 2019 Q3 data] (US BLS, Employer Costs for Employee Compensation, 2020). [b]Total number of employed persons in the US (as of July 2019) = 157,288,000 individual workers (US BLS, Current Population Survey, 2020)

Table 5.
Estimated costs of avoidable absenteeism from loneliness

performance and improve the health of the organization (Ozcelik and Barsade, 2018; Erdil and Ertosun, 2011). Worker training and learning curriculums should incorporate education that builds emotional, communicative and cultural intelligence skills, and providing positive organizational psychology exercises for generating constructive feelings and meaningfulness (Mayer, 2020). There are also a variety of different human resource and management techniques that can be implemented to evaluate loneliness and facilitate renewed opportunities for engagement, social belonging and team communication (Knight *et al.*, 2019; Shuffler *et al.*, 2011). Employers are increasingly using frequent short-form pulse surveys to detect real-time changes in worker well-being. Timely insights from internal survey data can be utilized to advance current human resource interventions targeting loneliness and social inclusion and augment decision-making processes, training operations and employee engagement efforts (Marr, 2018). Some employers are taking alternative approaches, like hiring ritual consultants and soul-centered advisors to devise behavioral conventions, group bonding practices and shared sensory experiences that promote connectedness within virtual work teams (Bowles, 2020). Employee-led resource groups are another popular method to bring together workers who share similar backgrounds to engender social cohesion and foster supportive relationships. Notwithstanding, the context of the work setting and organizational culture should guide the job and personal resource development techniques employers use to attend to loneliness in the workplace.

Employers must also account for how race or ethnicity, age, gender and their intersections influence the personal experiences of employees and their perceptions of social belonging in the workplace (Hawkley *et al.*, 2008; McKay *et al.*, 2007). The analysis found significant outcomes related to some respondent demographic characteristics, suggesting these differences may also play a role in shaping employee workplace loneliness and job withdrawal (Hawkley *et al.*, 2008; McKay *et al.*, 2007). Employers should take measures to proactively manage loneliness and other social health factors impacting worker populations. Investigating and addressing disparity in loneliness and job withdrawal outcomes based on specific employee groups can help to inform strategies for retaining diverse talent (Aldrich and Pullman, 2019; Hawkley *et al.*, 2008; McKay *et al.*, 2007).

Limitations
Selection bias is an inherent limitation of survey research. Participants recruited for the study voluntarily self-selected to become members of the iSay online survey panel group. It is unknown how response outcomes from these individuals might differ from the general population. Self-reported survey data are subjective, and we could not control for differences in the perceptions and interpretations of individual respondents. Analysis using cross-sectional design also puts limitations on assuming casual inference when interpreting results. In addition, this study reports on the short-term outcomes of loneliness among workers before the coronavirus (COVID-19) pandemic. Recent research has shown that overall rates of loneliness are not significantly different from levels measured before the onset of the pandemic (Luchetti *et al.*, 2020). Nevertheless, it may still be too early to tell how ongoing public health stressors and social distancing protocol could change work environments and the experience of loneliness for employees in the future.

Seven latent variable composite factors were developed to serve as proxy appraisal measures of worker job and personal resources. All constructed variables were created using individual questions contained in the survey instrument. Each of our composite measures achieved a Cronbach's alpha level greater than 0.7 (with the exception of work-life balance, $\alpha = 0.56$). Cronbach's alpha values above 0.7 are broadly considered indicative of satisfactory internal consistency among scale items. The alpha levels calculated for this study's composite variables are statistically acceptable for our purposes (Bonett and Wright, 2015), but these

measures have not been put through rigorous psychometric testing and should not be deployed in other studies without additional evaluation of reliability. Common methods bias is also a potential limitation of the study worth considering, as measures could be influenced by common rater effects (consistent response pattern), item characteristic effects (composite resource factors use the same scale formats) or measurement context effects (variables are measured at the same point in time and with the same survey) (Podsakoff *et al.*, 2003). Furthermore, the breadth of this study restricted the depth to which underlying environmental and personal factors could be explored in the analysis.

Conclusion

Worker job withdrawal behavior, such as avoidable absenteeism and voluntary unplanned separation, remains an issue for many organizations (Holtom *et al.*, 2008). Outcomes from this research show loneliness promotes job withdrawal among working adults in the US. Findings suggest that proactively developing job and personal resources may reduce loneliness and benefit employee psychosocial well-being, engagement and retention. Further studies are needed about the practical mechanisms and sustainability of existing employer-driven loneliness interventions and their usefulness for improving the physical and social health of workers and the overall business health of employing organizations. Qualitative investigations will also be essential to determine the efficacy of innovative strategies for decreasing loneliness and cultivating belonging at work, especially as applied to remotely networked teams and diverse worker groups. Successfully meeting the social health needs of employees will enhance the performance of the workforce, which, with time, can translate into measurable gains at the organizational level.

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Appendix 1

Composite factors with included survey items	Participants agreeing	
	#	% of Total
JOB RESOURCE: Social Companionship ($\alpha = 0.73$)		
I like meeting new people at work outside of my day-to-day interactions	4,406	74.30%
It is easy to meet new people at work	4,212	71.10%
I have similar worldviews and values as my colleagues and coworkers	4,145	69.90%
I have colleagues I like to eat lunch with at work	4,068	68.60%
I have a "best friend" or a very close friend at work	3,428	57.80%
I socialize and spend time with my colleagues and outside working hours	2,829	47.70%
JOB RESOURCE: Work-Life Balance ($\alpha = 0.56$)		
I believe I have a good work-life balance	4,553	76.80%
I am able to leave my work at work[a]	3,644	61.50%
My work life does not spill over into my personal life more than I would like[a]	3,431	57.90%
JOB RESOURCE: Satisfaction with Communication ($\alpha = 0.74$)		
In-person conversations or meetings	4,288	72.30%
Email messages	4,158	70.20%
Chat/ Messaging	4,106	69.30%
Social media posts or messages	4,068	68.60%
Phone calls or meetings (without video)	4,037	68.10%
Video calls or meetings	3,716	62.70%
JOB RESOURCE: Supportive Work Environment ($\alpha = 0.72$)		
My coworkers are supportive of me	4,979	84.00%
I have a good relationship with my manager	4,937	83.30%
My manager or supervisor is supportive of me	4,847	81.80%
Colleagues/managers make connections/introduce me to people I do not know	3,965	66.90%
JOB RESOURCE: Technology Enables Connection with Others ($\alpha = 0.76$)		
Workplace technology helps me feel more connected to my coworkers	3,587	60.50%
Workplace technology helps me establish meaningful connections to my coworkers	3,564	60.10%
PERSONAL RESOURCE: Resilience ($\alpha = 0.71$)		
There are people I can depend on to help me if I really need it	5,102	86.10%
I feel satisfied with the relationships I have at work	4,722	79.70%
I have close relationships that provide me with a sense of emotional security and well-being	4,660	78.60%
There are people at work who take the trouble to listen to me	4,524	76.30%
There is someone I can turn to for guidance in times of stress[a]	4,266	72.00%
I think other people respect my skills and abilities[a]	3,831	64.60%
PERSONAL RESOURCE: Less Perceived Alienation ($\alpha = 0.72$)		
There is someone at work I can share personal thoughts with if I want to[a]	4,481	75.60%
There is someone at work I can talk to about my day-to-day work problems if I need to	4,222	71.20%
My company's/organization's values align with my own[a]	4,013	67.70%
I have a manager that advocates for me[a]	3,948	66.60%
I feel part of a group of friends at work	3,824	64.50%
I do not need to hide my true self when I go to work[a]	3,636	61.40%

Note(s): [a]Reverse-coded format of original survey item. Participant count represents agreement with statement shown in table

Table A1.
Participant response frequency by composite factor survey item

Appendix 2

	MODEL 1 (OLS regression)				MODEL 2 (Linear probability regression)			
	Level 1 *Outcome*: Loneliness *(continuous)*		Level 2 *Outcome*: Days missed per mo. from stress		Level 1 *Outcome*: Loneliness *(continuous)*		Level 2 *Outcome*: Intention to turnover in next year	
Variable	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Loneliness *(continuous)*	–	–	0.02	0.000***	–	–	0.7%	0.000***
Job and personal resource factors								
Social companionship [JR]	−3.27	0.000***	−0.05	0.000***	−3.27	0.000***	−2.3%	0.000***
Good work-life balance [JR]	−0.93	0.000***	−0.01	0.000***	−0.93	0.000***	−0.7%	0.000***
Satisfied with communication [JR]	−0.33	0.054	−0.01	0.058	−0.33	0.054	−0.2%	0.062
Supportive work environment [JR]	0.20	0.275	0.00	0.276	0.20	0.275	0.1%	0.278
Technology enables connection [JR]	−0.53	0.005**	−0.01	0.006***	−0.53	0.005**	−0.4%	0.006**
Resilience [PR]	−7.01	0.000***	−0.11	0.000***	−7.01	0.000***	−5.0%	0.000***
Less perceived alienation [PR]	−2.85	0.000***	−0.04	0.000***	−2.85	0.000***	−2.0%	0.000***
Demographic characteristics								
Male	–	–	0.18	0.000***	–	–	7.0%	0.000***
Age	–	–	−0.01	0.000***	–	–	−0.8%	0.000***
White	–	–	−0.16	0.003**	–	–	−7.0%	0.000***
South region	–	–	0.04	0.412	–	–	0.1%	0.960
Occupational characteristics								
Hours worked per week	–	–	−0.01	0.001**	–	–	−0.1%	0.010*
Remote work arrangement	–	–	0.08	0.311	–	–	3.5%	0.138
Work for public company	–	–	−0.04	0.575	–	–	1.6%	0.472
Company with 1,000+ employees	–	–	0.05	0.400	–	–	4.1%	0.011*
5 years or more tenure	–	–	−0.05	0.325	–	–	−8.4%	0.000***
Job satisfaction rating	–	–	−0.22	0.007**	–	–	−36.2%	0.000***

Note(s): JR = Job Resource; PR=Personal Resource; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Table A2.
SEM regressions for stress-related absenteeism and turnover intention (loneliness as continuous variable)

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