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Supportive-Leadership Training to Improve Social Connection: A Cluster-Randomized Trial Demonstrating Efficacy in a High-Risk Occupational Context

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The high, and *still rising,* rate of loneliness is a threat to public health (Office of the Surgeon General, 2023), with negative mental and physical health consequences (e.g., Holt-Lunstad, 2021). Given that loneliness is a risk factor for poor mental health, efforts to address loneliness are urgently needed. Workplaces can facilitate an employee's social connection through supervisor support training, which can help mitigate loneliness. Among occupational groups, the military is at higher risk for mental health disorders, suicide, and loneliness (Fikretoglu et al., 2022; Naifeh et al., 2019). This study evaluated the efficacy of an evidence-based supportive-leadership training intervention targeting active-duty U.S. Army platoon leaders and targeting both proactive support behaviors that help bolster employee social connection and responsive support behaviors, including destigmatizing mental health. Ninety-nine platoon leaders (69.7% of eligible leaders) completed the 90-min training that consisted of both in-person and computer-based components. Using a cluster-randomized controlled trial design, intervention effects were tested using an intent-to-treat approach and revealed a significant effect, whereby loneliness of service members whose leaders were randomized to the intervention group ($N = 118$) was significantly reduced compared to loneliness reports for service members in the control group ($N = 158$). Additionally, service members with higher baseline loneliness were more strongly and positively impacted by the supervisor training, reporting higher levels of supportive behaviors from their leaders at 3 months postbaseline. In sum, these results suggest how workplaces, especially those that are considered high-risk occupations, and their leaders play a critical role in a national strategy to address Americans' well-being.

Keywords: leadership, training, military, loneliness, social connection

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The high and *still rising* rate of loneliness is a threat to public health, according to the Office of the Surgeon General (2023). Comparisons of loneliness prior to and following the onset of the pandemic indicate cause for concern, with a systematic review and meta-analysis demonstrating a "small but robust" increase in loneliness (Ernst et al., 2022). Loneliness is the subjective perception that an individual has inadequate social connection (Cacioppo et al., 2002) and is associated with hazardous alcohol consumption (Berkman et al., 2000) and suicidality (Department of Defense, 2021). Loneliness predicts early onset morbidity and disease susceptibility to an equal or greater extent than established health risks (e.g., smoking, cardiovascular disease, obesity; Holt-Lunstad, 2021; Holt-Lunstad et al., 2015) and is a risk factor for degraded psychological resilience (Cabrera et al., 2024), depression (Erzen & Çikrikci, 2018), and cognitive impairment (Luchetti et al., 2020). Conversely, social connection is a protective mechanism against the development of mental health disorders in the face of adversity (Britt et al., 2021). Effective interventions are needed to address loneliness as a public health concern. Indeed, the consequences of not addressing loneliness are costly given the association with such severe physical, cognitive, and mental health outcomes, including premature death (National Academies of Sciences and Engineering, 2020). Correspondingly, in his report, the Office of the Surgeon General (2023) called for a national multilevel (e.g., individual, workplace, community) strategy to build social connection. Social connection is described as an "umbrella term" representing three distinct categories of relationship factors including structure, function, and quality and is comprised of multiple facets including perceived or actual support and belonging needs (Holt-Lunstad, 2022). One critical function of one's social connections is to meet people's need to belong, which is considered a fundamental human motivation (Baumeister & Leary, 1995). This study aims to address the need for workplace interventions to increase social connection, thereby facilitating belonging in the workplace and reduced loneliness. In particular, interventions are needed that train supervisors in providing both proactive support behaviors that help bolster employee social connection resources, thereby protecting and promoting employee well-being, and empirically based responsive support behaviors to recognize and respond to employee mental health concerns (Hammer et al., 2024).

The Role of Workplaces in Loneliness Reduction

Work has been identified as a key social determinant of health, as it is an important social environment that can either promote or reduce health. Workplace social support contributes to improved employee well-being through increased social connection and decreased stress and is one of the key modifiable risk factors identified by workplace stress theories and researchers. More specifically, decades of research demonstrate that workplace risk factors, such as high demands, low control, and low support, are related to poor physical and psychological health of employees (Niedhammer et al., 2021), while protective factors, such as supervisor social support, are related to improvements in these outcomes (e.g., Bodner et al., 2014; Kossek et al., 2019). Thus, workplaces have an important role to play in addressing loneliness by bolstering social connection through supervisor support.

Given that most adults spend most of their waking hours at work, focusing on social support as a way to increase social connection *at work* is critical (Hammer et al., 2022; Office of the Surgeon General, 2023). Importantly and of relevance to the present study, levels of social connection and loneliness outside of the workplace can spillover to impact employee loneliness at work (Ozcelik & Barsade, 2018; Rothbard, 2001). Thus, whether an individual is experiencing workplace-specific loneliness or more general loneliness (i.e., private life loneliness), the impacts can be felt in the workplace; hence, the workplace can serve as a point of intervention to reduce loneliness. Further, given evidence that loneliness is contagious (J. T. Cacioppo et al., 2009; Ozcelik & Barsade, 2018), the presence of loneliness among members of a work unit is a concern (Wright, 2015), especially in workplace contexts in which group or unit functioning is critical (e.g., active-duty military; J. T. Cacioppo et al., 2016).

It is well-established that supervisors and leaders have influence on employee mental health and well-being (Arnold, 2017; Hammer et al., 2023; Inceoglu et al., 2018; Kelloway & Barling, 2010). We contribute to this literature by demonstrating the role that supervisors and leaders can play in reducing a mental health risk factor, namely employee loneliness, through increased social connection. In recent years, supportive-leadership trainings have shown their ability to harness resources derived from supervisor–employee relationships to bolster employee well-being (e.g., Dimoff et al., 2016; Hammer et al., 2021; Mohr et al., 2021; Stein et al., 2021). The focus on workplace

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social support is informed by the conservation of resources (COR) theory (Hobfoll, 1989; Hobfoll et al., 1990), wherein workplace support represents a valuable resource, which can bolster employee well-being, help promote further resource gain, and offset resource loss (e.g., Halbesleben et al., 2014).

As a workplace context, the military is a high-risk occupation that is particularly relevant to this inquiry, in that service members frequently relocate for domestic or international assignments and are typically separated from family during deployments (Army Public Health Center, 2022), leading to increased loneliness. Indeed, service members are at higher risk for loneliness than the general public (J. T. Cacioppo et al., 2016). Since 2008, U.S. military service members have experienced a much higher rate of suicide than the civilian population, leading to significant efforts to understand contributing risk and resilience factors (Naifeh et al., 2019), such as loneliness, low levels of belonging, and more generally, low levels of social connection (Naifeh et al., 2019). Because it can be viewed by some as connoting weakness, service members may be less likely to report or seek help when experiencing loneliness (J. T. Cacioppo et al., 2016). In the military organizational context, strong support from unit leaders is especially important to service member well-being, given evidence that unit leaders play a key role in creating a sense of community (Bowen & Martin, 2011) with downstream effects on service member mental health (Trachik et al., 2020). Existing loneliness intervention studies in nonelderly adults show promise for reducing loneliness by building social connection (Bessaha et al., 2020; Veronese et al., 2021). A handful of these studies have been conducted in a workplace context, specifically with military populations (Bessaha et al., 2020), most notably a large-scale resilience study in the U.S. Army (J. T. Cacioppo, Adler, et al., 2015). Yet, existing interventions tend to target the individual to reduce their own loneliness, rather than targeting leadership or supervisors to facilitate reduced loneliness among employees.

In the present study, we develop and evaluate the effectiveness of a supportive-leadership training intervention aimed at reducing employee loneliness and improving belongingness through a randomized controlled trial (RCT). We draw on social support theory (e.g., Bavik et al., 2020; Cohen & Wills, 1985) to train supervisors to enact proactive and responsive strategies, operationalized as emotional support strategies and destigmatizing strategies that support positive service member mental health and social connection (i.e., *Mental Health Supportive Supervisor Behaviors* [MHSSB]; Hammer et al., 2024). By focusing on developing leadership skills related to the provision of emotional support and specifically teaching supervisors to build more positive social relationships with employees to improve psychological health, we expect the intervention to have ameliorative effects on employee loneliness.

Loneliness and Social Connection

Social connection is considered a fundamental human psychological need according to multiple theoretical perspectives and across multiple disciplines (Baumeister & Leary, 1995; Deci, & Ryan, 2012). In the present study, we focus on the function of social connection, which includes the provision of social support and the signal of loneliness when social connection needs are not being met (Holt-Lunstad, 2022). Loneliness is a pervasive experience affecting most people at some point in time, and can fluctuate day-to-day and also arise in response to specific situational circumstances, such as major life transitions (e.g., military personnel and routine permanent change of station; Ribeiro et al., 2023). Preventing the transition from situational loneliness into more chronic and severe levels of loneliness is a critically important prevention strategy (Perlman & Peplau, 1981), in addition to intervening with those who are chronically lonely. Social connection is a protective factor against loneliness and its negative outcomes (Holt-Lunstad, 2021), as well as in preventing the transition of day-to-day loneliness to more chronic forms. A key affordance of social connection is the social support that it provides (Holt-Lunstad, 2022), theoretical models of which specify the influence of support on health and well-being outcomes (Bavik et al., 2020; Cohen & Wills, 1985). Specifically, social support is known to function as a *positivity catalyst*, building stronger social relationships through the social norm of reciprocity, contributing to the accumulation of resources, and helping to fulfill one's fundamental needs (Bavik et al., 2020). Social support also serves as a *negativity buffer*, helping to protect the individual against stress and strain (Bavik et al., 2020). Substantial empirical evidence and theory provides insight into effective support provision, which must be *responsive* to their needs (Collins & Feeney, 2000) in order to bolster the individual's well-being and other positive outcomes, leading them to feel understood, valued, and cared for (Maisel & Gable, 2009; McCabe et al., 2017). Further, effective support may be relatively subtle and, in some cases, be most impactful when it is indirect or invisible; support is beneficial when it is adequate to address the need without undermining self-efficacy (Pietromonaco & Collins, 2017).

Workplaces have the potential to improve well-being by cultivating a greater sense of social connection among employees (Cockshaw & Shochet, 2010; Huynh et al., 2014); building social support is a key mechanism by which social connection can be established. Workplace socially supportive connection can serve as a protective factor against traumatic experience on the job for those in high-risk occupations (Geuzinge et al., 2020). In a study of emergency services personnel, social connection at work was associated with lower distress and enhanced resilience (Shakespeare-Finch & Daley, 2017). Social connection is also an important mechanism by which resilience protects against mental health disorders among service members following military deployments (Britt et al., 2021).

Workplace relationships, especially those between a leader/supervisor/manager and their employees, provide the potential elements to satisfy social connection in offering a stable and enriching set of regular and ongoing social interactions, provided that they are not aversive (Reich & Hershcovis, 2011). In fact, workplace supervisors are particularly well-positioned to create a culture of support within an organization (Hammer & Perry, 2019; Mohr et al., 2021). Importantly, leaders also set the socioemotional tone for the group (Humphrey, 2002; Mohr et al., 2021). Thus, their support may be most helpful in enhancing socially supportive connection among service members.

Given our focus on social connection within a workplace context, we also examine a sense of belonging with fellow service members. In particular, we examine team or unit belonging, which entails seeing oneself as a group member (Bollen & Hoyle, 1990). Unit belonging is one dimension of team cohesion (the other dimension being morale; Chin et al., 1999). As a secondary social connection

outcome measure, belonging is related to but distinct from loneliness, reflecting the function or provision of resources afforded by social connections, whereas loneliness describes a perceived deficit in relationships (Holt-Lunstad, 2022).

Reducing Loneliness Through Leader Support: Theoretical Rationale

COR theory can help explain why leader support can reduce loneliness (or bolster belonging) as it posits that individuals are motivated to accumulate resources and protect against resource loss for those resources that are of value; as a social animal, humans must strive to accumulate and protect social bonds (Hobfoll et al., 2018). Alternately, resource loss (e.g., moving away from one's social network) is strongly related to loneliness (Egozi Farkash et al., 2022). The desire for social connection has long been recognized as a key motivation behind employees' desire to work (Wright & Silard, 2021). At the heart of promoting social connection is a focus on positive relationship building (Baumeister & Leary, 1995), including in the workplace (Reich & Hershcovis, 2011; Slemp et al., 2021; Waller, 2021), and in the context of COR, represents an opportunity for resource accumulation.

Social support is a fundamental provision of these workplace relationships (Cohen & Wills, 1985) and comprises a sense of empathy, trust, concern for the other, and behavior reflecting loyalty (Ferris et al., 2009). Existing meta-analytic evidence of effective loneliness interventions affirm the potential for social support to reduce loneliness (Masi et al., 2011; Veronese et al., 2021); however, these interventions directly target lonely individuals to reduce their *own* loneliness. In addition, prior research has shown that supervisor supportive training was especially effective in the context of low team cohesion, suggesting that such interventions may be especially beneficial for employees who perceive low levels of unit belongingness (Hammer, Truxillo, et al., 2019). The present study intervention trains leaders to be more supportive to build social connection among their service members and thereby reduce loneliness among service members. Consequently, our approach maximizes the potential impact of loneliness reduction by reaching many more individuals through workplace-based intervention and potentially facilitates an organizational culture high in social connection (Holt-Lunstad, 2022). Thus, social support theoretical models (Bavik et al., 2020; Cohen & Wills, 1985) as described above provide a framework for interventions aiming to improve workplace social connection. Specifically, social support builds positive social relationships, which helps the individual to accumulate resources to meet one's needs and also serves as a buffer against stress and negative experiences (Bavik et al., 2020). The focus of effective supportive-leadership training, then, is to cultivate empirically based, responsive support skills that supervisors can employ and the situational cues and awareness to understand how best to utilize those skills to meet the needs of their employees.

Accumulating research supports the value of providing supervisors with evidence-based tools designed to build employee social support resources through bolstering supervisor supportiveness (Hammer et al., 2011, 2021; Hammer, Truxillo, et al., 2019; Hammer, Wan, et al., 2019; Mohr et al., 2021). Of particular focus are employee populations experiencing significant stress or mental health challenges (Dimoff & Kelloway, 2019). This body of work provides the evidence base to effectively respond to the significant need for workplace interventions to promote employee well-being, including loneliness. From a social connection perspective, direct supervisors also have stable and ongoing interactions with employees that are necessary for building high-quality relationships, relationships that are optimally built on a foundation of caring, understanding, and validation (i.e., supervisor responsiveness; McCabe et al., 2017).

Mental Health Stigma and Loneliness

Loneliness, like mental health conditions, is a stigmatized condition associated with a variety of negative attributes (e.g., dislikeable, less attractive; Lau & Gruen, 1992). Stigma regarding mental health conditions falls into the category of concealed stigma, as it is not publicly apparent (Goffman, 1963). According to Goffman (1963, p. 11), concealed stigma regards "blemishes of individual character," which motivates the individual to carefully protect the information as it could discredit them. The employee concern is that revealing stigmatized mental health information could hinder perceptions of their employability (Stone et al., 2023). For those experiencing mental health challenges, stigma perpetuates loneliness and leads to a reluctance to engage in help-seeking or treatment-seeking behavior, which can further perpetuate feelings of loneliness (Oexle et al., 2018). In addition, loneliness is commonly reported among those seeking mental health services or psychiatric treatment (Lasgaard et al., 2016; Wang et al., 2020). Similarly, among individuals accessing psychological treatment for loneliness, symptoms of depression, general anxiety, or social anxiety are commonly reported (Käll et al., 2020). Loneliness is also prevalent—and a source of distress—among those seeking treatment for substance use disorders (Ingram et al., 2020).

Service members who have internalized stigma of mental health conditions are less likely to seek care, and those with mental health conditions are more likely to report fear of stigmatization (Greene-Shortridge et al., 2007). Service members who are lonely might be concerned about appearing weak (J. T. Cacioppo et al., 2016) and, thus, less likely to seek help. Research also shows that lonely individuals feel more shame, perceive greater public stigma associated with loneliness, and are more likely to conceal their feelings from coworkers (Barreto et al., 2022). Stigmatization of loneliness is stronger among young and male individuals (Barreto et al., 2022), who comprise the majority of active-duty service members. Thus, supervisor support can have a destigmatizing effect on service member mental health challenges, which can lead to or co-occur with loneliness by normalizing help seeking or accessing appropriate resources when needed (S. Cacioppo, Grippo, et al., 2015) and, more generally, by improving the culture of support for mental health (Hammer et al., 2024; Stone et al., 2023).

The Present Study

There is growing interest in loneliness in organizations and noted potential for organization-based loneliness interventions (Ozcelik & Barsade, 2018; Wright, 2015). Building on this promising literature and recent evidence for the efficacy of supportive-leadership training in boosting social well-being (Stein et al., 2021), we proposed to examine the efficacy of a workplace supervisor support intervention to reduce loneliness. To address the identified need for effective social support interventions, the present study included the

development of a 90-min hybrid (face-to-face and computer-based) supportive-leadership training program. To inform this intervention, we drew upon previous supportive-supervisor training interventions (e.g., Hammer et al., 2011; 2021) and mental health awareness training for managers (e.g., Dimoff et al., 2016; Dimoff & Kelloway, 2019) and the empirically and theoretically informed framework introduced for MHSSB (Hammer et al., 2024). These prior supportive-leadership trainings were developed to teach supervisors/leaders how to be supportive of their employees around issues of family support, support for reintegrating military service members into the civilian workplace, and support for mental health of employees. These trainings were evidence-based, evaluated in randomized controlled trials, with empirically demonstrated beneficial effects on both leaders and their followers/employees in terms of employee job and personal well-being and family functioning (Hammer et al., 2022), though this prior work has not examined their impact on belongingness or loneliness. We integrated modified forms of the supportive behaviors from these prior trainings to be oriented toward leader support for service member mental health.

MHSSB

The current intervention is based on modified content from these prior effective supervisor support interventions and prior effective manager mental health awareness interventions that were based on both proactive and responsive supportive behaviors (see Hammer et al., 2024, for framework). The MHSSB framework describes the integration of proactive and responsive behaviors. We suggest that targeting supervisor emotional support, a proactive behavior, may help to alleviate loneliness by communicating that the person is valued, cared for, and not alone (Shaw et al., 2021). Providing emotional support is a key component to building the high-quality relationships that underly social connection in the workplace (Holt-Lunstad, 2018).

We also recognize that employees vary with regard to their loneliness, wherein some employees may have greater social connection needs than others. An intervention that focuses on building social connection through enhanced social support may be particularly effective at reducing loneliness for those experiencing social connection deficits. This is consistent with previous supervisor support intervention research (Brady et al., 2021; Hammer, Wan, et al., 2019; Mohr et al., 2021), which revealed moderated intervention effects, such that those employees with greater needs at the time of baseline would benefit more from the intervention. Accordingly, for employees who are experiencing higher levels of loneliness, we anticipate that they may perceive additional emotional support relative to other employees from supervisors as a result of the training.

As with proactive behaviors, we predict that responsive behaviors will reduce loneliness. Supportive-leadership interventions also offer an opportunity to provide social connection to service members who need it but may be likely reluctant to seek it out. In particular, our training also focuses on the responsive behavior of destigmatizing mental health challenges and help seeking. Because of the significant stigma in workplaces, including the military, regarding mental health conditions often in conjunction with loneliness and help-seeking, it is critical for interventions to create a psychologically safe workplace environment in which employees feel safe to seek help when needed (Hammer et al., 2024). Further, because of the stigma associated with loneliness, those employees who are higher in loneliness may also be especially impacted by leaders employing destigmatizing behaviors that result from the intervention.

In sum, the purpose of the present study was to test, via a cluster-randomized controlled trial (cRCT), the efficacy of the supportive-leadership intervention targeting U.S. active-duty Army platoon leaders to increase their employee service members' social connection. We focused, in particular, on the outcome of loneliness as a powerful and painful signal that social connection needs are unmet (Holt-Lunstad, 2022). We hypothesized a main effect of the intervention on loneliness, such that employees of the leaders in the intervention groups would be expected to demonstrate benefits in terms of a reduction in loneliness resulting from the supportive-leadership training.

We also examined intervention effects for service members' sense of belonging within their unit. We posited that if the intervention is effective at building social connection this may be reflected in a greater self-reported perception of belonging within one's unit. That is, as a positivity enhancer, the resources received through the supportive-leadership training should increase norms in the unit for reciprocation and greater provision of support (Bavik et al., 2020) and may cross over into the larger work groups or units as a whole (Hobfoll et al., 2018; Westman, 2001). At the same time, to the extent that perceptions of lower unit belonging reflect a deficit in social connection, we anticipate that the intervention, in building social connections with leaders, could help ameliorate these unit-belonging deficits.

Further, we examine whether the intervention results in increased perceptions of leader emotional support and leader destigmatizing behaviors among service members whose leaders received the training. We focused on these particular dimensions because of the significant stigma associated with loneliness, as noted above, and the role of emotional support in positive relationship building, which underlies the increase in social connection and thus decrease in loneliness. We also hypothesized significant moderation effects, such that those with higher levels of loneliness at baseline will experience greater benefits from the intervention in terms of perceived leader emotional support and destigmatizing behaviors. This is because they demonstrate a higher need for social connection, as reflected in their higher loneliness scores, and a greater need for a workplace environment that is supportive of mental health and discourages stigma. We considered parallel moderation effects for unit belongingness.

Hypotheses 1 and 2: Relative to the control condition, service members of leaders in the supportive-leadership training condition of the cRCT will report (Hypothesis 1) lower levels of loneliness and (Hypothesis 2) higher levels of perceived unit belonging.

Hypothesis 3: Relative to the control condition, service members of leaders in the supportive-leadership training condition of the cRCT will report higher levels of (a) emotional support and (b) destigmatizing behaviors from supervisors.

Hypothesis 4: Service members' loneliness will moderate the effect of the supportive-leadership training intervention on service member outcomes 3 months postbaseline. Specifically, service members with higher baseline levels of loneliness will

be more strongly and positively impacted by the program, reporting (a) lower levels of loneliness, (b) higher levels of perceived supervisor emotional support, (c) higher levels of leader destigmatizing behaviors at 4 months postbaseline, and (d) higher levels of perceived unit belonging.

Hypothesis 5: Service members' perceived sense of unit belonging will moderate the effect of the supportive-leadership training intervention on service member outcomes 4 months postbaseline, with those service member with lower baseline levels of unit belonging in the intervention condition reporting (a) higher levels of unit belonging, (b) higher levels of emotional support, and (c) lower levels of loneliness at 3 months postbaseline.

Method

Overview

The cluster RCT design was used to empirically test the effectiveness of the leader training on service member social connection, compared to a usual practice control group; the intervention study design was preregistered at https://clinicaltrials.gov/ (ID: NCT04152824). All participants were active-duty service members in the U.S. Army located at a major military installation in the Western continental United States. The study ran from 2019 to 2022, with data collection and intervention activities happening primarily in 2020–2021, coinciding with the COVID-19 pandemic. We worked with senior army leadership on base to determine our target population, consisting of two combat brigades, and formed an advisory board to review training materials, provide the research team with contextual information, and advise on the best recruitment methods. A combat brigade is made up of multiple battalions (the latter being our unit of randomization, as described below), and each battalion is typically comprised of four to six companies with approximately 1,000 soldiers; about three to four platoons (our training intervention level) are combined into a company—about 200 soldiers (Department of Defense, n.d.).

Randomization occurred at the battalion level. The brigades are similarly structured, with similar units and subunits. We capitalized on this existing design to maximize comparability across the control and training intervention conditions. There was a total of 10 battalions in the final randomization (five treatment and five control battalions) balanced across the brigades; two other battalions were excluded because of extensive competing demands and field trainings. We targeted our supervisor support training to platoon leaders who are typically responsible for approximately 36 service members in a given platoon (Department of Defense, n.d.) and are the immediate supervisors in the chain of command for service members. In our study, the term "platoon leaders" refers to commissioned officers (50% lieutenants or captains), who are called platoon leaders in the army, and noncommissioned officers, typically platoon sergeants (e.g., E6–E7 paygrades); our trainee group was comprised of roughly 50% commissioned and 50% noncommissioned officers. As immediate supervisors, these platoon leaders serve an important gatekeeping role linking service members to military organizational leadership, facilitating access to programs, and implementing policies and practices (Mohr et al., 2021).

Survey Participants

Platoon leaders in intervention group battalions received or were offered training, while those in control group battalions did not. Service members from both intervention and control group battalions (N = ~5,000 service members) were eligible to participate in the electronic survey, administered via REDCap survey software, which was the primary evaluation tool of the intervention. Following institutional review board approval, unit leaders in treatment and control groups were instructed via an operations order to share with their service member an easy-to-remember URL for the secure online survey and an overview and frequently asked questions about the study; unit leaders did not know whether service members participated. All participants provided informed consent prior to data collection. Our goal was 1,580 completed surveys at baseline based on our power analyses. A total of 2,216 surveys were completed at baseline (i.e., 70% or more of questions answered); after excluding service members who were members of battalions that were not part of the study and those who self-identified as platoon leaders, who therefore would be potentially targeted for the intervention, the sample of eligible service members was 1890, approximately 37.8% of the estimated sample population. The allocation to intervention and survey-only control groups was evenly split with $N_I = 948$ (50.2%) and $N_c = 942$ (49.8%).

For the follow-up survey, administered January 2021, the response rate was much lower. This was likely due to changes that we were required to make to our data collection protocol due to the COVID-19 pandemic at the start of the study, such that our face-to-face recruitment and survey administration was changed to a remote, online survey administration. Further, we were not provided contact information to follow-up those who completed the baseline survey to ensure follow-up survey completion. Thus, many of the strategies typically employed to obtain optimal follow-up rates were not available to the research team in this study. In all, 813 surveys were completed at follow-up (16.3% of the estimated sample population of 5,000). We then matched surveys from both survey waves using names and units, with 299 service members having completed both surveys. We excluded 23 additional service members because they did not provide information about their battalion or company, both of which were necessary to account for nesting and clustering of units (see the Data Analysis section below). Thus, our sample for the current analysis was $N = 276$, (118 in the intervention group and 158 in the control group).[1] See the Consolidated Standards of Reporting Trials diagram for more information (Supplemental Figure 1). For each survey wave, we gave pizza parties to the top three participating platoons, but no other incentives were provided.

The analysis sample (N = 276) comprised 88.4% men, 8.3% women, with 3.6% not providing their sex. Respondents were, on average, 23.9 years old ($SD = 4.7$) and were asked to check all races/ethnicities that applied to them, with 30.4% selecting multiple.

[1] We conducted an analysis to explore the potential for bias due to attrition from baseline to the postintervention assessment periods and whether participants were systematically less (or more) likely to remain in the study as a function of condition and the other focal variables in the study. Specifically, we compared baseline levels of outcome variables predicting a dichotomous variable differentiating those in the analysis sample (1) from those who provided only baseline data (0; Goodman & Blum, 1996). Logistic regression analyses revealed no significant differences in completion status as a function of study outcome variables (ps range = .35 to .90).

A majority of the sample checked White (60.5%), followed by 23.5% Hispanic/Latinx, 13.8% Black, 6.5% Asian, 4.3% Hawaiian/Pacific Islander, and 3.9% Native American or Alaskan Native. Just over half finished their education thus far with high school (54.8%), with 28.5% having some college or technical schooling in progress, 13.3% having completed a college or technical degree, and 3% reported having a graduate degree completed or in progress.

Nearly half of the sample were single/never married (46.9%), and 38.4% indicated they were currently married, and about a quarter reported having one or more children (26.8%). Most service members lived on post (67.2%). Participants had been in the military for an average of 3.2 years ($SD = 3.0$). Average time in the current unit was 9.1 months ($SD = 4.6$). The most common military occupational specialty was infantry (58.7%), followed by field artillery (12.4%), armor/tanks (11.6%), medical (6.1%), and maintenance (4.5%).

Survey Measures

Online surveys were collected approximately 1 month prior to intervention activities and again approximately 4 months after baseline. The survey took approximately 20 min. Service members were told that they could skip any questions that made them uncomfortable, and no one at the base would see their answers.

Perceived Supervisor Emotional Support

The three-item Emotional Support subscale of the Leader Resilience Supportive Behaviors measure was adapted from Perry et al. (2018) and Hammer et al. (2009, 2013). Soldiers were asked to respond to statements regarding their platoon leader's effectiveness ("My platoon leader asks me how I am doing on a regular basis," "My platoon leader provides me with emotional support," and "My platoon leader shows genuine concern for my behavioral health") on a five-response Likert-type scale (1 = *strongly disagree*, 5 = *strongly agree*; $\alpha = .90_{T1}$ and $.94_{T2}$), where T1 and T2 stand for Time 1 (baseline) and Time 2 (4 months postbaseline), respectively.

Perceived Supervisor Destigmatizing Behavior

This two-item measure was developed by the third author and included, "My platoon leader normalizes help-seeking" and "In formation, my platoon leader emphasizes that Soldiers in need should seek support from behavioral health resources or MilitaryOne Source." Items were rated on a Likert-type scale (1 = *strongly disagree*, 5 = *strongly agree*; item correlations, $r = .83_{T1}$ and $.88_{T2}$).

Unit Belonging

The three-item Belonging subscale of the Team Cohesion Scale (Chin et al., 1999) was administered. Soldiers were asked to think of their platoon/unit in general when responding *strongly disagree* (1) to *strongly agree* (7). A sample item from the Belonging subscale was "I see myself as part of this group" ($\alpha_{T1,T2} = .98$).

Loneliness

We administered the three-item Brief Loneliness Scale (Hughes et al., 2004), for example, "How often do you feel left out?" ($\alpha = .89_{T1}$ and $.92_{T2}$). Items were rated on a 4-point Likert-type scale (1 = *never*, 4 = *always*) and summed (following scoring procedures used with the brief and revised Loneliness scales; Hughes et al., 2004; Russell et al., 1980) to create a composite score.

Procedure

Supportive-Leadership Training Intervention

The intervention comprised a 90-min in-person (on-base) training. The first 30 min of the training was in-person and introduced the platoon leaders to the concepts of mental health and resilience in the military, how the training related to other existing ongoing trainings, and the importance of leaders supporting service members in their platoon. The second 30 min involved a computer-based training on the proactive and responsive strategies, with interactive videos and scenarios to help engrain the concepts, practice the supportive strategies, and translate the concepts to real-life examples in the military. Leaders took the training during the session on iPads. Finally, the last 30 min of the training was in-person and immediately followed the computer-based training and reviewed the proactive and responsive strategies (Hammer et al., in press)

The training was based on six evidence-based proactive and responsive supportive strategies. *Proactive strategies* referred to behavior supportive strategies that promote and protect employee mental health. These behaviors can be taught to leaders to help them improve social connections with employees and are based on social support and COR theories (Bavik et al., 2020; Cohen & Wills, 1985; Hobfoll, 1989, 2001). These included: (1) *Emotional support* strategies involve showing empathy and understanding and demonstrating that leaders care about service member (SM) family and personal lives, (2) *Practical support* strategies involve leaders providing clear information and guidance on obtaining available behavioral health resources, and (3) *Role modeling* is where leaders learn to demonstrate to their SMs how they took care of themselves both psychologically and physically. *Responsive strategies* include behaviors that train supervisors to destigmatize mental health concerns, promote help seeking, and recognize and respond to employee concerns; (4) *Reducing stigma* involves setting the tone and increasing the psychological safety for SMs to seek help regarding mental health issues when needed by communicating that it is safe and healthy to seek help; (e) *Recognition of warning signs* teaches a leader about what to look for to know that an SM is struggling; and (f) *Taking action* teaches leaders to provide support to seek out and use the resources available to them through attending to, communicating, and touching base with SMs when they need help.

The second author led the in-person training on base in October, 2020, in groups no greater than 10 total, and followed COVID-19 safety protocol (e.g., masks, sanitizing, social distancing). The training targets were platoon leadership (PL) teams, which typically consist of a junior-level officer serving as the platoon leader (i.e., a second or first lieutenant) and a noncommissioned officer serving as the platoon sergeant (staff sergeant or sergeant first class). The number of eligible PLs was estimated to be 145 PLs by our battalion contacts. A total of 99 PLs attended the 18 scheduled sessions, which is 69.7% of the estimated eligible. We do not have the number of PLs in the control condition, but since battalions were comparable in size and composition, we expected the number would be similar. Participants also set up an account on the study website to receive reminders and complete follow-up activities over the subsequent 6 weeks (i.e., behavior tracking, podcasts, and videos). We created detailed scripts

and guides for the supervisor training to ensure fidelity to the content and to assist in the dissemination of the training for future use. The trainer completed a fidelity check following each training session to ensure that all critical elements of the training were covered.

We administered a brief pre- and posttest to assess learning and reactions to the training and obtained informed consent for use of any data collected from the training for evaluation and research purposes. As reported in Hammer et al. (in press), evidence was strongly supportive of supervisor learning, with a gain from pre- to postintervention knowledge yielding a Cohen's *d* of 1.56. Supervisor reactions to the training were very favorable.

Data Analysis

Training intervention effects were evaluated on the basis of an intent-to-treat approach (Hollis & Campbell, 1999), meaning service member outcomes were compared across units randomized to treatment (condition = 1) or control (condition = 0) conditions. A linear mixed-model approach was used to evaluate intervention effects while accounting for the nested nature of these data. Specifically, service members were nested within companies, and models included eight contrast variables to account for battalion-level differences in the two study conditions. Participants were provided with the opportunity to select their platoon number using options provided (e.g., Platoon 1, Platoon 2) on the survey or through a typed response. However, some responses were unable to be stratified due to incomplete unit identification at upper echelons (e.g., missing company) or unsortable typed responses. Together, these issues would have diminished the sample size and posed concerns around statistical power. Therefore, the decision was made to use company identification as the cluster variable while controlling for battalion effects through the use of eight contrasts (four contrasts per condition).

Baseline values of the dependent variable were controlled for in a two-level analysis of covariance modeling approach (Bodner & Bliese, 2018). Each model included all available data for each variable. Small variations in the sample size for each model reflected minor missingness among variables. All continuous predictors were grand-mean centered to aid interpretability; analyses were conducted in Mplus Version 8 (Muthén & Muthén, 2017) using full-information maximum likelihood to address missing data. To maximize statistical power, main and moderated effects were modeled and analyzed separately (Bodner & Bliese, 2018). Study data are available from the second author upon request; syntax is provided in the Supplemental Materials.

Results

Descriptive Statistics

Descriptive statistics of study variables are provided in Tables 1 and 2. Given the clustered nature of military organizational structure, intraclass correlations coefficients were examined to determine the degree of dependence observed, and participants were clustered across 36 companies. Outcome variable intraclass correlations coefficients ranged between .018 and .086 (M = .049). We also examined whether there were systematic differences between the control and intervention condition at baseline in terms of demographics that could potentially bias the test of the intervention effect due to these preexisting differences. There were no significant differences between intervention and control conditions in terms of marital status, race, number of children, military rank, and age. We did find differences for military tenure (in years) and educational status (both of which were higher in the intervention vs. control condition). However, in multilevel models, which accounted for clustering by unit, these differences (which appear to reflect differences between units) were no longer significant. Women had a greater likelihood of being in the treatment versus control condition (n = 16 or 63.6% vs. n = 8 or 36.4%, respectively). Conversely, men were disproportionately represented in the control condition (59% vs. 41%), $X^2(1, 266) = 4.229$, $p < .05$. Including gender in our statistical analysis did not alter the key study findings regarding the intervention; therefore, statistical models without gender were retained.[2]

Multilevel confirmatory factor analysis (accounting for nested data) affirmed the distinctiveness of the baseline emotional support and baseline destigmatizing behavior-perceived supervisor variables, despite the large intercorrelations (rs = .84 and .85), wherein the two-factor model demonstrated superior fit (root-mean-square error of approximation [RMSEA] = 0.080; 90%, confidence interval, CI [0.025, 0.138]; comparative fit index [CFI] = 0.989; standardized root-mean-square residual [SRMR] = 0.013) to the single-factor model (RMSEA = 0.117, 90% CI [0.072, 0.166], CFI = 0.970, SRMR = 0.024), according to the Satorra–Bentler scaled chi-square difference test for maximum likelihood parameter estimates with standard errors (TRd = 7.52, $df = 1$, $p < .01$; Satorra, 2000; Satorra & Bentler, 2010). Further, we considered the empirical distinguishability of all four of the measured constructs, including loneliness and unit belonging in addition to the perceived supervisor variables. The three-factor model (which combined the emotional support and destigmatizing behavior) demonstrated significantly worse fit (RMSEA = 0.068, 90% CI [0.050, 0.086], CFI = 0.974, SRMR = 0.034) relative to the four-factor model (RMSEA = 0.055, 90% CI [0.034, 0.075], CFI = 0.984, SRMR = 0.032), based on the Satorra–Bentler scaled chi-square difference test for maximum likelihood parameter estimates with standard errors (TRd = 15.44, $df = 3$, $p <$ .001). Thus, the four individual constructs were treated as distinct.

Testing of Intervention Effects

Hypothesis 1 asserted that service members of leaders in the training condition would report lower levels of loneliness at 4 months postbaseline relative to service members in the control group. As shown in Table 3, Hypothesis 1 was supported in that a significant main effect of the intervention was found for service member loneliness at T2 ($b = -.46$, $SE = .23$, $p < .05$, $\beta = -.31$, pseudo $\Delta R^2 <$ .01, $d = -.21$). There was not a significant main effect of the intervention on service member-perceived unit belonging at T2; thus, Hypothesis 2 was not confirmed.

Hypothesis 3 predicted that service members of leaders in the training condition would report higher levels of perceived emotional support from supervisors and higher levels of destigmatizing behaviors from supervisors at 4 months postbaseline relative to

[2] We compared baseline loneliness scores between service members who self-identified as men ($M = 6.52$, $SD = 2.61$) and those identifying as women ($M = 5.68$, $SD = 2.50$) finding no significant differences, $t(262) = 1.439$, $p = .151$, $d = .32$. However, we caution that such tests are underpowered because of the unbalanced group sizes (244 men vs. 22 women; Rusticus & Lovato, 2014).

Table 1
Descriptive Statistics for Variables at Baseline and Follow-Up by Condition

	Control condition		Training condition	
	T1	T2	T1	T2
Variable	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Loneliness (range = 3–12)	6.45 (2.58)	6.53 (2.74)	6.44 (2.64)	6.21 (2.62)
Unit belonging (range = 1–7)	5.55 (1.70)	5.36 (1.81)	5.49 (1.69)	5.69 (1.60)
Emotional support (range = 1–5)	4.01 (.97)	3.90 (1.06)	3.88 (.91)	4.00 (.92)
Destigmatizing behavior (range = 1–5)	4.10 (.98)	3.94 (1.03)	3.93 (.88)	4.03 (.86)

Note. Follow-up data were collected 3 months after baseline. Control $N = 158$; Training $N = 118$. T1 = Baseline; T2 = Wave 2 at 4 months postbaseline.

control group service members. As revealed in Table 3, there was no significant main effect of the intervention on perceived supervisor emotional support or destigmatizing behaviors at T2; consequently, Hypothesis 3 was not affirmed. As a supplemental analysis, we examined the potential for indirect effects of the intervention on loneliness through perceived supervisor emotional support and destigmatizing behaviors; however, we did not find evidence in support of mediation.

Hypothesis 4 posited that loneliness would moderate the effect of the training intervention on service member outcomes at T2; the hypothesis was supported for some outcomes. To examine whether baseline levels of loneliness (T1) moderated the relationship between the intervention condition and outcomes at T2, both predictors and an interaction term were entered into a simultaneous multilevel regression model. The interaction between the intervention condition and T1 loneliness was significant for perceived supervisor emotional support ($b = .07$, $SE = .03$, $p < .05$, $\beta = .10$, pseudo $\Delta R^2 = .01$), indicating that the intervention effect depended on levels of T1 loneliness (see Table 4). Similarly, the hypothesized moderation effect of intervention and T1 loneliness on perceived supervisor destigmatizing behavior was significant ($b = .09$, $SE = .03$, $p < .01$, $\beta = .13$, pseudo $\Delta R^2 = .02$). We explored the interactions in two ways. First, we generated conditional effects graphs depicting the intervention effect on the outcome for each level of the moderator variable (i.e., baseline loneliness; Bodner, 2017). The form of the interaction is similar for emotional support and destigmatizing behavior (Figure 1a and 1b, respectively). The simple slope of the intervention crosses over to positive at baseline loneliness values of about 5.5 in both figures.

We also examined inferential tests of the simple effects, which revealed that the intervention effect on perceived supervisor emotional support at T2 was significantly positive at 1 *SD* above the baseline loneliness mean ($B = .73$, $SE = .33$, $p = .027$) but not significant at 1 *SD* below the baseline loneliness mean ($B = .31$, $SE = .16$, $p = .059$). Similarly, the intervention effect on perceived supervisor destigmatizing behaviors at T2 was significantly positive at 1 *SD* above the baseline loneliness mean ($B = .72$, $SE = .32$, $p = .025$) but not significant at 1 *SD* below the baseline loneliness mean ($B = .25$, $SE = .17$, $p = .136$). No other moderation effects were statistically significant.

Given these significant moderation effects, in a post hoc analysis, we considered whether baseline loneliness moderated the proposed intervention effect on loneliness via emotional support or destigmatizing behavior. Specifically, we conducted a Stage 1 moderated mediation analysis (comparable to PROCESS Model 7; Hayes, 2015). These tests were not significant: $ab = 0.014$, $SE = 0.057$, 95% CI [−0.115, 0.227] for emotional support and $ab = -0.003$, $SE = 0.024$, 95% CI [−0.085, 0.056] for destigmatizing behavior.

In Hypothesis 5, we predicted that T1 unit belonging would moderate the effect of the training intervention on service member outcomes at 4 months postbaseline. As shown in Table 5, the interaction term between intervention condition and T1 unit belonging and loneliness at 4 months was not statistically significant ($b = .24$, $SE = .15$, $p = .099$, $\beta = .08$, pseudo $\Delta R^2 < .01$). Likewise, the intervention was not significantly predictive of perceived supervisor emotional support ($b = -.14$, $SE = .08$, $p = .09$, $\beta = -.12$, pseudo $\Delta R^2 = .01$) or perceived supervisor

Table 2
Descriptive Statistics and Bivariate Correlations Among Study Variables

Variable	*M*	*SD*	1	2	3	4	5	6	7	8
1. Loneliness (T1)	6.44	2.60	—							
2. Loneliness (T2)	6.39	2.69	.58**	—						
3. Unit belong (T1)	5.53	1.69	−.36**	−.24**	—					
4. Unit belong (T2)	5.50	1.73	−.33**	−.36**	.45**	—				
5. Emotional support (T1)	3.95	0.95	−.22**	−.11	.58**	.29**	—			
6. Emotional support (T2)	3.94	1.00	−.24**	−.24**	.31**	.68**	.38**	—		
7. Destigmatizing (T1)	4.03	0.94	−.18**	−.15*	.57**	.31**	.84**	.34**	—	
8. Destigmatizing (T2)	3.98	0.96	−.26**	−.22**	.26**	.65**	.32**	.85**	.32**	—

Note. *N*s vary from 265 to 275. T1 = Baseline; T2 = Wave 2 at 4 months postbaseline.
* $p < .05$. ** $p < .01$.

Table 3
Model Results of Intervention Effects on Loneliness and Unit Belonging at Time 2

DV Variable	Loneliness		Unit belonging		Supervisor emotional support		Supervisor destigmatizing Behavior	
	Est.	*SE*	Est.	*SE*	Est.	*SE*	Est.	*SE*
Intercept	6.68***	.11	5.55***	.16	4.01***	.07	4.14***	.06
Baseline of DV	.60***	.05	.46***	.09	.40***	.06	.37***	.06
Intervention	−.46*	.23	−.01	.18	−.05	.08	−.06	.10
Residual variance	4.67***	.51	2.28***	.25	.84***	.10	.71***	.12
Intercept variance	.01	.04	.01	.12	.01	.11	.01	.04
Total model R^2	.35		.23		.14		.13	

Note. Models included eight contrast variables to account for battalion-level differences in the two study conditions. All estimates listed represent unstandardized values. For the intervention variable, 1 = *intervention condition* and 0 = *control condition*. Intercept variances represent variability in the outcome variables due to the clustering of employees in the randomized battalion and company. All continuous predictors are grand-mean centered. *N*s = 265–270. DV = dependent variable; Est. = estimates; *SE* = standard error.
* $p < .05$. ** $p < .01$. *** $p < .001$.

destigmatizing behavior ($b = -.09$, $SE = .05$, $p = .07$, $\beta = -.08$, pseudo $\Delta R^2 = .015$) at 4 months for those service members with lower T1 unit belongingness. Thus, Hypothesis 5 was not confirmed.

Discussion

The purpose of the present study was to develop and evaluate the effectiveness of a supportive-leadership training intervention aimed at fostering employee social connection to reduce loneliness and improve belonging with fellow service members through an RCT. We drew on social support theory (e.g., Bavik et al., 2020; Cohen & Wills, 1985) to train supervisors to enact proactive and responsive strategies, operationalized as emotional support strategies and destigmatizing strategies that support positive service member mental health and social connection (i.e., MHSSB; Hammer et al., 2024). Building on recent evidence documenting the benefits of supportive-leadership trainings on social well-being (Stein et al., 2021), the present study demonstrated a significant reduction in employee loneliness as a function of a workplace supervisor intervention. Thus, this study affirms the importance of the workplace as an appropriate and effective context for reducing employee loneliness by targeting supervisor/leader social support. That is, organizations are a social determinant of health and arguably have an obligation to play a role in helping to alleviate such loneliness, given that such organizations can cause, exacerbate, or perpetuate employee loneliness (Wright, 2015). Indeed, workplaces have been called upon to build social connection as part of a national public health campaign to reduce loneliness (Holt-Lunstad, 2022). This can be done through supervisor support training (Hammer et al., 2022, 2024). Our study highlights the value of focusing on the role of workplaces in improving well-being by cultivating greater social connection (Cockshaw & Shochet, 2010; Huynh et al., 2014).

The timing of this research is critical as loneliness has been on the rise, even prior to the COVID-19 pandemic (Office of the Surgeon General, 2023). In light of the negative mental and physical health consequences associated with loneliness (Holt-Lunstad, 2021; Holt-Lunstad et al., 2015), efforts to address this growing public health crisis are urgently needed. Loneliness is a significant risk factor for depression (Erzen & Çikrikci, 2018) and cognitive impairment (Luchetti et al., 2020). High costs of loneliness to the workplace have also been documented directly in terms of lost productivity (Ozcelik & Barsade, 2018).

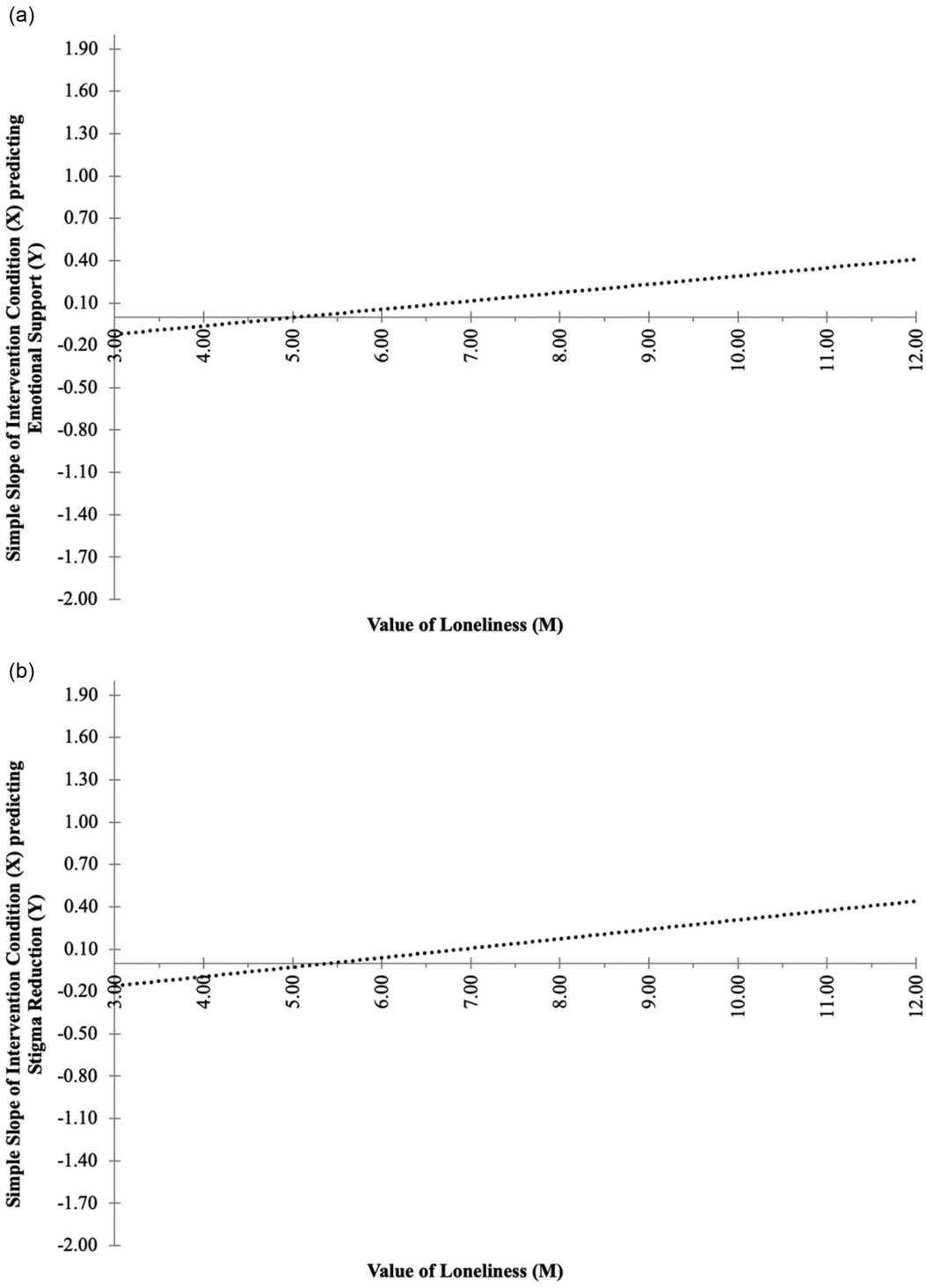
Table 4
Model Results of Intervention Effects on T2 Outcomes as Moderated by T1 Loneliness

Variable	DV: loneliness		DV: unit belonging		DV: supervisor emotional		DV: supervisor destigmatizing	
	Est.	*SE*	Est.	*SE*	Est.	*SE*	Est.	*SE*
Intercept	6.42***	.10	5.55***	.13	4.02***	.07	4.14***	.05
T1 of DV	.59***	.05	.39***	.09	.36***	.06	.29***	.06
Intervention	−.48*	.23	−.04	.17	−.05	.10	−.13	.13
T1 loneliness			−.13***	.03	−.05**	.02	−.06***	.02
Intervention × T1 loneliness	−.08	.10	.05	.06	.07*	.03	.09**	.03
Residual variance	4.66***	.52	2.17***	.25	.81***	.11	.73***	.11
Intercept variance	.01	.04	.01	.08	.00	.10	.00	.07
Total model R^2	.35		.27		.19		.21	

Note. T2 = Wave 2 at 4 months postbaseline; T1 = baseline; DV = dependent variable; Est. = estimates; *SE* = standard error.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Figure 1

Conditional Effects Plot Depicting the Simple Effect of the Intervention on Emotional Support (a) and Destigmatizing Behavior (b) at Increasing Levels of Baseline Loneliness



This study also represents a significant contribution to the literature on loneliness interventions, which have largely been focused on older adults or the elderly (Poscia et al., 2018). Recent systematic efforts to evaluate the efficacy of loneliness interventions among nonelderly adults have shown promising results (Bessaha et al., 2020). Interventions that target an individual's social connection (in addition to those targeting maladaptive social cognitions) are effective at reducing loneliness (Veronese et al., 2021). This

Table 5
Model Results of Intervention Effects on T2 Outcomes as Moderated by Baseline Unit Belonging (UB)

Variable	DV: loneliness		DV: unit belonging		DV: supervisor emotional Support		DV: supervisor destigmatizing Behavior	
	Est.	*SE*	Est.	*SE*	Est.	*SE*	Est.	*SE*
Intercept	6.44***	.09	5.55***	.14	4.01***	.07	4.137***	.06
T1 of DV	.57***	.06	.44***	.08	.31***	.07	.26**	.09
Intervention	−.56**	.21	.03	.17	−.00	.08	−.10	.12
T1 UB	−.04	.05			.06*	.03	.04	.04
Intervention × T1 UB	.24†	.15	−.16	.16	−.14†	.08	−.09†	.05
Residual variance	4.62***	.50	2.26***	.26	.82***	.11	.76***	.11
Intercept variance	.01	.05	.01	.08	.00	.12	.00	.03
Total model R^2	.36		.24		.18		.17	

Note. T2 = Wave 2 at 4 months postbaseline; DV = dependent variable; Est. = estimates; *SE* = standard error; T1 = baseline.
† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

includes the resilience training RCT conducted with the U.S. Army, wherein soldiers in the training condition who learned in part about the importance of and strategies for building social connection experienced reduced loneliness compared with the control condition soldiers (J. T. Cacioppo, Adler, et al., 2015). However, the interventions in these studies target an individual's own loneliness, as opposed to the supportive behaviors of those in an individual's social network. Our study makes an important contribution to the literature by demonstrating the effectiveness of targeting supervisors or leaders, as opposed to individual employees or soldiers, to reduce employee (or soldier) loneliness, thus taking an organizational approach, as opposed to an individual approach to reducing loneliness. Moreover, this study design is distinct from other research studies in that we are not recruiting lonely individuals for an intervention. Consequently, our approach may help overcome any self-selection bias present in loneliness intervention studies given the stigma that might prevent individuals from seeking help (Lau & Gruen, 1992). Not only does it afford support for those who are experiencing loneliness (without requiring them to seek out interventions), but it also helps facilitate an organizational culture high in social connection that benefits all employees (Holt-Lunstad, 2022).

Our study also provides tentative evidence that supervisor support interventions may be particularly beneficial for those who report higher initial levels of loneliness. Specifically, among those higher in loneliness at baseline, exposure to the intervention reduced loneliness and increased perceptions of emotional support and destigmatizing behaviors from supervisors. This finding is consistent with theory that social support provision may be most beneficial to those who are experiencing low social connection from their coworkers or work group (military unit in this study), in line with the negativity buffer role of social support (Bavik et al., 2020).

Despite these moderated relationships predicting emotional support and destigmatizing behaviors from supervisors, we did not find direct effects of the intervention on these outcomes, nor did we find evidence for mediation of these outcomes in predicting the loneliness effect. Moreover, our post hoc examination of moderated mediation, which might point to different mechanisms for service members with higher versus lower levels of loneliness, did not yield significant effects. Previous research with supportive-leadership interventions has produced mixed evidence of mediation (Brady et al., 2021; Hammer et al., 2021). The absence of mediational effects in the present and similar studies may be an indication that perceptions of support are not necessary for the supportive-leadership intervention to have positive effects on service member or employee outcomes. A substantial body of evidence regarding social support has shown that it is not necessary for the recipient to perceive support to have effect, and indeed, perceiving support sometimes has the opposite effect (e.g., Bolger & Amarel, 2007; Bolger et al., 2000; Pietromonaco & Collins, 2017). In particular, visible support (observed by the recipient in the context of a stressful experience) can undermine one's sense of self-efficacy or draw attention to their ineffectual coping (Bolger & Amarel, 2007). In addition, studies have shown that invisible support, occurring outside of the recipient's awareness or sufficiently subtle as to not come across as "support", can have the theorized positive benefits (Bolger et al., 2000). We encourage future research on these issues, including the link between supervisor behaviors and employee appraisals, which has not been well-studied (Heaney, 2011).

Interestingly, intervention main and moderating effects were not significant for unit belongingness. That the intervention significantly influenced loneliness, but not unit belongingness, demonstrates the distinction between these two constructs. These disparate findings echo emotion and social relationships research and theory, which characterize positive and negative relationships processes as independent (Reis & Gable, 2003). That is, loneliness is an emotionally distressing experience, regardless of the domain in which it occurs (private life or at work), and the supportive-leadership intervention may have produced effects through the stress- or negativity-buffering role of social support (Bavik et al., 2020; Cohen & Wills, 1985). On the other hand, the unit-belonging measure used in the present study is adapted from a subscale from the Team Cohesion Scale (Chin et al., 1999) and reflects participants' appraisal or perception of their relationship to the group (in this case, their military unit; Bollen & Hoyle, 1990).

Given the central role of peer relationships in unit cohesion, it may be that, as part of a broader cohesion-building intervention, cultivating stronger unit belonging may inherently involve building stronger ties among group members (Gesell et al., 2016). Although strengthening peer (coworker) support is undoubtedly valuable in workplace contexts, we articulated a number of reasons why targeting leaders was an important primary target. Workplace leaders or

supervisors offer a potentially stable and enriching set of regular and ongoing social interactions, which can bolster social connection, as long as they are not aversive (Reich & Hershcovis, 2011). Further, workplace supervisors are well-positioned to create a culture of support within an organization (Hammer & Perry, 2019; Mohr et al., 2021).

That said, it may be the case that our intervention did not produce significant effects on unit belongingness, because the training did not address strategies for providing support at the group level. Whereas the training is focused on supporting individual well-being, as with other workplace/organizational interventions, it is expected to affect all individuals that one supervises, as opposed to only some individuals. Unfortunately, we do not have data to specifically assess whether the behavior change was at the individual dyad level or the overall group level. We encourage further research efforts to examine the role of supervisor support in reducing loneliness and building greater belonging among employees and their workgroups, particularly among those experiencing greater disconnection, and how supportive leadership can improve employee mental health (Hammer et al., 2022).

Strengths and Limitations

The timing of the survey, during the midst of the COVID-19 pandemic, represents a significant limitation to the present study in that it hindered recruitment of leaders (for training) and recruitment and retention of service members for the evaluation. Our study was completed before widespread availability of the vaccination and thus occurred during a time of relatively high fatality and symptom severity of COVID-19. Given the ongoing crisis, troops were also being deployed for unique missions (e.g., supporting health care centers, conducting lockdown patrol; Gibson-Fall, 2021). Deployments to fight fires also impacted our study data collection. In addition, we had planned to collect survey data in person, but due to COVID-19 restrictions, we had to rely on the more impersonal remote website data collection process. As noted above, our recruitment and retention protocols were hindered, and we were not provided contact information to facilitate follow-up survey completion. Yet, the timing also presents an opportunity to evaluate the intervention during a period of great difficulty. Among the many challenges faced during the pandemic, the contagious nature of COVID-19 meant that people were more socially isolated from their social networks and social distancing was required, including on military bases (Dunleavy, 2020). The leaders who participated had an immediate opportunity to engage and enact training strategies to provide support to service members.

Although our results are promising in terms of the observed intervention effects on loneliness, we cannot rule out the possibility that the intervention changed how service members conceptualized study constructs. Ideally, we would conduct measurement invariance analyses with our longitudinal data (Somaraju et al., 2022). The clustered nature of the data, with service members nested within battalions, adds complexity to the statistical approach for analyzing measurement invariance, and results in a multiple group–multilevel structure. Unfortunately, there are no clear guidelines on data requirements and procedures for conducting such a test. However, given the (relatively small) number of groups and number of observations within groups in our overtime data, we had significant concern about the power to reject the null hypothesis that the measures are similar. Because we did not want to falsely claim that there were no differences in the measurement, we did not conduct these analyses in this study. We encourage future research with more appropriate samples to explore measurement invariance as a function of supervisor interventions and loneliness.

The present study employed a well-validated general measure of loneliness as an outcome measure. Importantly, we adopted a unidimensional approach to measuring loneliness, as validated in previous research (Russell et al., 1984), which considers that loneliness results from a deficit across a "wide variety of social relationships and can have varied consequences" (Firoz et al., 2020, p. 7). Future work should consider the impact of supervisor support on distinct dimensions of loneliness (e.g., social, emotional), which could help extend our understanding of how workplace interventions impact distinct experiences of loneliness versus the emotional experience more generally. Relatedly, we did not measure workplace loneliness (i.e., the experience of perceived inadequacy in one's workplace relationships; Wright & Silard, 2021). Thus, there is a potential mismatch in measurement between the target and criterion, in which case our test for intervention effects would be conservative. Yet, because of the nature of military service and centrality of service members to one's social network (e.g., Wilson et al., 2018), in which the military is not just a job but rather a lifestyle, sense of identity, and purpose (Hammond, 2019), it is likely that there is less differentiation between workplace and general loneliness in this sample. Further, given evidence that loneliness (generally speaking) is contagious (J. T. Cacioppo et al., 2009), its presence among employees threatens workplace functioning, whether it is workplace-specific or not.

The demographics of our sample closely resembled that of other studies that drew on similar (combat) army units (Adler et al., 2011; J. T. Cacioppo et al., 2016; Gunia et al., 2021) with regard to age, gender, race, education, and marital status. However, our sample had markedly less combat exposure, which is unsurprising given the peace-time focus of the sampling window relative to previous eras (e.g., Operation Enduring Freedom/Operation Iraqi Freedom). Moreover, our sample demographics were similar to official demographics reported by the Department of Defense but were comprised of slightly more males (91.7% vs. 85%), which could be due to our study focus on combat brigades. Participants were more likely to be married relative to other enlisted (e1–e4) service members (38.4% vs. 29.5% nationally and 36.5% in Washington State; Military One Source, 2022). They were also more likely to have one or more children (26.8% vs. 20.3% of e1–e4 service members in Washington State). Thus, our sample may be limited in the extent to which it generalizes to the larger military population, particularly in terms of female service members and those who were single and without children.

We also acknowledge that our sample of active-duty army service members may not be representative of the civilian employee population. Unique to this profession are several occupational risks (i.e., combat) that cannot be avoided and present unique risks to service members (Adler & Castro, 2013). The hierarchical nature of the military is also distinctive; the unit leaders, targeted by our training, play a particularly important support role for service members, having an outsized effect on military family functioning and the perception of community support for service member families (Bowen & Martin, 2011). At the same time, military occupations share similarities to civilian high-risk occupations

(e.g., firefighters, police officers) in the potential exposure to trauma and the extent to which being embedded in a supportive social workplace environment is protective against negative effects of trauma (Geuzinge et al., 2020). Given the universal nature of social connection needs (Baumeister & Leary, 1995) and diversity of research across disciplines validating key social support provisions (Bavik et al., 2020; Cohen & Wills, 1985), we are optimistic that this intervention approach will translate to other workplace and employee contexts.

Although the research team administered the training to nearly 70% of the possible platoon leaders, this also means that approximately 30% of the platoon leaders *did not* receive the training. Consequently, our estimate of treatment effects using the intent-to-treat approach is likely conservative in that service members with untrained platoon leaders were included in the intervention condition. A fuller understanding of supervisor support training effects on loneliness can be gained by including leader data. We encourage future work that examines leader–soldier matching and explores the extent to which changes in leader variables mediate the relationship between the intervention and soldier outcomes. Yet, it is important to establish these findings with the intent-to-treat approach, not only as the gold standard for RCT assessment but also because we are aiming for culture change with our intervention approach. That is, we would posit that the cultivation of resources that result from supportive-leadership training may cross over into the larger work groups or units as a whole (Hobfoll et al., 2018; Westman, 2001).

We encourage research that examines supportive leadership and loneliness from a leader perspective. Future work on supervisors should consider the impact of leader support interventions on leader loneliness. In addition, the supportive-leadership training has the potential to impose additional responsibilities on supervisors, resulting in an increased burden and resource drain (Hobfoll, 1989, 2001). Yet, supporting one's employees may be one mechanism by which managers derive meaningfulness in their work (Silard & Wright, 2022). Further, leader support interventions may have positive benefits for leaders themselves, given that leaders may be vulnerable themselves to loneliness due to functional distance from subordinates (Gabriel et al., 2021), especially in a hierarchical organization like the military. Yet, different contributing factors may lead to leader loneliness compared to subordinate loneliness (Silard & Wright, 2022), which may suggest the need for different approaches to address loneliness for leaders.

Conclusion

More Americans than ever are expecting their employers to show concern for their mental health (American Psychological Association, 2022). The peri-pandemic period is one of ever-greater need when it comes to social disconnection and loneliness. The time is ripe for workplace leadership to cultivate supportive practices that are both proactive in facilitating social connection and responsive to employee mental health needs, ultimately bolstering employees' well-being. The present study demonstrates efficacy of a theoretically informed workplace supportive-leadership training to reduce employee loneliness. These outcomes are beneficial for both the service member (employee) and the organization, thereby representing a win–win organizational strategy based on supportive-leadership training. More broadly, these results suggest how workplaces and their leaders play a critical role in addressing Americans' well-being.

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