

Awareness and Commitment Training for Workers with Chronic Demands:

Taking ACTION towards Improved Sleep and Wellbeing

By  
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## Abstract

Awareness and Commitment Training for Workers with Chronic Demands:  
Taking ACTION towards Improved Sleep and Wellbeing

By Meredith M Ivany

Sleep is critical for functioning and wellbeing, but many workers struggle with sleep because of chronic demands (e.g., health problems, caregiving, or shift work; e.g., Bohle, 2016). This project had three objectives: 1) to investigate the relationships among chronic demands, sleep, and wellbeing; 2) to evaluate the efficacy of a phone-based coaching program called Awareness & Commitment Training in Organizational Networks (ACTION) to improve wellbeing; and 3) to determine whether ACTION, a general (i.e., not sleep-specific) program, can improve sleep. Mental health concerns were more strongly related to poor wellbeing than were any other chronic demands. ACTION participants (n = 32) reacted positively to the program and reported improvements in behavior. However, compared to the control group (n = 33), ACTION participants did not exhibit significant improvements in sleep quality or wellbeing. Longer term measurement may be necessary to detect improvements in wellbeing, and targeted sleep content may be necessary.

August 1, 2018

## Awareness and Commitment Training for Workers with Chronic Demands:

## Taking ACTion towards Improved Sleep and Wellbeing

Sleep is critically important for human functioning and wellbeing, both at work and in one's personal life. Poor sleep is associated with increased work-related stress (Van Laethem et al., 2015), burnout (Söderström et al., 2012), absenteeism (Lallukka et al., 2014) and presenteeism (Swanson et al., 2011), and reduced work engagement (Barber, Grawitch, & Munz, 2013). Poor sleep also contributes to higher health-care costs (Hui & Grandner, 2015). Despite the importance of sleep, about one third of Canadian adults do not get enough sleep, and many suffer from poor sleep quality (Chaput, Wong, & Michaud, 2017). These effects may be more pronounced in workers who are experiencing chronic physical health demands, psychological health demands, caregiving challenges, and other life demands, such as shift work (Åkerstedt & Wright, 2009; Devins et al., 1993; Eidelman et al., 2010; Rajbhandary & Basu, 2010).

Given the relationship between sleep and wellbeing, interventions that improve sleep may be highly beneficial to employees, especially to workers experiencing a chronic health, caregiving, or other life demand. Kirkpatrick's (1976; 1994) model of training outcomes posits that participants must have positive reactions to training and exhibit changes in their behaviour before quantitative changes in outcomes can be observed; therefore, it is important to examine participant reactions to any new program. ACT (Acceptance and Commitment Therapy) is a third-wave behaviour therapy that has been used as a treatment for insomnia and has improved sleep in participants with other chronic conditions, such as chronic pain and tinnitus (Dalrymple, Florentino, Politi, &

Posner, 2010; Daly-Eichenhardt et al., 2016; Hertenstein et al., 2014; Westin et al., 2011). However, previous ACT research examining sleep as an outcome of interest contained intervention content targeted specifically towards sleep, and it is currently unclear whether general ACT-based programs can improve sleep. Furthermore, many people may not have access to certain therapeutic interventions or may not take advantage of them because their demands prevent them from attending programs at a certain time or place (e.g., scheduling or accessibility problems). Individuals with chronic demands have unique needs and may benefit from interventions that can be easily tailored to meet those needs.

Given the importance of sleep for employee functioning and wellbeing, the associations among chronic demands, sleep, and wellbeing, and ACT's potential to improve sleep, I examined the effectiveness of a flexible and accessible ACT phone-based coaching program (i.e., Awareness and Commitment Training in Organizations and Networks; ACTion) to improve sleep and wellbeing. More specifically, this project had three objectives: 1) to examine the extent to which chronic demands are related to indicators of sleep quality and wellbeing; 2) to examine ACTion's effectiveness to improve wellbeing using Kirkpatrick's (1976; 1994) framework; and 3) to examine whether ACTion, a general ACT-based program, can improve sleep quality in the absence of sleep-specific content.

### **Worker Chronic Demands**

Many workers face chronic challenges with their health or in their life roles. These "chronic demands" can encompass any constant personal challenges that place

strain on an individual above and beyond average daily hassles. For the purposes of this paper, I included people with four types of chronic demands that may influence sleep quality and wellbeing: (1) physical health concerns, such as diabetes, chronic pain, or injuries; (2) mental health concerns, such as depression or anxiety; (3) caregiving demands, such as single parenthood or care of an elderly or disabled family member; and (4) other life demands, including shiftwork.

These chronic demands are prevalent among working populations. For example, an estimated 59% of Canadian employees have a chronic physical condition, such as hypertension (21%) or high cholesterol (19%). Furthermore, 19% of Canadians have a mental health concern, such as depression or anxiety (Sanofi, 2016). The symptoms of physical and mental health concerns can interfere with one's sleep and overall functioning (e.g., Koffel et al., 2016; Sanofi, 2016). In terms of caregiving demands, a national Canadian study from 2012 found that 72% of respondents had some form of eldercare responsibilities (Duxbury & Higgins, 2012). Furthermore, one third of respondents spent time each week on both childcare and eldercare activities, and one fifth of employed respondents indicated high levels of caregiver strain (Duxbury & Higgins, 2012). The prevalence of eldercare responsibilities in workers may become more pronounced over time because the proportion of individuals over 65 is projected to increase as the Canadian population ages (Statistics Canada, 2015). Finally, approximately 30% of Canadian employees are shift workers, which may create demands on their time, energy, and ultimately on their sleep quality (Shields, 2002).

Workers with chronic demands may struggle to remain engaged and productive in the workplace. For example, nearly two out of every five workers with a chronic condition, and three out of five workers with depression indicated that their health condition made their job more difficult or caused them to miss work (Sanofi, 2016). Employees with chronic conditions may be more susceptible to the negative effects of workplace stressors, leading to higher rates of burnout (Ahola et al., 2005; Honkonen et al., 2006; Mealer, Burnham, Goode, Rothbaum, & Moss, 2009), and people with chronic conditions are more likely to be unemployed or take sick leave than are the general population (e.g., Bernklev et al., 2006; De Backer et al., 2006; Muchmore, Lynch, Gardner, Williamson, & Burke, 2003). Many workers with mental health problems leave work to go on short-term disability, long-term disability, or permanent unemployment: An estimated 30% of Canadian disability claims are attributed to mental illness (Dewa, Lesage, Goering, & Caveen, 2004). Employees with mental health problems have higher absenteeism and presenteeism than do employees who are psychologically healthy, resulting in an estimated loss of \$4.5 billion annually (Dewa et al., 2004).

Chronic demands other than one's own health-related challenges also can influence work. For example, caregivers, may struggle to remain engaged at work, especially if the caregiver is responsible for both children and elderly parents (Künemund, 2006). These individuals often have to change their work schedules to fulfill their caregiving demands. Changes may include formal work modifications (e.g., switching to part-time work) or informal accommodations (e.g., taking time off during the day and making up for it during evenings and weekends; Metropolitan Life Insurance

Company, 1999). Many individuals with high caregiving demands end up reducing their workforce participation or leaving the workforce entirely (Berecki-Gisolf, Lucke, Hockey, & Dobson, 2008; Metropolitan Life Insurance Company, 1999). Shift workers, for instance, have higher job strain, workplace injuries, and likelihood of taking sick leave than do non-shift workers (Bourbonnais, Vinet, Vezina, & Gingras, 1992; Shields, 2002; Wong, McLoed, & Demers, 2011).

Given the prevalence of chronic demands in the workforce, and the challenges that these workers often experience to remain engaged and productive in the workplace, this population may have a significant need for workplace supports. One of the key issues reported by people with chronic demands is a lack of quality sleep (Ancoli-Israel, 2006; Duxbury & Higgins, 2012; Meltzer & Mindell, 2006), which can influence both work and life roles (Barber, Grawitch, & Munz, 2013; Barling & Wagner, 2016; Hui & Grandner, 2015). Therefore, workplace interventions that can improve sleep may be especially beneficial for workers with chronic demands.

### **Chronic Demands and Sleep**

Sleep is critical for human functioning and wellbeing, and sleep can be conceptualized as a means of replenishing resources, such as energy, mood, and mental capacity (e.g., Barling & Wagner, 2016; Pilcher & Huffcut, 1996). Conservation of Resources Theory (COR; Hobfoll, 1989) posits that individuals strive to gain and maintain resources, and that real or perceived threats to, or losses of, these resources causes stress. Because poor sleep leads to reduced physical and mental abilities (e.g., Dingnes et al., 1997; Zohar, Tzischinsky, Epstein, & Lavie, 2005), it may cause stress due

to this loss of resources. Even though the general public has become more aware of the negative effects of poor sleep (Perry, Patil, & Presley-Cantrell, 2013), 59% of Canadian employees fall short of the recommended seven to nine hours of sleep each night (Hirshkowitz et al., 2015; Sanofi, 2016). Sleep is important for all workers because poor sleep is associated with many negative outcomes, including higher burnout, greater absenteeism, and more occupational accidents (Barber et al., 2013; Hui & Gradner, 2015; Lallukka et al., 2014; Letvak et al., 2012; Scott et al., 2014; Söderström et al., 2012; Suzuki et al., 2005). Sleep may be especially important for workers with chronic demands because their mental and physical resources are already strained by their health, caregiving, or other life challenges.

Sleep is related to physical and mental health, such that poor sleep exacerbates chronic conditions by making symptoms more severe and by hastening disease progression (Devins et al., 1993; Eidelman et al., 2010). Some chronic conditions have a bidirectional relationship with sleep, such that symptoms interfere with sleep, and this lack of sleep subsequently exacerbates symptoms (Foster et al., 2013; Koffel et al., 2016; Snyder, 1969). In the case of chronic pain, sleep influences pain symptoms twice as much as pain symptoms influence sleep (Koffel et al., 2016). Poor sleep also can contribute to the development of new diseases, including cardiovascular disease (Rod et al., 2014), diabetes (Cappuccio, D'Elia, Strazzullo, & Miller, 2010), and obesity (Gangwisch, Malaspina, Boden-Albala, & Heymsfield, 2005; McNeil, Doucet, & Chaput, 2013).

In addition to physical or psychological health demands, other life demands such as caregiving and shift work also may influence sleep. Many caregivers have poor sleep,

often because of caregiving-related sleep disruptions, such as a crying child or disoriented parent in the night (McCurry, Logsdon, Teri, & Vitiello, 2007; Meltzer & Mindell, 2006). Caregiving demands can exacerbate or contribute to the development of health problems, increasing the individual's chronic demands even further (Metropolitan Life Insurance Company, 1999). Shift workers are at an increased risk of having poor sleep (Ilhan et al., 2008), largely due to disruptions to their sleep schedules (Åkerstedt & Wright, 2009). These disruptions to circadian rhythms may lead to negative health outcomes, because shift workers have higher incidences of health problems including cardiovascular disease, diabetes, and gastrointestinal disorders (Knutsson & Bøggild, 2010; Wang, Armstrong, Cairns, Key, & Travis, 2011). Given the challenges that workers with chronic demands experience with their sleep and wellbeing, they may benefit from additional workplace resources.

### **Supporting Employees with Chronic Demands**

Organizations can take steps to support employees with chronic demands at four levels (Day & Nielsen, 2017; Nielsen, Yarker, Munir, & Bültmann, 2018). At the *organizational* level organizations can improve workplace policies or working environments (e.g., provide flexible work arrangements; Friedman, 2012), and organizations can improve leadership skills by providing training at the *leader* level (Hartling, Day, & Mackie, 2016). At the *group* level organizations can improve working relationships and increase coworker support (Gilin-Oore et al., 2010; Laschinger, Leiter, Day, Gilin-Oore, & Mackinnon, 2012; Leiter, Day, Oore, & Laschinger, 2012; Rickard et al., 2012), and organizations can provide resources and implement programs to help

employees better manage and cope with their demands at the *individual* level (Day, Francis, Stevens, Hurrell, & McGrath, 2014). Implementing supports at all levels of the organization is important to holistically support workers with chronic demands; however, individual-level interventions can be especially useful because they can give tools to the employee that will support them both at work and at home. For example, leader- and group-level interventions can help employees to have a more positive work experience and allow them to better manage demands in their work role (Barling, Weber, & Kelloway, 1996; Leiter et al., 2012; Lewis & Malecha, 2011), yet there is little evidence to suggest that these interventions help them directly manage demands with their health or in their life roles. Individual-level interventions, such as counselling or therapy-based programs, equip workers with tools and concepts that they can apply to many aspects of their life, rather than to just their work demands (McLoed, 2010).

Kirkpatrick (1976; 1994) developed a four-phase model that describes how training programs result in positive outcomes: 1) participants have positive reactions to the training; 2) participants learn the program content; 3) participants exhibit changes in their behavior; and 4) participants display changes in quantitative outcomes (e.g., improved wellbeing or productivity, reduced absenteeism or stress). It's important to note that Kirkpatrick (1994) argued that these phases occur in chronological order (i.e., positive reactions occur first and quantitative changes occur last). Therefore, it is important to first evaluate participant perceptions of training programs because positive reactions act as a gatekeeper to participant learning, behaviour change, and quantitative improvements.

Workers with chronic demands have unique needs that may vary due to the nature of their specific demand (e.g., physical condition, caregiving demand, etc.) and the demands placed on them at work (e.g., the tasks they must perform on a regular basis). For example, a manual labourer with chronic back pain will have very different needs from a teacher who takes care of a disabled parent. Demographic factors such as gender, age, or ethnicity also can influence one's experience of chronic demands. For example, men often are expected to be independent and not to ask for help, which may deter them from accessing certain health services (Mansfield, Addis, & Mahalik, 2003). Due to the high degree of individual differences, interventions may be more effective if they can be tailored to meet the unique needs of each participant. Individualized one-on-one interventions are used often in clinical settings, but they are less commonly employed in workplace programs. One-on-one programs can be more easily tailored to each individual participant, which may make these programs more effective than are group interventions for workers with chronic demands.

Individuals with chronic demands may have difficulty accessing interventions because their demands prevent them from attending programs at certain times or locations. For example, people with chronic demands may not be able to participate in interventions at certain locations due to mobility problems, social anxiety, or other symptoms. The timing/scheduling of the program also may be a problem if the prospective participant has trouble finding alternate caregiving arrangements for their dependents. Furthermore, shift work can be a barrier to accessing workplace health promotion initiatives because of changing work schedules, leaving this high-need

population without as many options as daytime workers (Bohle, 2016; Kilpatrick et al., 2017). Allowing participants to choose when and where they complete an intervention may make it more accessible to people with chronic demands.

### **Supporting Workers through ACTion**

In the present study, I evaluated the effects of a flexible, accessible, and tailored intervention on sleep and wellbeing. ACTion is an individual-level, phone-based coaching program based on Acceptance and Commitment Therapy (ACT). ACTion can be completed at a time and place of the participant's choosing, which may make it more accessible to individuals with chronic conditions. ACT has been effective at improving sleep and wellbeing in people with certain physical and mental health conditions (Dalrymple, Florentino, Politi, & Posner, 2010; Hertenstein et al., 2014; Westin et al., 2011). However, previous studies examining the effect of ACT on sleep have used a great deal of specific sleep-related content in the intervention. It is unclear whether this content is necessary or whether a general ACT-based intervention can improve sleep. Furthermore, phone-based coaching has not been thoroughly examined for ACT-based interventions, and it is important to evaluate if this format is effective, accessible, and well-received by participants.

### **Acceptance and Commitment Therapy**

ACT is a clinical technique designed to improve psychological flexibility and facilitate behaviour change. ACT works through six mechanisms: Values, Committed Action, Mindfulness, Acceptance, Cognitive Defusion, and Self as Context (Hayes et al., 2006). *Values* define what is important to a person, and values differ from goals in that

values can never be achieved whereas goals are things that happen or don't happen. For example, if 'being supportive to others' is an important value for a leader, it is not sufficient for that leader to tell one employee that she is performing very well, and then stop displaying these positive recognition leadership behaviours: The leader must continue to reinforce and recognize their employees in order to live by their values (Wilson, & Luciano, 2002). Thus, values promote long-term changes in behavior. ACT helps participants to shift their views from a goals-based perspective to a values-based perspective.

*Committed Action* consists of specific behaviours linked to the individual's chosen values (Wilson, & Luciano, 2002; e.g., specific behaviours that support others, such as providing constructive feedback to an employee). The other four mechanisms are designed to help participants make choices that are consistent with their values.

*Mindfulness* is a state of being engaged in the present moment and being aware and non-judgmental of thoughts, feelings, and sensations (Hayes et al., 1999; Hayes et al., 2006). For example, mindfulness would help someone to identify when they are first beginning to feel anxious, so they can utilize other techniques as means to accept or address their anxiety.

*Acceptance* involves accepting internal experiences (i.e., one's thoughts, feelings, and sensations) as they are, rather than avoiding those internal experiences and without trying to change them (Hayes et al., 1999; Hayes et al., 2006). For example, a leader with anxiety may hesitate to give constructive feedback to an employee for fear of how they may react. If this leader values being supportive to others, not providing the constructive

feedback would be inconsistent with their values. By accepting the feeling of anxiety, they may provide the employee with constructive feedback even though they feel anxious, which would be a values-consistent decision.

*Cognitive Defusion* alters how people relate to their unwanted thoughts, feelings, and sensations. That is, rather than changing the internal experiences themselves, individuals can change the function or diminish the power of internal experiences (Hayes et al., 1999, Hayes et al., 2006). For example, people with self-criticizing thoughts (e.g., “I’m a horrible leader”) could diminish the power of the thoughts by repeating the thoughts out loud, until the words have lost their meaning (Harris, 2009; Hayes et al., 1999; Zettle, 2007).

*Self as Context* (i.e., the Observer Self) refers to having a flexible sense of self and an understanding that people are distinct from their experiences (Hayes et al., 1999; Luoma, Hayes, & Walser, 2007). Self as Context can help individuals maintain a stable sense of self when they are going through changes (e.g., entering a new work role, experiencing changes in their health). For example, if an organization is downsizing and a manager is tasked with choosing which of their employees to lay off, they may question their identity and values in this difficult situation. They may question how they can be supportive to others when they are laying off their employees. By identifying that the part of themselves that observes outside experiences (i.e., their Observer Self) has not changed, they can stabilize their sense of self and behave according to their sustained values (e.g., treating all employees respectfully, supporting laid off workers in job search, etc.) in spite of their difficult situation. This technique of flexible perspective-taking

underlies other mechanisms including Cognitive Defusion, Acceptance, and Mindfulness (Luoma et al., 2007).

When individuals are faced with challenging situations, they can make choices that are either consistent or inconsistent with their values, and the above techniques can help them make the values-consistent choice (Hayes et al., 2006). For example, an employee who is struggling with caregiving demands may hesitate to request a flextime arrangement (i.e., so that they can have flexible working hours to better manage their demands and be a more effective caregiver and worker). They may worry about what their supervisor will think of them, or they may be worried that their supervisor will deny their request. By focusing on their values, and using these techniques, the employee may be better able to request a flextime arrangement and make the values-consistent decision (Hayes et al., 2006).

**ACT Outcomes.** ACT has been very successful in clinical applications, is transdiagnostic (i.e., it is an effective treatment for many different diagnoses and conditions; Hayes et al., 2006; Ruiz, 2010), and can help people manage and cope with physical and mental illnesses (Bach & Hayes, 2002; Branstetter et al., 2004; Gregg, 2004; Woods, Wetterneck, & Flessner, 2006). On average, ACT-based interventions result in better outcomes than control conditions such as wait-list control, psychological placebo, and treatment as usual (A-tjak et al., 2015; Powers, Vörding, & Emmelkamp, 2009). Furthermore, compared to established treatment comparisons (e.g., cognitive behavioural therapy, systematic desensitization), ACT yields either equivalent (Powers & Emmelkamp, 2009) or better (Levin & Hayes, 2009) results. In non-clinical contexts,

ACT has been demonstrated to reduce anxiety associated with math and public speaking (Block, 2002; Zettle, 2003) and to improve emotional and social functioning (Vowles, McCracken, & Eccleston, 2007).

Previous research has examined the effects of ACT on employee wellbeing and productivity. Bond and Bunce (2000) compared workers who had received ACT, workers who received training on how to reduce workplace stressors, and workers assigned to a wait-list control. Both intervention groups were better at reducing workplace stressors than was the control group, but the ACT group had significantly higher general health scores than did either the stressor reduction or control group. Flaxman and Bond (2010) utilized a similar methodology, comparing the effectiveness of ACT, stress inoculation training, and a control group. ACT and stress inoculation training were equally effective at reducing psychological distress. In a randomized, controlled trial of Swedish social workers, ACT was effective at reducing stress and burnout in social workers with high stress levels at baseline (Brinkborg, Michanek, Hesser, & Berglund, 2011). Most recently, a study of an ACT program in Canadian healthcare workers found an increase in self-reported performance after the intervention when compared to baseline levels (Lee-Baggley, Day, & Helson, 2017).

The improvements in employee wellbeing following ACT programs may be partly explained by COR Theory (Hobfoll, 1989). Kroon, Menting, and van Woerkom (2015) conceptualized mindfulness as a personal resource because it is a psychological element that can facilitate the achievement of work goals (Chatzisarantis & Hagger, 2007) and improve job performance (Dane, 2011). Mindfulness also may make

employees more attuned to alternative resources available in the workplace, which would allow them to build their resources more effectively or restore their resources more quickly following a loss (Kroon et al., 2015). Kroon et al. (2015) also proposed that acceptance may allow employees to better adapt to new levels of resources, thereby reducing the stress typically associated with a resource loss. In other words, ACT training may a) build psychological resources within participants, b) allow participants to gain additional resources using their new tools, and c) reduce the negative influences of resource loss.

Other theories of stress, such as the transactional theory of stress and coping (Lazarus & Folkman, 1986), the job demands-control model (Karasek, 1979), and the job demands-resources model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001), also may provide insight into how ACT-based programs result in improvements in wellbeing. The transactional theory of stress and coping posits that stressors (i.e., stimuli that may be perceived as stressful) cause stress (i.e., an uncomfortable emotion accompanied by changes in biochemistry, physiology, and behaviour; Baum, 1990) if the individual perceives the stimulus as a threat to wellbeing (i.e., primary appraisal; Lazarus & Folkman, 1986). This stress will lead to strain (i.e., physical symptoms that result from stress) if the individual believes that they do not have the resources to adequately deal with the stressor (i.e., secondary appraisal; Lazarus & Folkman, 1986). Mindfulness and acceptance are associated with lower stress appraisals (Major, Richards, Coopers, Cozzarelli, & Zubek, 1998; Weinstein, Brown, & Ryan, 2009), and mindfulness can be conceptualized as a resource to help individuals deal with stressors (Kroon et al., 2015).

Therefore, ACT mechanisms may affect both primary and secondary appraisal within the stressor-strain relationship.

The demands-control model posits that job demands and job control interact to influence strain, such that job control buffers the negative effect of job demands (Karasek, 1979). Job demands are stressors, and they may be perceived less negatively, and therefore cause less strain, through the use of ACT mechanisms such as mindfulness and acceptance (Major et al., 1998; Weinstein et al., 2009). Furthermore, acceptance may allow individuals to adjust to low levels of control (Kroon et al., 2015), thereby reducing the negative effects associated with low job control. Therefore, ACT mechanisms may moderate both the job demands-strain and control-strain relationships.

The job demands-resources model (Demerouti et al., 2001) proposes that job demands and job resources interact to influence job strain and motivation, such that the relationship between job resources and motivation is moderated by job demands, and the relationship between job demands and strain is moderated by job resources. Mindfulness has been conceptualized both as a resource in itself and as a means of obtaining further resources (Kroon et al., 2015). Similarly, the other ACT mechanisms (i.e., acceptance, cognitive defusion, and self as context) may also be conceptualized as psychological resources because they are functional in making values-consistent choices, which may facilitate the achievement of work goals. Therefore, ACT-based interventions may increase participant's psychological resources, which would directly increase motivation and buffer the relationship between job demands and strain.

When examining sleep specifically, ACT has yielded significant improvements in different populations (Dalrymple, Florentino, Politi, & Posner, 2010; Hertenstein et al., 2014; Westin et al., 2011). ACT for sleep has been shown to be effective in both clinical and non-clinical populations. For example, in a sample of insomnia patients who had been unresponsive to cognitive behavioural therapy, Baglioni et al. (2014) found that both subjective sleep quality and sleep-related quality of life improved after an ACT-based intervention. In a randomized controlled trial of participants with tinnitus, Westin et al. (2011) found that participants who received ACT-based training had greater improvements in sleep than did participants who received Tinnitus Retraining Therapy.

Improvements in sleep can be theoretically and empirically connected to ACT mechanisms. If individuals are able to connect sleep to one of their chosen values, they may perform behaviours that promote sleep more frequently. For example, if their chosen value is 'adventure', they can acknowledge that being well-rested allows them to do more adventurous things. Therefore, by going to bed at the same time each night or removing technology from their bedroom, they can lead a more values-consistent life. Previous research has established that sleep hygiene practices (i.e., behaviours that promote sleep) lead to improved sleep (Brown, Buboltz, & Soper, 2002). Mindfulness-based interventions have been shown to improve sleep across multiple studies, which may be due to reductions in stress (e.g., Carlson & Garland, 2005; Shapiro, Bootzin, Figueredo, Lopez, & Schwartz, 2003). The relationship between mindfulness and sleep has been well established in the literature using cross-sectional (e.g., Howell, Digdon, Buro, & Sheptycki, 2008), intervention (e.g., Crain, Schonert-Reichl, & Roeser, 2017), and daily-

diary designs (e.g., Hülshager et al., 2014). Additionally, acceptance may be critical for people who struggle to fall asleep or stay asleep because sleep effort (i.e., actively trying to fall asleep) actually prevents falling asleep (Espie, Broomfield, MacMahon, Macphee, & Taylor, 2006). Acceptance may reduce or prevent sleep effort, therefore improving one's ability to fall asleep. For example, a study of an ACT intervention for chronic pain patients found that pain acceptance consistently predicted improvements in sleep beyond the impact of pain intensity (Daly-Eichenhardt et al., 2016).

Studies examining the effects of ACT on sleep have had an exclusive or significant focus on sleep during the intervention, and the literature is currently unclear about whether ACT can improve sleep without such an explicit focus. The present study aims to fill that gap in the literature by examining sleep before and after an ACT intervention that has only a small focus on sleep. There are two advantages of demonstrating that a general ACT-based program can improve sleep without a direct sleep focus in the content of the intervention. First, researchers or practitioners aiming to improve sleep through ACT may be able to shorten interventions by removing sleep-related content. Shortening an intervention would save time and resources for both the researchers and the participants. Second, it may encourage future research to examine the generalizability of 'all-purpose' ACT-based interventions, without requiring a significant amount of time or effort to increase specific content to address individual issues. Given the potential of an ACT-based program to improve sleep and wellbeing, it may be a key intervention for people who are at risk of having poor sleep, such as employees with chronic demands.

### **Summary and Hypotheses**

Employees face many demands, whether at their jobs, with their health, or in their personal lives. Given these demands, some workers may experience challenges with their sleep or their overall wellbeing and functioning (e.g., Foster et al., 2013; Honkonen et al., 2006; Koffel et al., 2016; McCurry et al., 2007). Understanding these relationships is key to fostering employee productivity and wellbeing. Because sleep is so important to individual health and productivity (e.g., Barber et al., 2013; Hui & Gradner, 2015), implementing and evaluating tools that can aid employees in getting adequate sleep and managing their chronic demands may be helpful for their overall wellness. Therefore, this study has three primary objectives: 1) to examine the relationships among chronic demands, sleep, and wellbeing; 2) to assess participants' perceptions of a general ACT-based intervention (i.e., ACTion) and its effectiveness in improving wellbeing in workers with chronic demands; and 3) to evaluate whether ACTion, a general ACT-based program, can improve sleep quality or whether sleep-specific content is required. Within these three objectives, there are several specific hypotheses.

**Objective 1: Chronic demands, sleep quality, and wellbeing.** Past research demonstrates that people with chronic demands often struggle with their sleep and overall wellbeing (e.g., Ahola et al., 2005; De Backer et al., 2006; Dewa et al., 2004; Metropolitan Life Insurance Company, 1999; Sanofi, 2016). However, much of this past research has been conducted on the general population, and not within a sample of individuals who report having chronic demands. It is currently unclear whether the nature of the chronic demand will be associated with negative outcomes among individuals who

experience chronic demands. Therefore, I examined the relationships among demands, sleep, and wellbeing.

*Hypothesis 1:* Chronic demands (i.e., physical health concerns, mental health concerns, caregiving demands, or shift work) are associated with reduced sleep quality and indicators of wellbeing (i.e., stress, strain, and burnout).

**Objective 2: ACTION and changes in wellbeing.** The ACTION program was designed to be flexible, accessible, and effective for workers with chronic demands. ACTION utilizes a phone-based coaching methodology, which is a novel format compared to previous workplace ACT programs (e.g., Bond & Bunce, 2000; Flaxman & Bond, 2010; Harvey et al., 2017). Kirkpatrick's (1976; 1994) model of training outcomes proposes that participants must react positively to training programs before they learn the material, enact changes in behaviour, and exhibit quantitative changes in outcomes. Therefore, it is important to first evaluate how participants perceive both the content and the format of the intervention.

*Research Goal 1:* To examine participants' perceptions of the ACTION program, in terms of the program content and format.

Kirkpatrick's (1994) model posits that changes in participant behaviour occur after positive perceptions of training and before quantitative changes in outcomes.

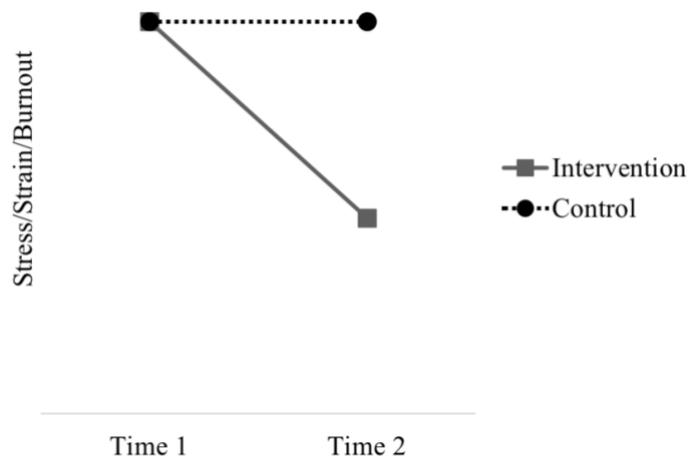
*Research Goal 2:* To examine whether participants self-report changes in their behaviour as a result of the ACTION program.

The last step proposed in Kirkpatrick's (1994) model of training outcomes is quantitative changes in outcomes. Because previous ACT interventions have

demonstrated improvements to participant wellbeing in a variety of contexts and with many different chronic demands (e.g., A-tjak et al., 2015; Barreto & Gaynor, 2018; Hertenstein et al., 2014; Powers et al., 2009), it is expected that ACTION will be associated with more positive outcomes.

*Hypothesis 2:* Compared to individuals in the control group, individuals in the intervention group report improvements in wellbeing (i.e., reduced stress, strain, and burnout) from Time 1 to Time 2.

Specifically, it is expected that the intervention and control group will have similar levels of stress, strain, and burnout at Time 1 (before the intervention group receives the ACTION program). Individuals in the control group are expected to maintain their levels of stress, strain, and burnout at Time 2, whereas individuals in the intervention group are expected to have reduced stress, strain, and burnout at Time 2 compared to Time 1 (see Figure 1).



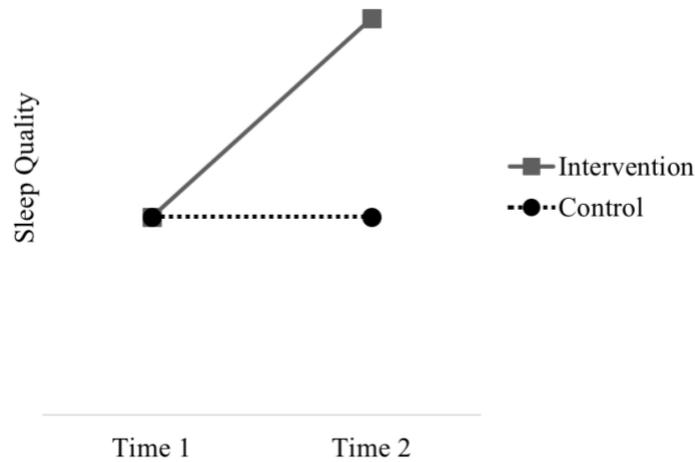
*Figure 1: Hypothesized interaction between Group (Intervention vs Control) and Time (before and after the intervention) on Stress, Strain, and Burnout.*

**Objective 3: ACTion and changes in sleep quality.** Previous ACT interventions have yielded improvements to participant sleep; however, these studies have included sleep-specific content in the intervention (e.g., Dalrymple et al., 2010; Hertenstein et al., 2014; Westin et al., 2011). It is unclear whether a general ACT-based intervention is able to create improvements in sleep, or if targeted sleep-related content is required. Given that improvements in sleep can be linked to mindfulness and acceptance (e.g., Carlson & Garland, 2005; Espie et al., 2006), which are constructs targeted by ACTion, it is expected that participants in the ACTion program will have more positive sleep outcomes.

*Hypothesis 3:* Compared to individuals in the control group, individuals in the intervention group report improvements in their sleep quality from Time 1 to Time 2.

Specifically, it is expected that the intervention and control group will have similar levels of sleep quality at Time 1 (before the intervention group receives the ACTion program). Individuals in the control group are expected to maintain their levels of sleep quality at Time 2, whereas individuals in the intervention group are expected to have higher sleep quality at Time 2 compared to Time 1 (see Figure 2).

One of the key benefits of ACTion is that it is highly customizable: ACTion allows participants to choose how they apply the ACT tools and concepts to their lives (Ruiz, 2010). Therefore, participants with high sleep priority may choose to apply the ACT tools and concepts to their sleep, and subsequently, they may have greater improvements in their sleep than participants with low sleep priority. It is unclear whether participants with low sleep priority will exhibit any improvements in sleep, or if



*Figure 2: Hypothesized interaction between Group (Intervention vs Control) and Time (before and after the intervention) on Sleep Quality.*

participants with high and low sleep priority will have differing levels of sleep quality before the ACTION program; however, it is expected that any changes in sleep quality from Time 1 to Time 2 will be greater for intervention participants with high sleep priority than for intervention participants with low sleep priority.

*Hypothesis 4:* Compared to intervention participants with low sleep priority, intervention participants with high sleep priority exhibit greater improvements in sleep quality after the ACTION program (compared to before the intervention).

## Method

### Procedure

Awareness and Commitment Training in Organizational Networks (ACTION) is a 10-week phone-based coaching program. Participants receive a manual outlining

concepts, activities, and tools to help them behave more consistently with their values. The manual introduces the program and provides the basic tenets of ACT and value-consistent behaviours in Sessions 1 and 2. Sessions 3-6 focus on internal barriers and resources, and these sessions cover tools (e.g., mindfulness, self-compassion) to help participants address their internal experiences. Sessions 7 and 8 discuss external barriers and resources, and Sessions 9 and 10 focus on troubleshooting, sustainability, and moving forward. A portion of one session focuses on linking values to health behaviours and includes information and activities on sleep. Each participant meets with their assigned coach weekly to review the manual, solve problems, and tailor the topics to their unique individual needs. The coaches are professionals working in healthcare, including social workers, counsellors, and psychologists.

The present study used an intervention and a control group, such that participants were randomized (with a few exceptions, please see below) into the two groups. Participants completed surveys before (Time 1) and after (Time 2) the intervention group completed the ACTion program, approximately three months apart.<sup>1</sup>

### **Participants**

Participants were recruited through organizations that were partnered with Dr. Day's EMPOWER partnership team. Participation was open to any employed individual with a chronic demand, which includes chronic physical or psychological conditions and

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<sup>1</sup> The current project was part of a larger study that utilized a wait-list control group, such that the control group completed the ACTion program after the intervention group. In the larger study, participants completed surveys at two additional times (i.e., after the wait-list control group completed the ACTion program, and at a three-month follow-up).

caregiving or other life demands. Participants were 65 employees (63 women, 2 men) from 6 organizations across Canada, 95% of whom were from three major healthcare organizations. Participants were randomized into the intervention (n=32) or control group (n=33); however, there were a few exceptions to randomization due to scheduling conflicts. Five participants were unavailable to participate in either the intervention (n=2) or control group (n=3), so were assigned to a group based on their availability.

Statistically, only two or three of those participants would have been placed into a group to which they would not have been originally assigned. To evaluate whether the participants differed across the two groups, independent-groups t-tests were conducted on the Time 1 measures. The results suggest that there are no meaningful differences in the age, shift work, sleep quality, or wellbeing (indicated by stress, strain, and burnout) of the two groups. All participants were assigned to one of 18 coaches based on availability.

The average age of the sample was 45.37 years (SD =9.64), and participants worked an average of 36.13 hours each week (SD = 9.57). Of the 65 participants, 75% were employed full time and 71% worked non-shift schedules. This sample was very well educated: 82% of participants were college or university graduates, and 25% of participants had completed graduate programs. Most participants (77%) were married, and 69% had children. At Time 1, many participants reported dealing with a mental health concern (43%), physical health concern (58%), or caregiving demand (48%).

Approximately half (52%) of participants reported experiencing more than one type of chronic demand (see Table 1 for an overview of participant chronic demands). Many participants had poor sleep: 54.5% got less than the recommended minimum 7 hours of

sleep at Time 1, and one person got more than the recommended maximum 9 hours of sleep. Only 31% of participants described their sleep quality as ‘fairly good’ or ‘very good’, and 20% indicated that they had trouble sleeping every night in the previous 14 days. Thirteen participants (20%) had received a diagnosis of a sleep-related disorder. See Table 2 for an overview of the demographics for the intervention and control groups.

Table 1.

*Participant chronic demands and comorbidity at Time 1*

	Physical Health Concerns	Mental Health Concerns	Caregiving Demands	Shift Work
Full sample (n = 65) <sup>a</sup>	38	28	31	14
1 Type of Demand (n = 20) <sup>a</sup>	8	3	8	1
2 Types of Demands (n = 17) <sup>a</sup>	12	8	9	5
3 Types of Demands (n = 15) <sup>a</sup>	14	14	11	6
Physical Health Concerns <sup>b</sup>	-			
Mental Health Concerns <sup>b</sup>	21	-		
Caregiving Demands <sup>b</sup>	18	13	-	
Shift Work <sup>b</sup>	8	9	6	-

<sup>a</sup>Frequencies indicate how many participants reported each type of chronic demand, separated by how many types of demands the participant reported. Rows may not sum to the sample size indicated in the leftmost column because participants reported multiple demands.

<sup>b</sup>Frequencies indicate how many participants from the full sample reported both the type of demand indicated in the row and the type of demand indicated in the column (e.g., a total of 21 participants reported experiencing both a physical health concern and a mental health concern). These participants may have reported additional demands as well.

Thirteen participants who completed the first survey did not complete the second survey (n=11 from the intervention group and n=2 from the control group). Six participants withdrew before the program began, two dropped out after the first session, and two dropped out after the fourth session. Three participants did not formally withdraw; rather, they completed the program but did not complete the second wave of data collection. To evaluate whether the participants who did not complete the second wave of data collection were different from participants who remained in the program, post-hoc t-tests were conducted on the two groups. The results suggest that there are no meaningful differences on the age, sleep quality, or wellbeing (indicated by stress, strain, and burnout) of the two groups. One man did not complete the second survey, leaving one man in the full data set. Moreover, four shift workers did not complete the second survey, leaving ten shift workers with both waves of data collection.

### **Measures**

**Demographics.** Participants were asked about their age, occupation, gender, marital status, and number of children.

**Chronic demands.** Information was collected on the chronic demands that each participant experienced. Physical health concerns, mental health concerns, and caregiving demands were each measured with a single item (e.g., “Are you currently experiencing a physical health concern?” with “Yes” and “No” response options). Information was collected on the type of shift schedule each participant followed (i.e., fixed, rotating, unpredictable, or flexible), as well as specific details on what time of day their shifts took place, shift length, and how many hours they worked each week. Participants were coded

as shift workers if they described any work schedule other than fixed day and evening shifts (i.e., when an employee works at the same time each day), which includes fixed night shifts, rotating, and unpredictable shift schedules (Costa, 2003).

**Sleep quality.** An adapted version of the Pittsburgh Sleep Quality Index (PSQI, Buysse et al., 1989) was used to assess five components of participant's sleep over the past two weeks: sleep duration (average sleeping hours each night), sleep latency (average minutes from going to bed to falling asleep), self-reported sleep quality (a single item, on a scale from 1 = 'very bad' to 5 = 'very good'), sleep disturbances (a single item measuring how many nights they had trouble sleeping in the past 2 weeks, responses 0-14), and daytime sleepiness. Daytime sleepiness was an average of four items, measuring how many days in the past two weeks participants experienced symptoms of daytime sleepiness (e.g., 'In the past 2 weeks, how many of the days did you feel physically exhausted?', responses 0-14). Each of the five components was transformed into scores from 0-3 following the procedure described by Buysse et al. (1989) with two exceptions. The original PSQI used a 4-point scale to measure sleep quality, sleep disturbances, and daytime sleepiness, whereas the present study used a 5-point scale for sleep quality and a scale from 0-14 for sleep disturbances and daytime sleepiness (to reflect the 2-week time period) to keep the format in line with other scales. Sleep quality was proportionally scaled-down to responses from 0-3, and sleep disturbances and daytime sleepiness were re-coded according to the original PSQI, such that 0 was recoded as 'Never', 1 was recoded as 'Less than once a week', 2-4 were recoded as 'Once or twice a week', and 5-14 was recoded as 'Three or more times a week'. The five components were reverse-

Table 2.

*Sample demographics by Group at Time 1*

	Full Sample (n)	Intervention (n)	Control (n)
N	65	32	33
Age (years) <sup>1</sup>	45.37 (9.64)	47.38 (8.62)	43.42 (10.30)
Gender (women:men)	63:2	31:1	32:1
Tenure (years) <sup>1</sup>	11.37 (8.82)	11.75 (8.86)	11.01 (8.91)
<u>Employment status</u>			
Full-time	49	25	24
Part-time	12	5	7
Casual/temporary	3	1	2
Not specified	1	1	-
Weekly working hours <sup>1</sup>	36.13 (9.57)	36.27 (9.46)	35.98 (9.84)
<u>Shift type</u>			
Fixed day/evening shift	49	27	22
Rotating	6	2	4
Unpredictable	8	3	5
Flexible	1	-	1
Absenteeism (days in 3 months) <sup>1</sup>	5.15 (13.47)	4.27 (10.63)	6.08 (16.09)
College/university graduate	53	28	25
Completed graduate degree	16	9	7
<u>Chronic demands at Time 1</u>			
Physical health concern	38	15	23
Mental health concern	28	15	13
Caregiving demands	31	11	20
Shift work	14	5	9
1 type of demand	20	11	9
2 types of demands	17	4	13
3 types of demands	15	7	8
4 types of demands	2	1	1

<sup>1</sup> Given in the format Mean (SD)

scored, such that higher scores indicate better sleep, and were averaged to create a global indicator of sleep quality. Cronbach's alpha was  $\alpha = .69$  at Time 1, and  $\alpha = .82$  at Time 2.

**Sleep priority.** A single item was created for this project to assess sleep priority: 'Is improving your sleep (or maintaining good sleep habits) a priority for you?'. Responses ranged from 1 = 'not at all' to 5 = 'extremely'.

**Perceived stress.** The 7-item stress subscale of the Depression, Anxiety, and Stress Scale (DASS; Lovibond & Lovibond, 1995) was used to assess participants perceived stress. Using a scale from 1 = 'not at all' to 4 = 'very much, or most of the time', participants indicated how much statements applied to them over the past two weeks (e.g., 'I found it difficult to relax' and 'I felt that I was rather touchy'). Cronbach's alpha was  $\alpha = .81$  at Time 1, and  $\alpha = .84$  at Time 2.

**Strain.** Strain was assessed using the 20-item Strain Symptoms Checklist (Bartone et al., 1989). Using a frequency scale (1='never'; 6='always'), participants indicated how often they experienced symptoms of strain over the past two weeks (e.g., 'general aches or pains' and 'feeling down or blue or depressed'). Cronbach's alpha was  $\alpha = .88$  at Time 1, and  $\alpha = .91$  at Time 2.

**Burnout.** A reduced 9-item version of the Maslach Burnout Inventory (aMBI; full MBI created and validated by Maslach et al., 1996; abbreviated version validated by McManus, Winder, & Gordon, 2002) was used to assess participant's level of burnout. Using a scale ranging from 0 = 'never' to 6 = 'always', participants indicated how often they experienced Emotional Exhaustion (three items; e.g., 'I felt tired when I got up in the morning and had to face another day'), Cynicism (three items; e.g., 'I became more

cynical about whether my work contributes anything’), and Professional Efficacy (three items; e.g., ‘I accomplished many worthwhile things in this job’). Cronbach’s alphas were  $\alpha = .90$  at Time 1, and  $\alpha = .89$  at Time 2 for the exhaustion subscale;  $\alpha = .64$  at Time 1, and  $\alpha = .71$  at Time 2 for the cynicism subscale; and  $\alpha = .78$  at Time 1, and  $\alpha = .74$  at Time 2 for the professional efficacy subscale.

**Program evaluation.** Participants were asked both quantitative and open-ended questions to evaluate their perceptions of the ACTion program. Using a 5-point scale (1 = ‘strongly disagree’ to 5 = ‘strongly agree’), participants indicated the extent to which they agreed with statements about the program (e.g., ‘I found my coach helpful’; ‘Overall, I feel that I met my program goals.’). Participants also rated how helpful they found different aspects of the ACTion program (e.g., phone-based coaching; manual) using a scale from 1 = ‘not at all helpful’ to 5 = ‘extremely helpful’. Participants were asked two open-ended questions about the most and least helpful aspects of the ACTion program. Using a 10-point scale (1 = ‘not at all’ to 10 = ‘extremely’), participants indicated how likely the participant is to recommend ACTion to a colleague. Using a 5-point scale (1 = ‘no progress’ to 5 = ‘excellent progress’), they also indicated the degree of progress that they felt they made. Three open-ended questions were included on the areas that participants perceived the most improvements in their lives, the barriers they had been facing, and final comments or suggestions for the program.

## Results

All quantitative analyses were conducted in SPSS 24. The descriptive statistics and zero-order correlations of all study variables at Time 1 are in Table 3. The descriptive

statistics and zero-order correlations of all study variables at Time 1 and Time 2 for only the participants who completed both waves of data collection are in Table 4.

### **Chronic Demands, Sleep Quality, and Wellbeing**

To test Hypothesis 1, I examined the zero-order correlations between chronic demands and Time 1 measures of sleep quality and wellbeing (i.e., stress, strain, emotional exhaustion, cynicism, and professional efficacy; see Table 2). The types of chronic demands are not mutually exclusive, and many participants experienced multiple demands (see Table 1). Because the zero-order correlations do not account for shared variance with other variables, this analysis does not account for comorbidity with other types of chronic demands (i.e., the tested variance is not unique to each specific chronic demand). All variables were normally distributed within each cell, determined by visual inspection of histograms and skewness values within  $\pm 2$  and kurtosis values within  $\pm 7$ .

Participants who reported having a physical health concern did not differ on sleep quality nor any indicator of wellbeing from participants who did not report experiencing a physical health concern. Participants who reported having a mental health concern had significantly higher strain,  $r = .51, p < .001$ , emotional exhaustion,  $r = .36, p = .01$ , and cynicism,  $r = .28, p = .03$ , compared to participants who did not report experiencing mental health problems, as well as lower professional efficacy,  $r = -.28, p = .03$ .

Participants who reported having a caregiving demand did not differ on sleep quality nor any indicator of wellbeing from participants who did not report experiencing a caregiving demand. Shift workers had higher strain,  $r = .30, p = .02$ , emotional exhaustion,  $r = .41, p = .001$ , and professional efficacy,  $r = .33, p = .01$ , compared to non-shift workers. The

Table 3.

*Descriptive statistics, zero-order correlations, and reliabilities of all study variables at Time 1*

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Gender	-	-	-													
2. Age	44.92	9.32	.15	-												
3. Number of Demands	1.75	1.08	-.13	-.25	-											
4. Physical Health	-	-	.04	-.17	.60*	-										
5. Mental Health	-	-	-.03	-.29*	.70*	.30*	-									
6. Caregiving	-	-	-.01	.08	.47*	.04	.03	-								
7. Shift Work	-	-	-.34*	-.21	.46*	-.03	.23	-.06	-							
8. Sleep Quality	1.27	0.61	.06	.10	-.26*	-.08	-.23	-.04	-.24	.69						
9. Sleep Priority	3.53	1.20	.16	-.11	-.05	-.09	.00	-.15	.15	-.17	-					
10. Stress	2.03	0.54	-.14	-.32*	.27*	.17	.24	.01	.20	-.41*	.13	.81				
11. Strain	2.56	0.68	-.14	-.44*	.41*	.19	.51*	-.07	.30*	-.48*	.19	.55*	.88			
12. Emotional Exhaustion	3.60	1.65	-.08	-.63*	.32*	.06	.36*	-.08	.41*	-.33*	.24	.53*	.64*	.90		
13. Cynicism	2.98	1.15	-.03	-.31*	.25	.18	.28*	.00	.08	-.18	.00	.47*	.37*	.70*	.64	
14. Professional Efficacy	4.20	1.23	-.07	-.04	-.15	-.08	-.28*	-.24	.33*	-.14	.25*	.09	-.07	-.13	-.32*	.79

*Note:* This table includes all participants that completed the Time 1 survey, using listwise deletion to address missing data, n =

60. Cronbach's alpha is reported on the diagonal. Gender is coded as: men = 1, women = 2. \*p < .05

Table 4.

*Descriptive statistics, zero-order correlations, and reliabilities of study variables at Time 1 and Time 2*

	M	SD	1	2	3	4	5	6	7	8	9
<u>Time 1</u>											
1. Age	45.04	9.07	-								
2. Number of Chronic Demands	1.77	1.07	-.15	-							
3. Sleep Quality	1.37	0.61	.12	-.31*	.69						
4. Sleep Priority	3.52	1.22	-.08	-.09	-.14	-					
5. Stress	2.00	0.54	-.30*	.24	-.49*	.13	.81				
6. Strain	2.47	0.69	-.45*	.45*	-.53*	.17	.60*	.88			
7. Emotional Exhaustion	3.52	1.66	-.61*	.25	-.42*	.23	.58*	.64*	.90		
8. Cynicism	2.94	1.21	-.24	.20	-.26	-.01	.49*	.34*	.67*	.64	
9. Professional Efficacy	4.11	1.24	.01	-.20	-.01	.27	.01	-.06	-.14	-.35*	.78
<u>Time 2</u>											
10. Sleep Quality	1.40	0.63	.27	-.21	.63*	-.12	-.28	-.43*	-.36*	-.17	.04
11. Sleep Priority	3.90	0.97	-.06	-.35*	.02	.64*	-.01	.03	.02	-.13	.25
12. Stress	1.92	0.62	-.26	.40*	-.49*	-.02	.66*	.54*	.46*	.27*	-.06
13. Strain	2.25	0.74	-.45*	.47*	-.50*	.19	.42*	.71*	.53*	.26	-.13
14. Emotional Exhaustion	3.19	1.66	-.52*	.27	-.56*	.22	.46*	.65*	.68*	.51*	-.25
15. Cynicism	2.61	1.21	-.05	.29*	-.21	-.08	.28	.25	.25	.52*	-.41*
16. Professional Efficacy	4.57	1.13	.25	-.23	.18	.25	-.10	-.19	-.23	-.26	.46*

	10	11	12	13	14	15	16
<u>Time 2</u>							
10. Sleep Quality	.82						
11. Sleep Priority	-.05	-					
12. Stress	-.39*	-.17	.84				
13. Strain	-.69*	.07	.68*	.91			
14. Emotional Exhaustion	-.64*	.13	.56*	.75*	.89		
15. Cynicism	-.43	-.13	.41*	.49*	.63*	.71	
16. Professional Efficacy	.33*	.37*	-.30*	-.38*	-.26	-.32*	.74

*Note:* This table includes participants who completed both Time 1 and Time 2 measures using listwise deletion to address missing data,  $n = 49$ . Cronbach's alpha is reported on the diagonal. \*  $p < .05$ .

number of types of chronic demands experienced was negatively related to sleep quality,  $r = -.26$ ,  $p = .05$ , and positively related to stress,  $r = .27$ ,  $p = .04$ , strain,  $r = .41$ ,  $p = .001$ , and emotional exhaustion,  $r = .32$ ,  $p = .01$ . That is, people who experience more types of chronic demands tend to report reduced sleep quality and more stress, strain, and emotional exhaustion.

### **ACTION and Changes in Wellbeing**

Changes in wellbeing were assessed using Kirkpatrick's (1994) model as a framework. I first qualitatively evaluated participants' perceptions of the ACTION program and their self-reported behaviour change before I quantitatively evaluated changes in participant wellbeing.

**Perceptions of the ACTION program and changes in behaviour.** To evaluate perceptions of the ACTION program content and format (i.e., Research Goal 1), as well as

perceptions of improvements and behaviour change (i.e., Research Goal 2), intervention participants (n = 18) were asked both quantitative and open-ended questions about their experience in the ACTion program. Specifically, they were asked about their perceptions of the program content and format and their perceived helpfulness of different aspects of the ACTion program, as well as their perceptions of progress. To simplify reporting, responses were dichotomized such that 4 and 5 indicated that the participant agreed with a statement (i.e., 4 and 5 were coded as ‘agree’ and 1, 2, and 3 were coded as ‘do not agree’) or found that aspect of the program very helpful (i.e., 4 and 5 were coded as ‘helpful’ and 1, 2, and 3 were coded as ‘not helpful’).

All program participants indicated that ACTion was practical, relevant, and credible, and the majority of participants (94%) found the program beneficial. When asked to rate on a scale from 1-10 how likely they would be to recommend ACTion to a colleague, 83% of participants responded with an 8 or higher, indicating that they are extremely likely to recommend the program. Both the coaching and weekly practice activities were rated as very helpful by 83% of participants, and 72% rated the manual as very helpful. In the open-ended question regarding the “most helpful” aspects of the ACTion program, half of participants indicated the coaching and 22% indicated the manual in their response. For example, in response to what was most helpful, one participant responded that it was the “ACTion manual overall. It's a great resource that I can continually refer to. And the coaching sessions alongside the manual were very helpful.” Participants indicated that the coaching sessions helped them to clarify parts of the manual that they did not understand and remain on-track with their independent

study. For example, one participant reported that “The coach helped me figure out some of the parts I was unclear about” and that “Encouragement from the [coach] and accountability to her to complete the weekly tasks” were all helpful.

In the open-ended question regarding the least helpful aspects of the ACTION program, 28% of participants gave some variation of “all was helpful” or “nothing I can think of”. Some participants experienced technical difficulties with the online resources (11%), found some parts of the manual to be vague or confusing (11%), or thought that one week was too short a time period between coaching sessions (11%).

In terms of behaviour change, 89% felt that they met their behaviourally-based program goals and 83% reported making positive changes at work. All participants self-reported making moderate to excellent progress since they first began the ACTION program, and 89% reported that they can continue to implement the positive changes that they have made going forward. In the open-ended question regarding the areas that participants felt they experienced the most improvement, half of participants described improvements in their thoughts and feelings, or improvements in how they relate to their thoughts and feelings. Some participants (28%) indicated improvements in self-compassion, and 28% described improvements in their work-life balance or greater engagement with their personal life. For example, one participant commented that their improvements involved “Commitment to exercise mindfully, acknowledge behavior - have been able to change behavior [and] thoughts/feelings and better deal with them. Set limits on myself in terms of work - leave work on time.”

In the open-ended question about barriers to their success, participants had very diverse responses. Some indicated external factors such as work-related demands (22%), demands from their personal life (6%), or bullying (6%). Other participants indicated that internal barriers such as negative emotions (22%), pain or discomfort (11%), or poor coping skills (6%) hindered their success.

In terms of overall general comments and suggestions, three participants gave suggestions for improvements to the program (i.e., allowing more time between coaching sessions, including a monthly follow-up coaching session after program completion, and going through the content with the coach as opposed to independently). The majority of participants (67%) reiterated how helpful they found the program and 33% explicitly thanked the research team for the opportunity to participate. For example, one participant noted that:

*It was hard to fit it into my busy schedule, but I was always glad I did.*

*It forced me to look at my values and habits in a methodical, practical way with clear well-thought out steps and tools to help me change behaviours that were holding me back. I felt heard and respected in my journey.*

Another participant felt the program was very effective, noting that:

*This program empowered me to move forward with my vision for my life and helped identify my blockers and strategies to manage them. We could all benefit from such a program. Enjoyed the visuals and videos, especially the coaching.*

**Quantitative changes in outcomes.** To evaluate the general effects of the ACTION program (i.e., Hypothesis 2), a MANOVA on five dimensions of wellbeing (i.e., stress, strain, emotional exhaustion, cynicism, and professional efficacy) was conducted to test the main and interactive effects of time and group (intervention and control). All variables were normally distributed within each cell, as determined by visual inspection of histograms and skewness values within  $\pm 2$  and kurtosis values within  $\pm 7$ . Box's M-test was nonsignificant ( $\chi^2$  approx.(55) = 67.26,  $p = .12$ ), indicating that the covariance matrices of the dependent variables were roughly homogeneous across cells. Each cell was assessed for multivariate outliers using Mahalanobis distance, and 3 multivariate outliers were identified in each group. The analysis was conducted with and without the outliers to examine the effect they may be exerting on the data. Some group means were slightly altered when the outliers were removed, but the significance of the main and interaction effects did not change greatly. Because removing the outliers did not significantly change the analysis, they were kept in the dataset for the reported results and follow-up analyses.

There was a significant multivariate effect of time on the wellbeing indices, Pillai's trace = 0.26,  $F(5, 45) = 3.15$ ,  $p = .02$ . However, there was no multivariate effect of group, Pillai's trace = 0.17,  $F(5, 45) = 1.86$ ,  $p = .12$ , nor multivariate time by group interaction, Pillai's trace = 0.12,  $F(5, 45) = 1.28$ ,  $p = .29$ . The wellbeing MANOVA was followed up with five univariate 2 (group; intervention and control) x 2 (time) ANOVAs, see Table 4 for a summary.

There was no main effect of group,  $F(1,49) = 4.89, p = .03$ , or time,  $F(1,49) = 2.21, p = .14$ , on stress. Furthermore, there was no group by time interaction on stress,  $F(1,49) = 0.74, p = .39$ ; see Figure 3a.

There was a significant main effect of time on strain, such that strain decreased from Time 1 to Time 2,  $F(1,49) = 9.97, p = .003$ , and a significant effect of group, such that the control group overall had higher levels of strain than did the intervention group overall,  $F(1,49) = 3.70, p = .04$ . Strain also had a significant time by group interaction, such that the intervention group had greater improvements from Time 1 to Time 2 than did the control group,  $F(1,49) = 5.56, p = .02$ ; see Figure 3b.

There was a significant main effect of group on emotional exhaustion, such that the control group overall had higher levels of exhaustion than did the intervention group,  $F(1,49) = 6.53, p = .01$ . However, there was no main effect of time,  $F(1,49) = 3.47, p = .07$ , nor was there a time by group interaction,  $F(1,49) = 1.06, p = .31$ ; see Figure 3c.

There was a significant main effect of time on cynicism, such that both groups experienced reduced cynicism from Time 1 to Time 2,  $F(1,49) = 4.03, p = .05$ . There was also a main effect of group on cynicism, such that the control group overall had higher levels of cynicism than did the intervention group,  $F(1,49) = 8.02, p = .01$ . However, there was no group by time interaction,  $F(1,49) = 0.35, p = .56$ ; see Figure 3d.

Finally, there was a main effect of time on professional efficacy, such that scores increased from Time 1 to Time 2,  $F(1,49) = 7.02, p = .01$ . There was no main effect of group,  $F(1,49) = 0.78, p = .38$ , nor was there a time by group interaction,  $F(1,49) = 0.93, p = .34$ ; see Figure 3e.

Table 5.

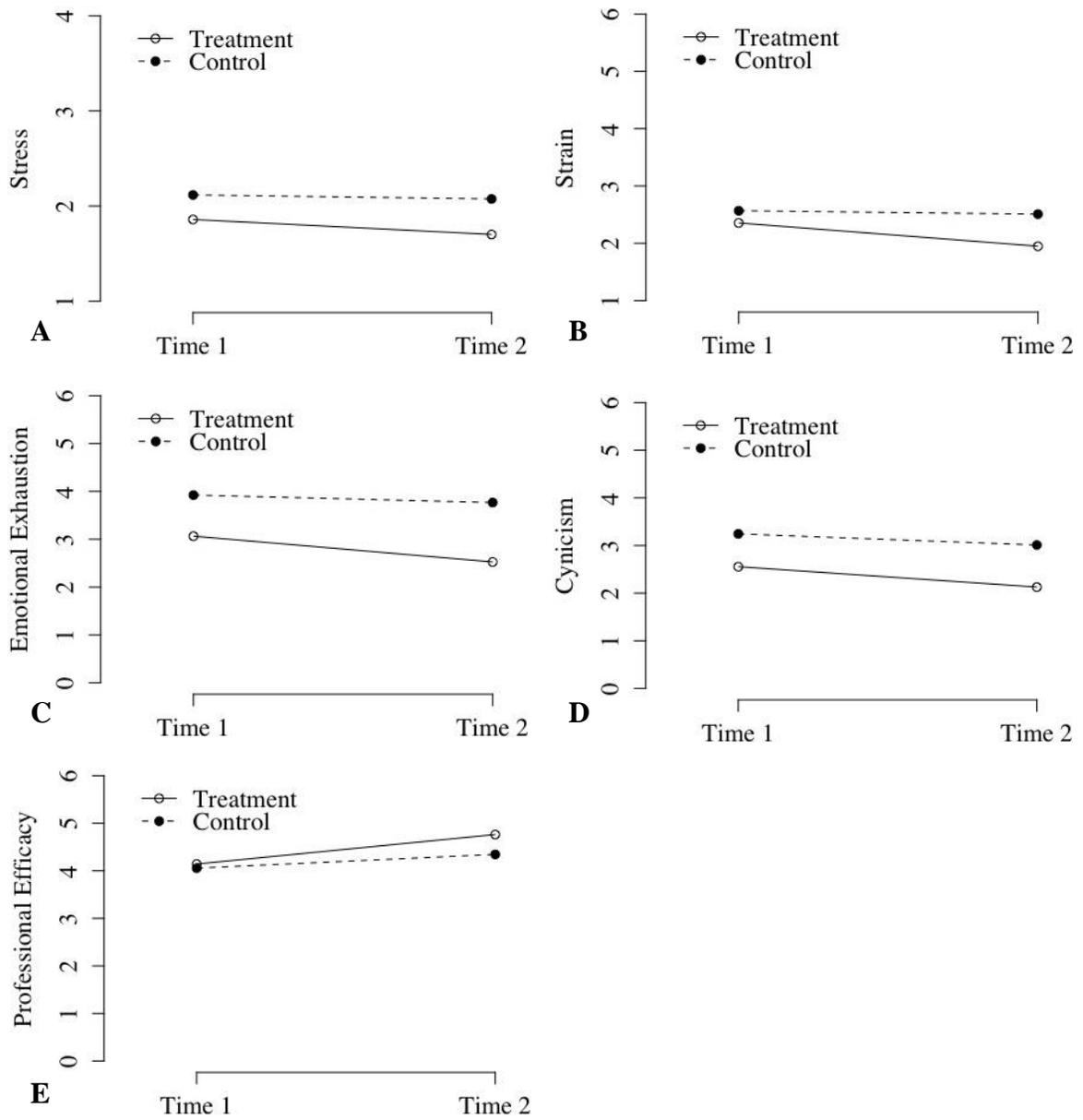
*Changes in wellbeing from Time 1 to Time 2 in Intervention and Control participants*

		Time 1 M(SD)	Time 2 M(SD)	Cohen's d	Main effect of Time	Main effect of Group	Time x Group Interaction
Stress	I	1.86(0.49)	1.70(0.61)	-0.18	$F(1,49) = 2.21$	$F(1,49) = 4.89$	$F(1,49) = 0.74$
	C	2.12(0.55)	2.08(0.56)	-0.07	$p = .14$	$p = .03$	$p = .39$
Strain	I	2.35(0.67)	1.95(0.66)	-0.54	$F(1,49) = 9.97$	$F(1,49) = 4.67$	$F(1,49) = 5.56$
	C	2.57(0.68)	2.51(0.70)	-0.09	$p = .003$	$p = .04$	$p = .02$
Emotional Exhaustion	I	3.06(1.41)	2.52(1.48)	-0.35	$F(1,49) = 3.47$	$F(1,49) = 6.52$	$F(1,49) = 1.06$
	C	3.92(1.78)	3.77(1.57)	-0.09	$p = .07$	$p = .01$	$p = .31$
Cynicism	I	2.56(1.14)	2.13(1.03)	-0.42	$F(1,49) = 4.02$	$F(1,49) = 8.02$	$F(1,49) = 0.35$
	C	3.24(1.15)	3.01(1.19)	-0.20	$p = .05$	$p = .01$	$p = .56$
Professional Efficacy	I	4.14(1.42)	4.76(1.01)	0.64	$F(1,49) = 7.02$	$F(1,49) = 0.78$	$F(1,49) = 0.93$
	C	4.06(1.06)	4.34(1.18)	0.25	$p = .01$	$p = .38$	$p = .34$

*Note:* Positive effect sizes indicate higher scores at Time 2 compared to Time 1. Effects are for univariate ANOVAs.  $n = 21$  for the intervention group (I) and  $n = 30$  for the control group (C).

### **ACTION and Changes in Sleep Quality**

To evaluate the effects of the ACTION program on sleep (i.e., Hypotheses 3 and 4), two analyses were conducted: an ANOVA on sleep quality to test the main and interactive effects of time and group (intervention and control); and an ANCOVA on sleep quality, using only intervention participants, to test the main and interactive effects of time and sleep priority. Sleep quality was normally distributed within each cell, as determined by visual inspection of histograms and skewness values within  $\pm 2$  and



Figures 3a-e. Indicators of wellbeing at Time 1 and Time 2 for the intervention and control groups: a) stress, b) strain, c) emotional exhaustion, d) cynicism, and e) professional efficacy.

kurtosis values within +/- 7.

There was no main effect of either group,  $F(1, 47) = 3.73, p = .06$ , or time,  $F(1, 47) = 0.14, p = .71$ , on sleep quality. Moreover, there was no group by time interaction on sleep quality,  $F(1, 47) = 0.17, p = .68$ . For the ANCOVA conducted on only the intervention participants, there was no significant main effect of time,  $F(1, 19) = 0.54, p = .47$  or sleep priority,  $F(1, 19) = 0.52, p = .48$ , on sleep quality. Furthermore, there was no time by sleep priority interaction on sleep quality,  $F(1, 19) = 0.84, p = .53$ .

### **Discussion**

Although workers tend to know that sleep is critical to their wellbeing, many of them struggle to obtain adequate sleep. Employees who experience chronic demands, such as shiftwork, are at an increased risk of having poor sleep. ACT-based interventions have been shown to improve sleep and wellbeing in a broad range of contexts, but previous programs may not have been accessible for workers with chronic demands because of scheduling difficulties. Therefore, in the current project, I explored the relationships among chronic demands, sleep quality, and wellbeing and evaluated a flexible, accessible, and tailored ACT-based intervention for workers with chronic demands.

### **Chronic Demands, Sleep Quality, and Wellbeing**

Hypothesis 1 was not supported: None of the chronic demand types were associated with reduced sleep quality, and only mental health concerns and shift work were associated with lower indicators of wellbeing. Participants who reported experiencing mental health concerns had higher strain, emotional exhaustion, and

cynicism, as well as lower professional efficacy, than did participants who did not report any mental health concerns. Participants who worked shifts had higher strain, emotional exhaustion, and professional efficacy than non-shift workers. Participants who reported having any physical health concerns or caregiving demands did not differ on wellbeing from participants who did not report these demands. People with more types of chronic demands tended to report lower sleep quality and higher levels of stress, strain, and emotional exhaustion than did participants with fewer chronic demands. Previous research indicates that people with any chronic demands benefit from additional supports and resources (e.g., McLoed, 2010); however, the present study may suggest that shift workers, employees with mental health concerns, and employees who experience multiple types of chronic demands would especially benefit from workplace interventions and resources. Future research should be conducted to verify these relationships in other samples, and to examine the unique effects of each type of chronic demand.

It is interesting to note that shift workers had higher professional efficacy than non-shift workers, which may be surprising. However, this increased level of efficacy may be because the shift workers in this sample were mostly front-line medical workers (e.g., nurses, physicians, pharmacists) — positions that are both demanding, rewarding, and essential to hospital functioning and patient safety. Shift workers in healthcare may be affected by the demands of their job, indicated by higher strain and emotional exhaustion, yet still have higher professional efficacy because they feel that they have a positive and meaningful influence on others in their jobs.

It is surprising that none of the chronic demands were associated with sleep quality. This may be a problem related to restriction-of-range: The sample consisted entirely of workers with chronic demands and the participants reported very poor sleep overall. Therefore, any variations in sleep quality caused by the nature of the chronic demand may have been too small to detect without a very large sample size. Future research should include some individuals with no chronic demands in their sample to act as a comparison. Including individuals with no chronic demands may increase variability in sleep quality and allow the researchers to draw stronger conclusions about how the type of chronic demand affects wellbeing.

### **ACTION and Changes in Wellbeing**

**Perceptions of the ACTION program and changes in behaviour.** With regards to Research Goal 1, participants responded very positively about the ACTION program and indicated that they would recommend it to others. Many reported feeling grateful for the opportunity to participate. Both qualitative and quantitative responses indicate that participants found the coaching very helpful and that it contributed to their success by helping them clarify material and remain accountable. These initial participant reactions suggest that future research should continue to investigate individualized coaching for ACT-based interventions. A study investigating whether participants prefer individual coaching or workshops may be especially beneficial for guiding the methodology of future intervention studies.

In terms of behaviour change (i.e., Research Goal 2), all participants felt that they made progress throughout the program, and most reported meeting their program goals,

which were all behaviourally based. Many participants reported improvements in their thoughts and feelings as a result of the ACTION program, and some noted behavioural improvements in their responses to open-ended questions. The positive perceptions of the ACTION program and participants' self-reported changes in behaviour are an important first step towards establishing ACTION as an effective and accessible workplace program for workers with chronic demands.

**Quantitative changes in outcomes.** Hypothesis 2 was not supported, such that, overall, wellbeing improved for both the intervention and control groups. Follow-up analyses indicated that all participants, regardless of group membership, had lower strain and cynicism, and higher professional efficacy at Time 2 compared to Time 1. Although improvements in the intervention group were expected, the improvements in the control group were unexpected. It is possible that an unrelated phenomenon, such as organizational changes or seasonal fluctuations in chronic demands, may have caused both groups to improve. Most participants completed the first survey in January, shortly after the winter holidays, and the second survey in late March or April. Many chronic demands are worse in the winter (e.g., Jansen, 2017; Richardson, 2002), so the improvements seen in the wellbeing of both the intervention and control groups may be due to abnormally low wellbeing at Time 1.

Although the interaction between time and group was nonsignificant in the multivariate analysis, the follow-up univariate ANOVA on strain had a significant interaction effect. Furthermore, the pattern of means was similar for all indicators of wellbeing, such that the intervention group had slightly greater improvements from Time

1 to Time 2 than the control group (see Figure 1). This pattern provides incentive to investigate the ACTion program's effect on wellbeing in future research.

Upon first examination, it may seem contradictory that intervention participants felt that they had made improvements as a result of the ACTion program yet did not achieve quantitative improvements significantly greater than the improvements made by the control group. However, Kirkpatrick's (1994) model of training indicates that changes in outcomes are preceded by both positive participant reactions to training and changes in behaviour. Positive reactions and self-reported changes in behaviour were observed, but the Time 2 survey may have been administered too soon to detect quantitative changes in outcomes.

Previous research has indicated that the effects of ACT-based training increase over time and may not be evident at post-treatment measures. For example, Gifford et al. (2011) studied an ACT intervention for smoking cessation and found that significant differences between the treatment and control group were observed at one-year follow-up, but not at six-month follow-up. Järvelä-Reijonen et al. (2018) found that participants in an ACT program for weight loss had significant improvements at post-treatment and continued to improve at nine-month follow-up. Therefore, future research should allow for more time between Time 1 and Time 2 measures or utilize multiple follow-up surveys.

### **ACTion and Changes in Sleep Quality**

Hypotheses 3 and 4 were not supported: There were no changes in participant sleep over the ACTion program, even for participants who prioritized their sleep.

Previous ACT-based interventions have yielded improvements in sleep (e.g., Hertenstein et al., 2014; Westin et al., 2011); however, the content of these interventions was focused almost entirely on sleep. Out of the ten sessions in ACTion, only a small section of one session was devoted to linking values to health behaviours, including sleep.

These results may suggest that a general ACT-based intervention cannot improve sleep and that specific sleep-related content is required to produce changes in participant sleep. ACTion was not advertised as a program to improve sleep, nor did any participants indicate sleep improvement as a goal before beginning the program. Furthermore, no participants indicated changes in sleep when asked an open-ended question about improvements they observed over the ACTion program. These results are similar to research on the effect of ACT-based interventions on alcohol use: Interventions with only a small focus on alcohol did not yield improvements (Blevins, Roca, & Spencer, 2011), but interventions with a focus on alcohol noted significant reductions in participants' alcohol use (Harvey et al., 2017).

Alternatively, the lack of change in participant sleep may be due to the timing of the Time 2 survey. As discussed previously, Kirkpatrick (1976; 1994) argued that quantitative changes in outcomes (in this case, sleep quality) occur only after changes in participant behaviour. Participants self-reported general changes in behaviour, but they did not report sleep-related behaviour change, nor did I include a measure of sleep hygiene (i.e., behaviours that promote high sleep quality) in the surveys. Given that sleep and wellbeing have a bidirectional relationship (e.g., Kahn, Sheppes, & Sadeh, 2013), it is possible that improvements in sleep may be evident only after improvements in

wellbeing have occurred. The prospect that a general ACT-based intervention can improve sleep should not be discounted until future research has been conducted over a longer time period with multiple follow-up surveys.

When designing ACT-based interventions, researchers should administer surveys over a longer time period and should emphasize sleep in the content of their program to achieve sleep changes. Future research should investigate specifically how much sleep-related content is required to yield improvements in participant sleep (i.e., is one session sufficient, or must sleep-related content be integrated throughout the program?). Furthermore, future projects should measure to what extent participants applied the ACT skills and concepts to their sleep to verify that participants are changing their sleep-related behaviour.

### **Limitations and Future Directions**

There are several limitations of the current study. First, there were issues around attrition and sample size. Due to recruitment challenges and small amounts of missing data, the sample size for the Time 1 analysis (i.e., Hypothesis 1) was only 60. With an alpha of .05 and power of .8, only correlations above .254 are statistically significant at this sample size. Additionally, nearly 20% of participants who began the study did not complete the Time 2 survey (5% completed the program but did not participate in Time 2 data collection), which limits the power of the quantitative analyses on changes in sleep quality and wellbeing. Although this attrition rate may be viewed as high, other studies of ACT for chronic demands have had similar or higher attrition rates: A study of ACT for eating disorders found that 25% of participants did not complete all follow up measures

(Juarascio et al., 2013), and a study of ACT for chronic pain found that 12% of participants did not complete post-treatment measures, and a total of 39% did not complete subsequent follow-up measures (Daly-Eichenhardt et al., 2016). Even though ACTION was designed to fit easily into busy and unpredictable schedules, the ACTION program required commitment in terms of time and effort for the participant (e.g., participants had to read a section of the manual, complete the activities, and meet with their coach). These activities may have been too much of a commitment for some individuals with chronic demands. Future research on workers with chronic demands should examine whether strategies to reduce the time and effort required by the participant helps increase retention while helping participants achieve their goals.

Another consideration is the characteristics of the sample. The present study used a sample that was very well educated and comprised of almost entirely women. These characteristics are typical of healthcare workers, many of whom experience shift work and burnout (e.g., Lindwall, Gerber, Jonsdottir, Börjesson, & Ahlborg, 2014; Waters, Frude, Flaxman, & Boyd, 2018). Previous research indicates that ACT is an effective platform for workers from a variety of sectors with different demographics (Bond & Bunce, 2000; Flaxman & Bond, 2010; Harvey et al., 2017); thus, even though this sample had a very specific demographic composition, the results may generalize to the average employee.

Chronic demands were a key characteristic of interest in the present study, specifically the nature of the participants' demands (i.e., physical health concern, mental health concern, caregiving demand, or shift work) and how many types of demands they

experienced. The measures I used did not account for the severity of the chronic demands nor for the number of the same type of chronic demands (i.e., if a participant had two different physical health concerns, it would have been coded the same as for a participant who had only one physical health concern). An additional concern is that when looking at the total number of demands, each type of chronic demand was equally weighted.

However, the different types of chronic demands may not contribute equally to an individual's experience. For example, mental health concerns may have more influence on an individual's experiences than other types of chronic demands because changes in emotions and cognitions are common symptoms of mental health concerns, such as depression or anxiety (e.g., Kovacs & Beck, 1986). Caregiving demands or shift work may not have as direct an influence on the individual's thoughts, feelings, and sensations. However, the nature of these demands is external to the individual, so they may be experienced differently than demands that stem from internal sources (i.e., physical and mental health concerns). Future research should more thoroughly investigate the characteristics of participant chronic demands to determine the strongest predictors of sleep quality and wellbeing.

Measurement of sleep quality is a limitation because the adapted version of the PSQI (Buysse et al., 1989) used in this study has not been validated. Two components of the PSQI were measured using 15-point scales (i.e., the number of days/nights in the past two weeks, from 0-14), and those scores were subsequently categorized to follow the 4-point measurement scale of the original PSQI to create the composite sleep quality score. Although this step kept the scaling to the original 4-point scale of the PSQI, it failed to

increase the variance in measurement (as was intended with the use of a 15-point scale). Conducting analyses on the full 15-point scale may be advantageous for future research because this scale takes a more nuanced measurement of sleep disruptions and daytime sleepiness.

Future research should investigate the different impacts of chronic demand type on sleep. The different types of chronic demands may influence different aspects of sleep: For example, individuals with caregiving demands may be awakened more frequently in the night (perhaps due to a crying child or a disabled parent) than are individuals with mental health concerns, or individuals with mental health concerns may have more difficulty falling asleep (due to symptoms such as anxiety) than individuals who are shift workers. I was unable to examine these separate sleep variables in the present study due to issues with missing data, but these different impacts may be of key interest to future research.

The different types of chronic demands may be differentially influenced by the ACTION program, in terms of processes and outcome variables. For example, increased acceptance may lead to improved sleep for individuals with physical or mental health concerns (Foster et al., 2013; Koffel et al., 2016; Sanofi, 2016), but may not lead to improved sleep for shift workers or participants with caregiving demands. This difference in improvements may occur because internal experiences (i.e., thoughts, feelings, and sensations) may be the cause of poor sleep for those with physical and mental health concerns, but the causes of poor sleep for shift workers or individuals with caregiving demands may be external to the individual (e.g., having sleep disrupted by a crying

child). Furthermore, individuals with caregiving demands may not be able to significantly reduce their absenteeism as a result of the ACTion program, because a great deal of their absenteeism is due to their caregiving demands (Berecki-Gisolf, et al., 2008; Metropolitan Life Insurance Company, 1999), but they may be able to reduce their presenteeism or increase their productivity. Understanding the differences in sleep between these types of chronic demands, and the different impacts of the ACTion program for different chronic demands, may aid in the development of future programs.

Future research should investigate the efficacy of using a smartphone app for ACT-based programs in an occupational context for both practical and theoretical reasons. From a practical perspective, initial costs will be greater to develop a high-quality intervention using an app compared to developing a series of workshops or even a phone-based coaching program; however, costs may be lower in the long-run because coach/therapist time and physical materials will not be ongoing costs. Furthermore, the intervention and data collection can be integrated seamlessly within the app, creating a simplified process for the participant, and researchers can use notifications to automatically remind participants to complete activities or surveys. From a theoretical perspective, an app may facilitate greater insight into mechanisms of change because researchers can easily add, remove, or alter sections of the intervention to examine which intervention components are driving changes in participant behaviour and outcomes. Additionally, researchers can examine participant engagement in new and objective ways, using indicators such as time spent using the app or a certain feature, number of activities completed, or scores on tests of program content (Zeng, Heffner, Copeland,

Mull, & Bricker, 2016). Previous research examining apps for ACT-based interventions have been conducted with promising findings for smoking cessation and other health behaviours (Bricker et al., 2014; 2017; Järvelä-Reijonen et al., 2018; Levin, Pierce, & Schoendorff, 2017; Ly, Dahl, Carlbring, & Andersson, 2012), but have not been examined in an occupational context. Further research into this area is needed to determine what costs and benefits may come with using an app in terms of development time, money, research insights, and participant experience.

Future research should continue to examine the ACTion program, specifically examining work-related outcomes such as absenteeism, presenteeism, and functioning/productivity. Supervisor reports of productivity or objective measures of absenteeism would be helpful to reduce the biases often associated with self-report measures. Organization-level outcome variables, such as healthcare costs or profits, or group-level outcome variables, such as civility or group productivity, would be of interest if a substantial number of participants can be recruited from a single department/organization. Self-reports or objective measures of cognitive and physical functioning at work would also be of interest both as outcomes of the ACTion program, and as mediators that may lead to improved individual wellbeing and organization-level outcomes.

### **Concluding Remarks**

This project was a very interesting first study evaluating the ACTion program, and this study yielded some notable results. Having a mental health concern was associated with higher stress, strain, and burnout, and participants who experienced

multiple types of chronic demands had higher stress, strain, and emotional exhaustion, as well as lower sleep quality, than did individuals with only one type of demand. These results suggest that workers with mental health concerns or workers with multiple demands may have the greatest need for support. Shift workers may also benefit from additional resources to deal with increased strain and exhaustion. The ACTion program was successful in that it was positively perceived by participants and participants self-reported changes in their behaviour; however, the Time 2 survey may have been administered too soon to detect quantitative improvements in outcomes that reflect participant perceptions and changes in behaviour. The ACTion program did not focus on sleep, and subsequently did not result in changes in participant sleep. This result suggests that targeted sleep content is necessary for substantial changes in sleep. Overall, this study is a promising first step in establishing the ACTion program as a flexible, accessible, and effective workplace program for employees with chronic demands.

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