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Does Social Role Functioning Predict Work Productivity? Further Validation of the Social Role Scale of the Outcome Questionnaire

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Outcome Questionnaire

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ABSTRACT

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Mental health problems are associated with significant losses in work productivity and, consequently, have significant ramifications for business entities and the general economy. Several instruments have been developed to measure productivity-related constructs such as absenteeism and presenteeism. The current study examines the utility of the Outcome Questionnaire-45 (OQ), a commonly used mental health questionnaire, in predicting work productivity. This relationship is explored as a preliminary step in assessing the degree to which changes in mental health brought about by psychotherapy will improve work productivity. Forty-nine participants were recruited from a call center in a small market research firm based in the Western United States. Work productivity was measured using four subscales of the Work Productivity and Activity Impairment (WPAI) questionnaire as well as an objective measure. The OQ and WPAI were administered on a weekly basis over the course of five weeks. Participant characteristic variables and work-time variables were also measured. A mixed models analysis of covariance (ANCOVA) with repeated measures showed that the Social Role (SR) Scale, a subscale of the OQ, was a significant predictor of Presenteeism, Overall Work Impairment, and Activity Impairment subscales. Latent growth modeling (LGM) was used to examine the relationship between the variables while accounting for individual trajectory differences. Although the results suggested that an unconditional model of Overall Work Impairment with SR as a time-varying covariate provided a good fit for the data, standardized regression weights between the variables were not significant. Implications of findings, limitations, and recommendations for future research are discussed.

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Mental Health Problems in the Workplace

Mental health problems affect a large number of individuals. Kessler and colleagues estimated that the twelve-month prevalence for mental disorder among U.S. adults is 26.2%, while the lifetime prevalence is 46.4% (Kessler, Berglund, Demler, Jin, & Walters, 2005; Kessler, Chiu, Demler, & Walters, 2005). Although individuals with a mental disorder experience impairment in their own functioning, it is important to recognize that the effects of mental health problems go beyond the individual level (American Psychiatric Association, 2000).

The prevalence and effect of mental health problems in the workplace has garnered the attention of many researchers. The prevalence and effect of depression, in particular, has received significant attention in the literature. Although it is not this investigator's intention to focus primarily on depression, the current review contains a large number of these studies, paralleling the strong representation in the literature. Goetzel and colleagues (2004) estimated that about 13% of employees suffer from depression, sadness, or a mental disorder in their analysis of data from seven large-scale studies. Stewart, Ricci, Chee, Hahn, and Morganstein (2003) found that 26.5% of a sample of 25,000 U.S. workers endorsed symptoms common to depression.

Diagnosable mental health problems coincide with significant impairment or distress which may be evident in an individual's functioning at work (American Psychiatric Association, 2000). The influence of mental health problems on the working capacity of an employee is considered at greater depth in future sections of the current review. It is important to realize,

however, that although the influence of mental health problems on workplace variables is a major topic of consideration, there is evidence that the relationship is reciprocal. In other words, workplace variables can negatively impact a worker's mental health. Although these factors, often referred to as psychosocial factors, are not reviewed at significant depth in the current literary analysis, they are mentioned since they have been studied at great length by other researchers (Arnetz, Lucas, & Arnetz, 2011; De Raeve, Vasse, Jansen, van den Brandt & Kant, 2007; Inoue et al., 2010; Kelloway & Barling, 1991; Stansfeld & Candy, 2006; Wang, Schmitz, Smailes, Sareen, & Patten, 2010).

Work Productivity

Work productivity is defined as the functioning level of a worker in the quantity or quality of work performed (Cockburn, Bailit, Berndt, & Finkelstein, 1999; Evans, 2004). Work productivity is one component of overall work functioning (Cockburn, Bailit, Berndt, & Finkelstein, 1999). Other components of work functioning include personal factors (e.g., work ethic, work role perceptions) and environmental factors (e.g., labor markets, regulatory influences, and workplace conditions) (Sandqvist & Henriksson, 2004). Researchers and business leaders alike have become increasingly interested in the construct of work productivity. At the organizational level, increased work productivity may enhance the capacity to most efficiently and economically deliver products and services while decreased work productivity may threaten the capacity to do so. Organizations may consider work productivity to be especially important considering increases in external pressures such as competition and costs of resources (Brinkerhoff & Dressler, 1990). Although the current review focuses on the influence of mental health on work productivity, it is important to recognize that the impact of psychosocial factors on work productivity is well documented (Arsenault & Dolan, 1983;

Baruch-Feldman, Brondolo, Ben-Dayan, & Schwartz, 2002; Bowling & Eschelman, 2010; Brooke, 1989; Darr and Johns, 2000; Dysvik & Kuvaas, 2011, Gilboa, Shirom, Fried, & Cooper, 2008; Ishizaki et al., 2006; Karasek et al., 1985; Karlsson, Bjorklund, & Jensen, 2010; Lerner et al., 2003; Murphy, 1989; Patterson, Warr, & West, 2004; Probst, Stewart, Gruys, & Tierney, 2007; Van den Berg et al., 2008; Zacher, Jimmieson, & Winter, 2012).

Absenteeism. Decreases in work productivity have traditionally been measured by absenteeism, the failure to report for scheduled work (Evans, 2004; Johns, 2002). Absenteeism, in the context of mental health problems, occurs when a worker does not report for work due to a mental disorder or a negative emotional state. Absenteeism can also occur due to physical health problems. Hackett and Bycio (1996) hypothesized that absenteeism may be a manifestation of employees utilizing coping strategies, such as staying away from work, to manage physical and psychological states. The relationship between mental health problems and absenteeism is further explored later in the literary analysis.

It is important to note that there are many causes for failing to report to work. For example, absenteeism can be accounted for, in part, by variables related to the work environment. Hill and Trist (1955) suggested that absenteeism occurs in response to work-related strain, while Giebels and Janssen (2005) showed that absenteeism is positively related to interpersonal conflict in the work environment. There is some evidence that absenteeism increases when job satisfaction is low or when workers perceive stronger norms of absenteeism in occupational environments (Lau, Au, & Ho, 2003). Ybema, Smulders, and Bongers (2010) used a longitudinal design to examine relationships between absenteeism, job satisfaction, and burnout in 844 employees from 34 companies in the Netherlands. The results showed that the relationship between absenteeism and job satisfaction was reciprocal. Specifically, lower levels

of job satisfaction were associated with higher rates of absenteeism in subsequent time periods and higher rates of absenteeism were associated with lower levels of job satisfaction in subsequent time periods. Burnout, as hypothesized, was associated with increased absenteeism. Wolpin and Burke (1985) reported a similar finding when they showed that absenteeism and turnover were positively related.

Van Yperen, Hagedoorn, and Geurts (1996) provided evidence for the deleterious effect of perceived inequity on absenteeism. They showed that perceived inequity was associated with intentions to report sick as well as absence behavior. Their study considered 378 Dutch male employees in two metal manufacturing plants. Perceived job inequity was measured by a 5-point Likert scale. Participants completed surveys which measured perceived group absence norms, intent to leave the organization, and intent to report sick. Absence data from the nine months prior to the commencement of the study and the three months following the study were obtained. Results showed that employees who reported high levels of perceived inequity were significantly more likely to have intentions to leave and to report sick. Additionally, these participants demonstrated higher levels of absence frequencies.

External factors and employee characteristics also contribute to changes in absenteeism. Markussen, Roed, Rogeberg, and Gaure (2011) showed that insurance policies, medical provider behaviors, and economic incentives can influence absenteeism. Lau and colleagues (2003) showed that absenteeism is related to demographic variables and employee characteristics. The researchers reviewed 40 published studies in their meta-analysis of counterproductive behaviors and used a combined sample size of 42,359. The results showed that absenteeism tends to be higher among employees who are young, female, and have lower incomes. In addition, the results suggested that absenteeism is higher in employees who, interestingly enough,

demonstrate stronger tendencies to be on time. Bass and colleagues (1996) showed that employee drug use accounted for increases in absenteeism.

Presenteeism. Absenteeism does not account for all losses in work productivity; researchers have become increasingly aware of work productivity losses suffered even when workers are present (Evans, 2004). This phenomenon, known as presenteeism, occurs when workers are physically present, but function at an impaired level (Lerner et al., 2003; Turpin et al., 2004). Presenteeism can be manifest in a number of ways including decreased output, failure to maintain production standards, additional training time, and work errors (Burton et al., 1999). Within some employment presenteeism is easy to quantify, but just as often it remains elusive to define. The relationship between mental health and presenteeism is examined elsewhere in the literary analysis, while other important factors related to presenteeism are explored below.

Presenteeism is associated with other variables related to work productivity such as physical health problems. Bergstrom et al. (2009b) studied whether presenteeism has an impact on future health outcomes by following two working samples for a period of three years. Participants in the first sample were 6,901 public sector employees, while the second sample was comprised of 2,862 employees from the private sector. Measures of presenteeism, general health, and other variables were taken at three different times: baseline, after 18 months, and after three years. Presenteeism was measured by asking participants to estimate the number of times they had gone to work despite feeling sick in the last 12 months on a 4-point Likert scale (i.e., "never," "once," "2–5 times," and "more than five times"). General health was measured by asking respondents to report their general level of health on a 5-point Likert scale (i.e., "excellent," "very good," "good," "fair," and "poor"). Results showed that initial presenteeism levels were significantly associated with an increased risk for poor health, even after accounting

for confounding variables (i.e., general health, mental health, vitality, physical and psychological role function, exhaustion, unwinding and recuperation).

Another research team led by the same principal researcher found that presenteeism predicts absenteeism (Bergstrom, Bodin, Hagberg, Aronsson, & Josephson, 2009a). The researchers analyzed data from a female-dominated public sector employer ($N = 3,757$) and a male-dominated private sector employer ($N = 2,485$). Presenteeism was assessed using the following question: "Has it happened over the previous 12 months that you have gone to work despite feeling that you really should have taken sick leave because of your state of health?" Respondents were prompted to endorse one of the following options: 1) "No, never," 2) "Yes, once," 3) "Yes, 2 to 5 times," and 4) "Yes, 5 times." Sick leave data was obtained from employer records and was coded as a dichotomous variable: annual sick leave less than or equal to 30 days or greater than 30 days. After accounting for previous sick leave, health status, demographic characteristics, lifestyle, and work-related variables, the researchers found that presenteeism was a significant risk factor in predicting future sick leave in both populations.

Mental Health and Work Productivity

A literary search of the impact of mental health on work productivity implicated a variety of related constructs including psychological distress, psychological illness, and well-being. Many researchers, it should be noted, have focused on the impact of depression and stress on work productivity. Work productivity has been quantified a number of ways including, but not limited to, absenteeism, presenteeism, and disability usage. There is substantial evidence suggesting that poor mental health is related to reduced work productivity. Thirteen studies of note are highlighted below to further examine the relationship between mental health and work productivity.

Darr and Johns (2008) considered the relationship between mental health problems and absenteeism in a meta-analysis of 275 effects from 153 studies. Most studies included in the analysis quantified absenteeism by single day absences, times absent, or time lost and obtained absenteeism data by means of self-report instruments or performance data records. The researchers hypothesized, among other things, that absenteeism is significantly and positively related to psychological health problems. Results showed that the correlation was small, but statistically significant (0.20). The researchers found that correlations between variables in postdictive studies were strongest for self-report measures as opposed to objective outcome data (.246 compared to .112 for absence frequency; .127 compared to .115 for time lost).

Serxner, Gold, and Bultman (2001) evaluated the relationship between behavioral health risks and absenteeism. Data from 35,451 employees of 28 organizations representing both the private and public sectors was collected during the study. Behavioral health risk was assessed using the Stay Well Health Path health risk assessment, a 78-item measure which evaluates risk in 10 areas of physical and mental health. Absenteeism was quantified as the number of missed days due to illness or injury during the previous 12 months. High-absenteeism was classified as two or more days of absence. According to multivariate logistic regression analyses, 8 out of 10 health risks measured in the study, including mental health and stress, were significantly associated with absenteeism such that individuals who were classified as high risk were more likely to have high rates of absenteeism.

Dewa, Chau, and Dermer (2010) examined the incidence of short-term disability due to mental health problems in their study of a large Canadian corporation. A total of 12,407 employees were included in the analysis. For the purposes of the study, the category of mental health problems was comprised of schizophrenia, mood disorders, stress-related disorders, and

substance abuse-related mental disorders. Four other illness categories were considered:
respiratory system disorders, digestive system disorders, musculoskeletal system disorders, and
injuries. Disability rates were calculated as the ratio of total days per episode to the number of
episodes. The analysis yielded an overall disability rate of 12.5 episodes/10 person-years. Of
the specific illness categories considered in the study, mental health problems were associated
with the second highest disability frequency (2.1/100 person-years) after respiratory disorders.
The study also showed that the approximate average costs associated with mental health
problems ($18,000/episode) largely outweighed all other illness categories.

Hilton and Whiteford (2010) explored the relationship between psychological distress
and workplace accidents, workplace failures, and workplace successes in government and private
sector employees. Workplace outcomes were measured by the World Health Organization
Health and Work Performance Questionnaire (HPQ), a measure of employee work productivity
for physical and mental health conditions. Psychological distress was measured by the Kessler 6
(K6) scale, a six-item scale embedded in the HPQ. The investigators utilized three regression
analyses while controlling for gender, age, marital status, education level, job category, physical
health, and employment sector. Results showed that moderate and high levels of psychological
distress were significantly associated with increased workplace accidents, increased failures at
work, and decreased success at work.

Many researchers have provided evidence that depression is related to reduced work
productivity. Munce, Stansfeld, Blackmore, and Stewart (2007) evaluated the relationship
between depression and absenteeism using data from a national epidemiologic survey. Data
from over 9 million individuals with chronic pain was used in the study. The results showed that
participants who reported being absent from work in the past week due to an illness were

significantly more likely to report experiencing depression based on results from a structured clinical interview.

Koopmans, Roelen, and Groothoff (2008) examined data from 9,910 Dutch employees to study, among other things, employee characteristics related to absenteeism due to depression. The researchers drew their sample from a selection of 15% of the Dutch working population. Absence data from between April 2002 and November 2005 was used in the analysis. Older employees and men were more likely to have longer absence durations than their counterparts. Employees in larger companies had shorter absences. Additionally, employees in educational and public services, commercial services, and health care had the longest mean duration of absence, while employees in the industrial sector had the shortest absence periods.

Allen, Hyworon, and Colombi (2010) linked the occurrence of depression to significant deficits in health and work productivity. The researchers considered 39,097 employees and collected data comprised of 41 measures of depression severity, health, presenteeism, absenteeism, as well as a variety of contextual characteristics (e.g., work-life balance, financial concerns, job characteristics). Participants who reported symptoms of depression were stratified into four classifications of severity for the purposes of the analysis: mild, moderate, moderately severe, and severe. In the analysis, the researchers used data reduction techniques to confine the model to a total of 17 variables. Almost 23% of participants in the study reported symptoms of depression. Results of structural equation modeling provided ample empirical support for the overall fit of the model. Depression and other variables in the model accounted for 25% of the variance in general health and 17% of the variance in absenteeism. Participants who were young and female were most likely to have higher rates of absenteeism. Also, absenteeism was positively associated with greater disease prevalence, lifestyle risks, and poor general health.

The results also showed that depression and other variables in the model accounted for 41% of the variance in presenteeism, a finding which corresponded to other investigations of depression and presenteeism (Wang et al., 2010; Lerner et al., 2003).

Stewart and colleagues (2003) used data from 1,127 U.S. workers to quantify work productivity loss associated with depressive symptoms. Participants included were workers who completed an initial interview, a depression screening, and an extended interview. Two hundred and nineteen of the participants included in the analysis met criteria for depression as measured by the PRIME-MD, a validated diagnostic interview. For the purposes of the study, criteria from the DSM-III-R were used. Results showed that depressed workers in the sample reported approximately 4.1 more hours of absenteeism and presenteeism than their non-depressed counterparts. The researchers showed that 81% of the total work productivity losses were due to presenteeism.

Dewa, Goering, Lin, and Paterson (2002) studied the economic impact of depression by analyzing short-term disability usage. The researchers collected data from three large insurance companies who employed approximately 12% of their sector nationwide. Almost 63,000 employees were considered for inclusion in the study and data from 1,521 employees were used in the analysis. Depression severity was assessed using a checklist of symptoms corresponding to the Diagnostic and Statistical Manual, 4th revision (DSM-IV). Results showed that approximately 2.5% of all employees considered for the study had at least one short-term disability episode due to depression during the course of the study. Employees who claimed short-term disability remained on disability for an average of 95.2 days. Eight percent of those who claimed short-term disability eventually claimed long-term disability. Severity of depression was associated with future long-term disability claims. The authors argued that short-

term disability due to depression should be concerning to business leaders and management personnel.

Some research has demonstrated that occupational type can impact the relationship between mental health and work productivity. Hilton, Schuffham, Sheridan, Cleary, and Whiteford (2008) used the HPQ to compare white-collar and blue-collar workers. They measured absenteeism, presenteeism, and mental health in 60,556 full-time employees. The results showed that absenteeism significantly increased as mental health decreased in blue-collar workers. However, among white-collar workers and service workers considered in the study, decreases in mental health were not associated with significant absenteeism increases. When the effects of absenteeism and presenteeism were combined, white-collar workers experienced an average work productivity loss of 6%, while blue-collar workers experienced an average work productivity loss of 25%.

These findings corresponded to results presented by Neftzger and Walker (2010) who asserted that current practices of measuring work productivity may not be appropriate for knowledge-based jobs, or positions which require complex cognitive functions and team interdependency (Turpin et al., 2004). The authors explained that absenteeism, for instance, does not always result in work productivity loss for tasks which can be completed remotely. Also, the researchers illustrated that incremental increases in work productivity translate to greater organizational gains for some positions.

Occupational task can also affect depression-related work productivity loss. Lerner et al. (2004) administered the WLQ to 389 employees, 246 of which had been diagnosed with a depressive disorder. The four subscales of the WLQ were used in the analysis as were measurements of depression severity, depression symptoms, and occupational requirements,

among other variables. Results of multiple regression analyses indicated that employees who engaged in occupational tasks related to decision-making and communication experienced greater work impairment and more absences due to depression. In addition, participants who engaged in more frequent customer contact were more likely to have difficulty handling occupational demands.

The thirteen studies described above highlight a number of important issues when examining the relationship between mental health and work productivity. Several of the studies provide evidence that decreases in mental health are associated with decreased work productivity. These reductions have usually been quantified in terms of absenteeism, presenteeism, disability usage, workplace accidents, and failures at work. The relationship between mental health and work productivity has manifested in a number of different work environments. Still, context is important. It is arguable that changes in work productivity (as far as the construct is currently measured) can be observed in greater clarity in production-based jobs. Also, it is important to note that there is some evidence that the negative association between mental health and work productivity manifests more strongly when self-report measures, as opposed to objective measures, are used.

General health problems, mental health, and work productivity. To understand the relationship between mental health and work productivity, it is important to also examine the role of general health problems. General health problems are negatively associated with work productivity and commonly occur in individuals with mental health problems (Boles, Pelletier, & Lynch, 2004; Brandt-Rauf, Burton, & McCunney, 2001; Burton et al., 1999; Darr & Johns, 2008; Kalimo & Vuori, 1991; Lenneman, Schwartz, Giuseffi, & Wang, 2011; Loeppke et al., 2007). Kessler, Ormel, Demler, and Stang (2003) showed that comorbidity of mental health

problems and general health problems is associated with role impairment (sickness absence plus work cut-back days). The researchers recruited 5,877 participants in a nationally representative household study. Participants responded to items which helped to assess physical disorders, mental disorders, and role impairments. Four physical disorders (hypertension, arthritis, asthma, and ulcers) were considered in the study. Although the analysis showed that these four physical disorders were significantly associated with role impairment, cases which exhibited role impairment were almost completely confined to cases with comorbid mental disorders. Results of odds ratios between physical and mental disorders showed that 29 of 36 were statistically significant at a .05 level. Almost half of the associations showed that mental disorders were over two times as prevalent among participants with physical disorders.

Relative to general health problems, mental health problems make unique and significant contributions to work productivity loss. Kessler et al. (2008) studied 7,320 employees of a large national information technology firm by administering the HPQ and obtaining medical claim information. Results of a regression analysis showed that depression was the largest contributor to work productivity decreases out of nine illness categories (cancer, cardio-metabolic conditions, diabetes, digestive conditions, energy-sleep conditions, other mental conditions, musculoskeletal conditions, respiratory conditions and other conditions). Besides depression, migraines were the only other condition which was independently associated with work productivity loss. In addition, anxiety and chronic sleep problems, despite having no effect on work productivity alone, were found to exacerbate the effects of depression in comorbid cases.

The effect of depression on work performance (relative to other chronic conditions) has been studied by other researchers. Wang and colleagues (2003a) studied over 2,000 employees in four occupational categories (reservation agents, customer service representatives, executives,

and railroad engineers). The researchers measured absenteeism, presenteeism, and critical

incidents (job-related accidents and failures) using the HPQ. Chronic conditions considered in

the study included arthritis, asthma, emphysema, depression, and chronic headaches. An

analysis of covariance was used to determine the association between the variables. Among all

of the conditions considered, depression was the only condition strongly associated with

absenteeism, presenteeism, and critical incidents. Kessler et al. (1999) used data from two

national surveys ($N = 3032$) and showed that participants who reported a major depressive

episode in the previous month were more likely to report higher short-term work disability

utilization. In fact, the authors showed that depression was associated with a higher rate of short-

term work disability than almost all other chronic conditions. Depression symptom severity was

positively associated with short-term work disability use.

When the effects of mental health problems and general health problems are combined,

the impact is substantial (Iverson, Lewis, Caputi, & Knospe, 2010). Parker, Wilson,

Vandenberg, DeJoy, and Orpinas (2010) collected data from 1,723 employees of a large retail

organization in the southeastern United States to evaluate the effect of comorbid physical and

mental health problems on work productivity. Participants were categorized according to four

different conditions: healthy, physical health condition, mental health condition, and comorbid

mental health and physical health condition. Nine measurements of physical health conditions

which commonly occur with mood and anxiety disorders were used in the study. Work

productivity assessments included measures of absence, turnover, accidents, lateness, job

performance, and work limitations. Twenty-eight percent of the sample was classified as

healthy, while 23.7%, 20.4%, and 27.7% fell into the physical health, mental health, and

comorbid mental health and physical health conditions, respectively. Results showed that

participants who reported symptoms due to both physical illness and mental health problems were significantly less productive on all work productivity measures.

Further examination of the relationship between mental health problems and general health problems suggests that it is often difficult to delineate the two constructs. Some evidence suggests that the mental health problems can lead to expenses in other illness categories (Hankin, Kessler, Goldberg, Steinwachs, & Starfield, 1983). Croghan, Obenchain, and Crown (1998), for example, showed that depressed employees are more likely to seek treatment for nondepressive illnesses. The researchers collected data from 3,439 patients from 20 U.S. employers who sought insurance claims following their participation in psychiatric treatment for depression. Results showed that more than 90% of depressed adults in the study sought medical care for at least one nondepressive illness following the initiation of depression treatment. Treatment costs associated with the nondepressive illness accounted for more than 70% of the total costs.

In addition to these findings, it is important to note that limiting the mental health treatment resources available to employees may result in increased general health costs (Rosenheck, Druss, Stolar, Leslie, & Sledge, 1999). In this study, an analysis of 41,441 employees of a large U.S. corporation showed that when total costs of mental health services per user declined by 37.7 percent, non-mental health services costs among mental health users increased by 36.6 percent. These results might suggest that employees may react to changes in mental health coverage by utilizing other channels to treat their mental health problems. Also, it is possible that some employees may have experienced exacerbated physical health problems as a result of untreated mental health problems.

Operationalizing Work Productivity

A variety of measures have been developed to gauge changes in work productivity (Mattke, Balakrishnan, Bergamo, & Newberry, 2007). Measures of work productivity are often used to assess problems in the workplace, help decision makers to appropriately allocate resources, and provide outcome data (Schwartz & Riedel, 2010). Most of these measures are self-report instruments which ask respondents to report their own level of work productivity over a specific amount of time. Some researchers have used objective means to quantify work productivity, although collecting data through this method is often more difficult (Burton, Conti, Chen, Schultz, & Edington, 1999; Evans 2004). While some researchers may consider objective work productivity data to be ideal compared to alternatives such as self-reports, it is important to note that self-report measures can make unique and independent contributions to the measurement of work productivity (Allen & Bunn, 2003a; Prasad, Wahlqvist, Shikiar, & Shih, 2004). Psychometric properties of self-report measures vary from instrument to instrument, but many self-report measures have demonstrated adequate concurrent and predictive validity. For example, Allen and Bunn (2003b) examined employees from two large manufacturing companies to determine whether self-report measures of productivity coincided with work productivity data obtained from administrative records. Seven self-report work productivity measures (e.g., "ability to work required hours" and "overall effectiveness at work") and fourteen objective measures (e.g., "'controllable' absentee hours") were used. In the initial stage, data from 4,505 participants were used, while data from 4,186 participants were collected several months later. The results showed that employees who had incurred work productivity losses based on objective measures were more likely to report work productivity losses on self-report measures. In other words, support for the concurrent validity of the self-report measures

used was found. Additionally, the results showed that most of the objective productivity measures were predicted by the self-report measures, suggesting evidence of predictive validity.

Several factors need to be considered when measuring work productivity. Evans (2004) argued that psychometric properties, ease of administration, and the targeted setting ought to be taken into account. Brooks, Hagen, Sathyanarayanan, Schultz, and Edington (2010) contested that self-report measures produce the most realistic estimates of work productivity losses when used to gather data about a sample of employees rather than individual workers. Schwartz and Riedel (2010) suggested that work productivity measures ought to be designed with the intention of improving employer interventions. Furthermore, they suggested that work productivity measures which quantify, or monetize, productivity changes may be most useful in workplace settings. Also, work productivity measures, the authors recommended, should account for complexities such as productivity losses stemming from multiple sources (e.g., multiple health conditions) and productivity losses stemming from team-interdependent workplace behavior. Prasad et al. (2004) acknowledged several limitations inherent in measures of work productivity, several of which are mentioned here. First, quantitative assessments only represent one method of measurement. Second, occupational output is often produced by teams of workers rather than one individual. Third, measures do not often account for shifts in occupational tasks. Fourth, measures do not often account for the differential impact of specific conditions. Lastly, measures do not account for impairment occurring outside of the workplace.

The Work Productivity and Activity Impairment (WPAI) questionnaire as a measure of work productivity. The WPAI, like several other instruments, was developed to measure productivity at work. The measure provides an assessment of an individual's absenteeism, presenteeism, overall work impairment, (an index of total work productivity loss),

and activity impairment (an index of difficulty in daily activities) over the span of seven days (Reilly, Zbrozek, & Dukes, 1993). Several studies have evaluated the characteristics and psychometric properties of the WPAI. Prasad and colleagues (2004) asserted that the psychometric properties of the WPAI have been tested more extensively than six other commonly used work productivity measures. The researchers also suggested that the construct validity, test-retest reliability, and generalizability of the WPAI are well-established. They recognized that the WPAI has been validated for several different disease states and that the administrator and respondent burden is low. Loeppke et al. (2003) selected an expert panel who reviewed a variety of work productivity measures based on psychometric characteristics, generalizability, the ability to translate data into monetary units, and practicality. The researchers concluded that the WPAI is a reliable tool for regular assessment of workplace productivity and suggested that it may be particularly useful in research work. Lofland, Pizzi, and Frick (2004) recognized the adequate construct validity and reliability of the measure and highlighted its usefulness in quantifying monetary adjustments due to work productivity changes. Finally, Evans (2004) acknowledges that at the time of his publication, the WPAI was one of four work productivity measures which have been translated into other languages other than English.

The Social Role (SR) Scale of the Outcome Questionnaire-45.2 (OQ) as a measure of work productivity. As discussed previously, a number of measures have been developed to assess work productivity. Trotter et al. (2009) recently used a subscale from the OQ, a commonly used mental health questionnaire, to examine the relationship between mental health and work productivity in 62 employees from the Utah State Hospital. The OQ was originally developed to track an individual's level of distress and progress in psychotherapy. The SR, a

subscale of the OQ, was of particular interest to the researchers given that the scale measured functioning at work, school, and other related areas. There is some evidence that the SR provides an index of mental health; Mueller, Lambert, and Burlingame (1998) showed in their study that the items of the OQ, including items making up the SR subscale, related to a general factor of mental distress. In addition to using the SR as a measure of mental health, Trotter and colleagues assessed work productivity using the WPAI. The measures were administered a month apart, over the course of four months. The results of a mixed models analysis of covariance (ANCOVA) showed that the SR subscale was a strong predictor for two of the WPAI subscales, Presenteeism and Activity Impairment. Each one-point increase of SR was associated with increases of 3.4% and 3.8%, respectively, for Presenteeism and Activity Impairment. The results provided a more accurate estimation of the relationship between mental health functioning and work productivity and provided support for the use of SR in occupational settings. Also, the results helped to lay groundwork for further examining the degree to which changes in mental health brought about by psychotherapy will improve work productivity.

The Cost of Mental Health Problems in the Workplace

The economic impact of mental health problems has garnered the attention of several researchers. Costs associated with mental health problems have been estimated directly and indirectly to account for health care expenses and losses due to work productivity (Langlieb & Kahn, 2005). Eight studies are mentioned below to further describe important issues related to the costs associated with mental health problems. Goetzel and colleagues (2003; 2004) analyzed data from 374,799 employees of six large employers over the course of three years. The results showed that employers paid a total of $179 per employee per year for health-related costs, absence-related costs, and short-term disability costs. Approximately 53% of the costs

associated with mental health problems were medical care expenses due to mental health problems, while absenteeism and short-term disability usage was associated with 34% of the total costs and 13% of the total costs, respectively. Also, compared to normal counterparts, participants who experienced mental or emotional distress reported an average of 10.7% more absenteeism and 15.3% more presenteeism per employee per year.

In a large-scale case study of a large U.S. insurance company, Johnston, Westerfield, Momin, Phillippi, and Naidoo (2009) compared the combined cost of employee depression, anxiety, and other emotional disorders to other disease categories. In the disease category of interest, a total of 11 categorizations were used including major depressive disorder, attention-deficit hyperactivity disorder, anxiety disorders, and eating disorders. The researchers utilized administrative health care claim data and included data from 4,031 participants in the analysis. The results showed that the psychological conditions of interest were the fifth costliest of all disease categories, corresponding to an average cost per case of $1,646. Results also showed that 53% of the costs were indirect costs (absenteeism, presenteeism, short-term disability, long-term disability and family and medical leave). It is important to note that this figure is larger than what was reported by Goetzel and colleagues (2003; 2004) presumably because Johnston et al. (2009) focused on a subset of employees who belonged to one of the disease categories of interest instead of the whole sample. Of the direct costs, pharmaceutical costs (59%) and outpatient services (40%) represented the highest proportion. Inpatient costs totaled 1% of the direct costs. Indirect costs were largely comprised of absenteeism (57%), presenteeism (28%), family and medical leave (9%), and short-term disability (6%).

Relative to other mental health conditions, the economic impact of depression is substantial (Goetzel, Ozminkowski, Meneades, Stewart, & Schutt, 2000). Relative to general

health conditions, the impact is substantial as well. Goetzel and colleagues (1998) showed that high-risk depressed employees incurred more medical costs than ten other common treatable health risk factors in 61,568 employees from six large U.S. employers. Compared to low-risk depressed employees, high-risk depressed employees incurred approximately 70% more medical costs. High-risk individuals in the next highest category (individuals who reported high levels of stress) incurred approximately 46% more medical costs than their counterparts. Greenberg et al. (2003) estimated the U.S. economic burden of depression in 2000 by replicating methodology used a decade earlier. In calculating total economic costs, researchers included direct costs, mortality costs associated with depression-related suicides, and workplace costs (absenteeism and presenteeism). The results showed that the economic burden of depression remained relatively stable ($83.1 billion in 2000 compared to $77.4 billion in 1990), although treatment rates of depression increased by over 50% (from 27.9% to 43.6%). The authors suggested that the imbalance may have occurred because the larger number of employees treated may have been linked to an overall decrease in the quality of care. The researchers found that 31% of the total costs in 2000 were due to direct medical costs, 7% were suicide-related mortality costs, and 62% were workplace costs. The researchers estimated that the costs of direct medical treatment for depression increased from 25.7% of the total cost in 1990 to 31.4% in 2000. Among inpatient, outpatient, and pharmaceutical treatment method categories, pharmaceutical treatment represented the highest increase in the percent of total costs over the ten years considered in the study. Pharmaceutical treatment of depression, the researchers estimated, increased from 2.4% of the total cost in 1990 to 12.5% in 2000.

Druss, Rosenchek, and Sledge (2000) compared health and disability costs of depressive disorders with four other major chronic health conditions. The researchers also compared

absenteeism among the conditions. Participants were 15,153 employees from a large U.S.

corporation. Costs to the employer and number of sick days incurred as a result of illness were

modeled using a series of ordinary least-squares multiple regression equations. Results showed

that participants with depressive disorders used significantly more sick days compared to

individuals with the other chronic conditions studied. Employees with depressive disorders

incurred medical costs comparable to three of the four chronic medical conditions in the study

($5,425 annual per capita). Individuals with the fourth chronic condition, hypertension, incurred

costs significantly less when compared to treatment costs associated with depressive disorders.

Also, participants who were diagnosed with a depressive disorder in addition to one of the three

other comparable chronic medical conditions incurred 1.7 times more costs than participants who

were diagnosed with just a chronic medical condition.

Curkendall, Ruiz, Joish, & Mark (2010) estimated the costs associated with

antidepressant-treated depression due to decreased work productivity using annual short-term

disability costs. Data was obtained from an employee database containing approximately 17

million entries. The investigators followed a cohort of individuals ($N = 22,427$) who had been

prescribed antidepressants after being diagnosed with depression. Participants were followed for

12 months to assess short-term disability usage compared to a control sample. Annual mean

short-term disability costs of depressed participants ($1,038) were greater than that of the control

group ($325). The researchers also presented evidence suggesting that the total cost of work

productivity loss may be directly related to the severity of symptoms.

The Effectiveness of Mental Health Treatment

Effective mental health treatment leads to improvements in work productivity. Seven

studies which demonstrate this principal are highlighted below. Wang, Simon, and Kessler

(2008) reviewed data from the National Institute of Mental Health (NIMH)-Harvard Work

Outcomes Research and Cost-Effectiveness Study (WORCS), an initiative developed to address

the barriers to mental health treatment implementation within institutional settings. One

objective of the NIMH-WORCS study, among other objectives, was to quantify the economic

impact of absenteeism, presenteeism, job-related accidents, and job turnover. Sixteen large

companies from diverse economic sectors were chosen for the study. Employees included in the

analysis represented a wide variety of occupations. Intervention in the study consisted of

telephone-based evaluations of depression with transition to in-person psychotherapy or

telephone-based psychotherapy. Overall improvement in work functioning was quantified by

measuring job retention and hours at work. The results showed that work productivity increased

by an average of 2.6 hours per week after the intervention.

Hilton and colleagues (2009) studied the effect of mental health treatment on the

relationship between work productivity and psychological distress. The researchers recruited

60,556 Australian employees from 58 different employers to participate in the cross-sectional

study. Work productivity was measured using the HPQ and psychological distress was measured

using the K6. The investigators used a general linear model univariate ANOVA procedure with

work productivity as the outcome variable and treatment status as the fixed factor. Treatments

available to participants in the study were cognitive behavioral therapy, pharmacotherapy, or a

combination of cognitive behavioral therapy and pharmacotherapy. To evaluate the effect of

treatment, a type-III sum of squares was used. The results showed that an active intervention for

depressed employees yielded the equivalent of a 3.5-hours increase in productivity per week.

The authors also found that work productivity improvements following successful treatment

approximated those of workers without a history of mental health problems. These findings

provided support for the effectiveness of screening and treating employees for mental health problems.

Pharmacotherapy treatment of mental health problems, including depression, leads to improvements in work productivity in employee populations (Wang, Simon, & Kessler, 2003b; Burton, Morrison, & Wertheimer, 2003). Simon and colleagues (2000) randomly assigned 290 depressed employees to treatment of desipramine, fluoxetine, or imipramine in their study. The Hamilton Depression Rating Scale (HAMD), a 24-item measure which assesses depression-related symptoms in the last week, and the Structured Clinical Interview for DSM-III-R were administered periodically over two years. Measures of economic burden were administered every six months and were comprised of the probability of paid employment, days missed from work, and total health services cost. A mixed model analysis of covariance showed that recovery from depression was associated with significant increases in paid employment probability and reductions in time lost from work due to illness. Specifically, treated patients were approximately 25% more likely to obtain or maintain employment. Positive responders incurred medical costs totaling approximately one-third of costs of their counterparts and missed approximately one-third of the work days missed by participants with persistent depression.

Rost, Smith, and Dickinson (2004) utilized a randomized controlled trial to test the effect of improving depression management on absenteeism and work productivity. Participants were 479 patients from 12 community primary care practices. Before randomization to usual care or enhanced care, participants were categorized by depression treatment patterns. Health care professional were trained to encourage participants in the enhanced care condition to initiate pharmacotherapy or psychotherapy. Absenteeism and work productivity measures were obtained at baseline, 6, 12, 18, and 24 months. Absenteeism was defined as the total number of

work hours lost due to illness or doctor visits. Work productivity was measured by asking participants to rate their own effectiveness at work over the last two weeks. Three hundred and twenty six participants were included in the analysis. Results showed that participants in the enhanced care condition reported improvements in absenteeism and significant increases in work productivity. At the end of the study, participants in the enhanced care condition reported 6.1% greater work productivity and 22.8% less absenteeism when compared to baseline measurements. It should be noted that intervention effects were greatest for consistently employed subjects. These participants experienced an increase of 8.2% in work productivity over the course of the study and a decrease of 28.4% in absenteeism. Estimated annual economic benefits associated with increased work productivity and decreased work productivity were $1,982 and $619, respectively, per depressed full-time employee.

Claxton, Chawla, and Kennedy (1999) studied the impact of antidepressant treatment on depression-related absenteeism in a retrospective cohort study. Antidepressants used in the research included medications from both the tricyclic antidepressant (TCAs) and selective serotonin reuptake inhibitor (SSRIs) classes. Participants were 630 individuals from large employers in the U.S. who had been diagnosed with major depressive disorder and had started a new episode of treatment. A comparison of pairwise *t*-tests revealed that absenteeism increased before antidepressant treatment began and decreased following antidepressant treatment for all medication options except for paroxetine.

Berndt and colleagues (1998) provided evidence of the negative association between work performance and depression severity in their three-phase randomized clinical trial of antidepressant intervention. Participants were 493 individuals who met criteria for chronic depression. Depression was measured by using the HAMD. Work performance was drawn from

six items assessing work impairment from six different behavioral measures. Variables were measured at baseline, at week 4, and at week 12. The results showed that depression scores fell to about half of baseline values after twelve weeks of treatment. Results of a regression analysis showed that symptom severity of depression was negatively associated with work performance. The results also provided evidence that a reduction in depressive symptoms was associated with an improvement in performance. Specifically, the researchers found that every one-standard deviation reduction in depression-related symptoms was associated with a 0.7 standard deviation increase in work performance.

The aforementioned studies suggest that mental health treatment leads to improvements in work productivity. Improvements in work productivity have been evident in samples undergoing treatment by means of pharmacotherapy as well as psychotherapy. This finding has been supported by analyses of studies utilizing both treatment-based and cross-sectional methods.

Employer Effects on Mental Health

Despite the rather convincing evidence that mental health treatment increases work productivity and thus affects profitability, mental health issues may be generally neglected by employers. Several possible reasons may explain this phenomenon. Employers may not be aware of the indirect costs associated with mental health problems and, consequently, may not recognize the full economic impact (Burton et al., 1999; Greenberg, Finkelstein, & Berndt, 1995). They may hesitate to make decisions regarding the mental health of their employees due to rising health care costs, even if they recognize the need for such decisions (Crofton, Lubalin, & Darby, 1999) and the work environment they help to create may be partly to blame. Also, employers may be ignorant of treatment options available for mental health problems or may be

unable to provide for such services (Goetzel, Ozminkowski, Sederer, & Mark, 2002). One line

of research has suggested that employers may avoid addressing the mental health needs of their

employees because doing so would require complex and complicated programs (Dugdill, 2000).

In addition to employer behaviors, employee behaviors and other factors may contribute

to the lack of utilization. Employees may be unaware that they are experiencing a mental health

problem or may deny experiencing symptoms altogether (Langlieb & Kahn, 2005). They may

choose to forgo mental health treatment or may be unaware of available options (Goetzel et al.,

2002). In particular, they may be reluctant to raise mental health issues through an employer

provided program for fear that the employer will somehow become aware of their psychiatric

status. Also, employees may seek services from health professionals who are unskilled in

recognizing psychological symptoms, leading to decreased detection of mental health conditions

(Langlieb & Kahn, 2005).

Although some employers may be deterred from providing effective mental health

treatment options to employees, research has suggested that direct costs of treatment are offset

by subsequent work productivity gains (Greenberg et al., 2003; Langlieb & Kahn, 2005;

Optenberg, Lanctot, Herrmann, & Oh, 2002; Simon et al., 2001; Wang et al., 2003b). There is

some evidence that outcomes are enhanced when treatment is provided by a mental health

specialist compared to a general health provider. Zhang, Rost, and Fortney (1999) recruited

participants from a representative sample of Arkansas residents and were assessed at baseline, at

6 months, and at 12 months. A total of 11,078 individuals participated in the study, 171 of which

were treated for depression over the course of the study. Of the participants treated for

depression, 56 were treated by a mental health specialist, while the remaining participants

received resources from general health care providers. Lost earnings were calculated as the

product of number of work absence days and worker wages. Results of a regression analysis showed that average lost earnings for participants receiving treatment from a mental health specialist were $2,101 lower than average lost earnings for participants treated by general health care providers. Taking into account the additional cost of mental health treatment, depression treatment by mental health specialists was associated with a net savings of $877 per participant.

A number of employer interventions have been developed to increase mental health and work productivity in workers (Birdi et al., 2008; Bjorklund, Grahn, Jensen, & Bergstrom, 2007; Guzzo, Jette, & Katzell, 1985; Krampen, 2010; Schwartz & Riedel, 2010; Sullivan, 2004). These interventions require programs that are distinct from traditional health-based programs (Dunnagan, Peterson, & Haynes, 2001). Examples of effective programming include facilitating the delivery of mental health information to employees and facilitating screening services (Allen, 2004; Anderzen & Arnetz, 2005; Wang et al., 2006). Such programming can lead to significant improvements in employee well-being, mental health, or consumer knowledge (Anderzen & Arnetz, 2005; Billings, Cook, Hendrickson, & Dove, 2008; Tsutsumi, Nagami, Yoshikawa, Kogi, & Kawakami, 2009).

Characteristics of Call Centers

Mental health and work productivity are particularly crucial in call center workers. Call centers are telephone-based establishments that allow employees to interact directly with customers. Many large companies rely on these customer interactions as the primary means of interface. According to one estimate, approximately 70% of customer-business interactions occur within call centers (Borst, Mandelbaum, & Reiman, 2004). Call centers have been considered to be an important key for the economic growth of many companies and make up an estimated 2 to 3% of the entire national workforce (Gans, Koole & Mandelbaum, 2003;

Mandelbaum, 2006; Marinho-Silva, 2007). Because efficiency is a key component of call center processes, objective and subjective measures of work productivity are often used (Borst et al., 2004).

Limited research exists for the relationship between mental health and work productivity in call center samples. Some researchers have linked psychosocial factors of call centers (e.g., job control, uncertainty, and task complexity) to work productivity-related variables such as job satisfaction, absenteeism, and turnover. These work productivity-related variables have traditionally proved problematic for call center workplaces. Bakker, Demerouti, and Schaufeli (2003) studied psychosocial variables implicated in employee absenteeism and turnover in 477 call center employees. Absenteeism and turnover were assessed using brief self-report measures comprised of two and three items, respectively. A variety of brief self-report measures (comprised of up to six items) were used to measure psychosocial variable categories of interest (job demands, job resources, health problems, involvement, and dedication). Results of structural equation modeling analyses showed that absenteeism was related to work pressure, emotional demands, and task changes, while turnover intentions were related to social support, supervisory coaching, performance feedback, and time control. These findings corresponded to analyses conducted by Lewig and Dollard (2003) on emotional exhaustion in call centers.

In a study of 234 Swiss call center employees, Grebner and colleagues (2003) compared psychosocial variables in the workplace to those found in more traditional job positions (cooks, sales assistants, nurses, bank clerks, and electronic technicians). The researchers also studied the relationship between psychosocial factors and several organizational climate variables. The investigators found that call center employees experienced lower job control, lower task complexity, lower task variety, and greater uncertainty when compared to more traditional job

positions. These findings paralleled results obtained by similar research (Zapf, Isic, Bechtoldt, & Blau, 2003). Grebner et al. (2003) also found that job control predicted turnover intention, while job complexity predicted job satisfaction and affective commitment within the call center sample, findings which have been duplicated in other work environments (Clegg, Wall, & Kemp, 1987; Clegg & Wall, 1990).

Hauptfleisch and Uys (2006) studied psychosocial variables in a call center environment using a qualitative design. Participants ($N = 26$) were chosen based on potential contribution to the study and were involved in three types of qualitative data collection: narrative, interview, and observation. Four themes were elicited during data collection. First, call center employees tended to perceive co-workers as their principal source of support in the work environment. The researchers found that employees relied on team members for motivation, enjoyment, and knowledge. Second, the call center environment was often seen as uncertain. Employees needed to adapt in reaction to unexpected stressful events. Third, call center employees tended to see management practices as unfair or unsupportive and believed that they were perceived by management personnel as replaceable. Lastly, call center employees reported experiencing depersonalization in the context of customer interactions.

Konradt, Hertel, and Schmook (2003) studied the impact of management behavior, job stress, and general stress on call center employee's ratings of psychological strain and job satisfaction. Job-related stressors of interest were concentration demands and timing control. Participants were 72 employees from 19 smaller companies in Northern Germany. The researchers found that the quality of management behavior predicted outcomes of psychological strain and job satisfaction. Specifically, employees who held more favorable perceptions of management with regards to the quantity of feedback, the clarity of goals, and the quantity of

participation, reported more positive outcomes. This finding was not accounted for by the other independent variables, suggesting that management behavior makes independent contributions to employees' levels of stress.

Summary of Literary Analysis

In summary, a review of the literature revealed a large number of studies related to mental health problems and work productivity. Work productivity has typically been examined by studying absenteeism and presenteeism and a large number measures have been developed to assess these constructs. Many studies show that mental health problems are positively related to absenteeism and presenteeism. In other words, as mental health problems increase, work productivity decreases. From an economic perspective, decreases in work productivity take a significant toll beyond the individual level. Employers have incentive to provide means for employees to have access to effective mental health services because the benefits of increased work productivity has been shown to outweigh the costs of mental health services. Work productivity may be an especially important factor in call center populations given the emphasis on efficiency and the increased risk for employees to develop mental health problems.

Statement of the Problem

The relationship between mental health and work productivity has been previously studied using the SR and subscales of the WPAI (Trotter et al., 2009). The current study adds to the current literature by providing further validation of the SR as a predictor of work productivity in a call center environment. This is undertaken while accounting for important participant characteristic variables and work-time variables. Data from both self-report measures and an objective measure were used to measure work productivity. In addition, the current study seeks

to examine the relationship between trajectories of variables over time using an extension of structural equation modeling.

Two hypotheses are evaluated in the current study:

1. A mixed models analysis of covariance (ANCOVA) will show that the SR is a significant predictor of absenteeism, presenteeism, overall work impairment, activity impairment, and an objective work productivity measure.

2. Latent growth modeling (LGM) will produce models of good fit for absenteeism, presenteeism, overall work impairment, activity impairment, and an objective work productivity measure when the SR is used as a time-varying covariate.

Method

Setting

Participants in the current study were recruited from a small market research and strategy firm based in the Western United States. During the course of the study, the firm employed approximately 125 individuals, most of which worked in the data collection call center of the firm. Call center employees considered for inclusion initiated outbound telephone calls and conducted pre-scripted telephone surveys to obtain information for advertising, political, governmental, and other projects. Twenty eight different survey types, or projects, were administered over the full course of the study. Call center employees worked on up to nine projects in a given week. In addition to conducting surveys, call center employees completed computerized call reports in order to document the results of surveys. Some call center employees were occasionally called on to perform other duties such as data cleaning or monitoring of calls. Call center employees were required to work at least 25 hours per week (i.e., at least five five-hour shifts) and could work up to 40 hours per week. They were allowed

up to 15 minutes of paid break time per shift worked, and up to three non-planned (i.e., last minute notice) absences per two month period. Call center employees earned eight USD per hour (75 cents more than minimum wage), with increases given to employees who performed better than average.

Measures

Outcome Questionnaire-45. The Outcome Questionnaire-45 (OQ) is a measure of mental health that provides a total score and three subscale scores: Symptom Distress, Interpersonal Problems, and Social Role Functioning (SR). The SR measures performance in social roles, such as those in the workplace. The OQ has been used to track patient change in psychotherapy through repeated measurements by gauging an individual's level of psychosocial functioning (Lambert et al., 2004). Higher total scores and subscale scores indicate higher levels of impairment.

Structural components of the OQ have been evaluated using factor analysis. Mueller, Lambert, and Burlingame (1998) found that confirmatory factor analysis showed that a one-factor model fit the data as well as two-factor and three-factor models in the American version. In a Dutch sample study, three-factor model produced a reasonable fit (de Jong et al., 2007). In a study of an Italian sample, Lo Coco and colleagues (2008) evaluated six competing models and found that a four bi-level factor solution produced the best fit. This model generated factor loadings for latent variables of symptoms distress, interpersonal relations, and social role as well as an overall maladjustment variable.

Reliability data based on a normative sample yielded high reliability for the OQ Total Score and adequate to high reliability for the SR. Administration on a sample of 157 individuals yielded test-retest reliability of .84 for the OQ Total Score and .82 for the SR over a three-week

time period. Internal consistency for this same normative sample was .93 for OQ Total Score and .70 on the SR. OQ Total Scores have shown to be relatively consistent over time in non-patient samples. Correlation coefficients between OQ Total Scores from one to ten weeks ranged from .66 and .82 (Lambert et al., 2004).

The OQ Total score has demonstrated high concurrent validity, showing moderate to strong correlations to measures in three different patient samples (Lambert et al., 2004). Correlation coefficients between the OQ Total Score and Symptom Checklist 90-R General Severity Index (.78-.88), OQ Total Score and Inventory of Interpersonal Problems Total Score (.66-.81), and OQ Total Score and Social Adjustment Rating Scale Total Score (.71-.81) were moderate to strong (Lambert et al., 2004).

Concurrent validity for the SR was measured in three patient samples using the Social Adjustment Rating Scale Total Score. Correlation coefficients between these two measures were moderate to high (.54-.73). In addition, Trotter et al. (2009) reported high correlations between the SR and two subscales of the WPAI. The researchers reported that four administration of measures on this sample yielded average correlation coefficients of .55 between the SR and the Presenteeism scale of the WPAI and .59 between the SR and the Activity Impairment scale of the WPAI.

WPAI - General Health Version (WPAI:GH). Work productivity was measured, in part, by the WPAI:GH, one of the most widely used work productivity instruments. The WPAI:GH was one of the first instruments to measure both absenteeism and presenteeism and also has the capability of quantifying the effect of work productivity loss (Reilly et al., 1993). The psychometric properties were first tested in a study of 106 employed individuals affected by a health problem. The authors found that the WPAI:GH demonstrated strong concurrent validity

with the General Health Perceptions (GHP) measure and three subscales from the SF-36: role function (physical), role function (emotional), and pain. Correlations were positive and ranged as high as .81. The authors reported that validation measures explained 54 to 64% of the variance in WPAI:GH variables. Test-retest correlations were high and ranged from .70 to .96 for all validation measures (Reilly et al., 1993).

The WPAI:GH is made up of six items intended to gauge an individual's level of work productivity over the previous seven days. It asks respondents about their current employment status (Q1), work loss due to a health problem (Q2), work loss due to other reasons (Q3), total hours worked (Q4), the effect of their health on work productivity (Q5), and the effect of their health on normal activities (Q6; Appendix A). Health problems are defined as any physical or emotional problem or symptom. Administration of the measure results in four subscales: Presenteeism, Absenteeism, Overall Work Impairment, and Activity Impairment. Equations 1 through 4 show the calculation of each WPAI:GH subscale.

$$\text{Absenteeism} = 100[Q2/(Q2+Q4)] \tag{1}$$

$$\text{Presenteeism} = 100(Q5/10) \tag{2}$$

$$\text{Overall Work Impairment} = 100(Q2/\{Q2+Q4\}+\{[1-Q2/(Q2+Q4)][Q5/10]\}) \tag{3}$$

$$\text{Activity Impairment} = 100(Q6/10) \tag{4}$$

Surveys Completed Ratio. Surveys Completed Ratios were used as an objective measure of work productivity. Since the raw number of surveys completed was influenced by several factors, it was necessary to adjust this number by accounting for individual differences due to projects worked on, time spent on each project, and time spent on all projects combined. Surveys Completed Ratios were calculated for each participant on a weekly basis. A ratio above one indicated that a given employee performed better than the weekly average for all call center

employees. A ratio below one indicated that a given employee performed worse than the weekly average. For the purpose of the study, weeks were defined as the seven days prior to each day of data collection. To obtain the Surveys Completed Ratio for one employee in a given week, the following formula was used:

$$\frac{\sum_{i=1}^{n} e_i}{\sum_{i=1}^{n} \frac{E_i t_i}{T_i}}$$

where *n* is the number of projects worked on by a given employee during the week, e_i is the number of surveys completed by the employee on project *i*, t_i is the time spent by the employee on project *i*, E_i is the number of surveys completed by all call center employees on project *i*, and T_i is the time spent by all call center employees on project *i*.

Work-time variables. The principal investigator was given access to information pertaining to the performance of individual employees in the call center. This information included number of surveys completed and hours spent on each project. Performance data spanned the time of the study and included data generated in between data collection days. In addition to calculating Surveys Completed Ratios, two additional variables, Work Hours and Percent Qualified, were calculated. Work Hours was calculated by adding the number of hours an employee spent at work in a given week. Percent Qualified was calculated by determining the ratio of hours spent on completing surveys to Work Hours.

Procedure

All call center employees were invited to participate in the study and were first made aware of the study two days prior to the first data collection day. Call center employees were informed of the dates they could participate and were given the opportunity to provide an email address to the principal investigator to complete the study electronically. Employees were

informed that their email would not be used for any other purpose and that providing an email address did not imply consent to participate in the study. In addition to this, emails were also retrieved from information previously collected by the firm.

Two formats of the measures, a paper format and an electronic format, were used. The electronic format of the study was created by the principal investigator using Qualtrics® web-based program. The electronic format of the study required that participants provide a response to every item on the measures. Participants who failed to respond to every item of the paper format were asked by the principal investigator to do so. During the first administration, participants were asked to complete the following measures: Consent to be a Research Subject Form (Appendix C), Research Profile and Demographics Form (Appendix D), the OQ, and the WPAI:GH. The Research Profile and Demographics Form prompted participants to provide the following information: age, first (native) language, gender, race/ethnicity, highest level of education completed, marital status, known medical/physical problems, and known mental health/emotional problems. During the remaining administrations, the participants were asked to complete only the OQ and the WPAI:GH.

Data was collected over the course of five weeks with each administration occurring one week apart. Employees were notified that they could participate in the study once during each day of data collection and a maximum of four times. Email invitations were sent the morning of each day of data collection. Paper copies of the study and advertisement flyers were distributed to each employee on each day of data collection. Advertisement flyers instructed employees that they could complete the measures one of four ways: by completing a paper format of the study, completing an electronic format of the study using one of several designated work stations,

clicking the link provided in the email from the principal investigator, or manually typing the

link in a web browser.

Employees were informed that the first administration of the measures would take an

estimated 20 minutes, while the second, third, and fourth administrations[1] would take an

estimated 15 minutes. They were instructed to not complete the measures during work time.

Employees received a gift card to Walmart® stores equivalent to 5.00 USD each time they

completed the measures. Participants could receive up to four gift cards (a total compensation of

20.00 USD) over the full course of the study. Participants were given the option to receive

compensation directly from the principal investigator or through the mail.

All participants were informed that only the primary investigator would have access to

their individual responses, that their responses would be held confidential, and that their

individual responses would not be released to any individual within the company. Furthermore,

employees were informed that participation in the study was voluntary, that the study was being

administered by an independent researcher, and that refusing to take the survey would have no

impact on their standing with their employer.

Results

Seventy-five employees were invited to participate in the study. The initial sample

included 53 individuals who completed at least one administration of the measures. However, a

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[1]   The original design of the study called for a four-week data collection phase. However, because some

participants were not made aware of the chance to participate in the study until the second week of data collection,

five participants were invited to complete the measures one additional time during the fifth week of data collection.

This data was included in ANCOVA analyses, but not in LGM analyses due to misspecification problems when

estimating parameters. It should be noted that despite this change in the procedure, an identical ANCOVA analysis

conducted on the first four weeks of data produced similar results with respect to the significance of variables.

total of 18 observations were removed, resulting in the partial exclusion or complete exclusion of seven participants. Of these seven participants, two participants were not employees of the firm during the entire span of the study, four participants did not log any hours on projects which could provide quantifiable outcome data in one or more weeks of the study, and one participant had not logged any work hours during one week of the study.

A total of 158 observations from 49 participants were used in the analysis. Of the 49 participants included in the analysis, 26 of the participants (53.1%) completed the measures four times, 14 of the participants (28.6%) completed the measures three times, three of the participants (6.1%) completed the measures two times, and six of the participants (12.2%) completed the measures one time. Eighty nine (56.3%) of total 158 observations were completed using the paper format of the study, while 69 (43.7%) were completed using the electronic format.

Participant Characteristics

The age of participants ranged from 18 to 59 years (M = 27.53; SD = 12.15). Frequencies for categorical variables are provided in Table 1.

Table 1.

Frequencies of Categorical Variables

Variable	Frequency	Variable	Frequency
Gender		Education	
Male	27 (55%)	Some College	27 (55%)
Female	22 (45%)	High School	10 (20%)
Ethnicity		Four year Degree	5 (10%)
Caucasian	40 (82%)	Some High School	2 (4%)
Hispanic	5 (10%)	GED	2 (4%)
Pacific Islander	1 (2%)	Other	2 (4%)
African American	1 (2%)	Technical Degree	1 (2%)
Native American	1 (2%)	Marital Status	
Other	1 (2%)	Single	33 (67%)
Medical Problems		Married	7 (14%)
Yes	12 (24%)	Divorced	6 (12%)
No	37 (76%)	Other	3 (6%)
Mental Problems		First Language	
Yes	11 (22%)	English	48 (98%)
No	38 (78%)	Spanish	1 (2%)

Because some participants endorsed "other" when asked to indicate ethnicity, marital status, or highest level of education, a description of the written responses of these participants is provided. When participants were asked to report their ethnicity, one participant identified as "Asian/Caucasian." When asked to report marital status, three participants endorsed "other" and listed the following: having a "girlfriend," being "engaged," and "living with [a] partner[.]" When asked to report their highest level of education completed, two participants indicated that

they had earned an Associate's Degree. In addition to this, the two participants who reported

completing some high school indicated that they had completed the 11th grade when asked to

specify the last grade completed.

Of the participants who endorsed having a medical or physical problem, seven listed one

problem, one listed two problems, three listed three problems, and one listed six problems.

When asked to describe the problems, participants listed the following: arthritis, asthma,

migraine headaches, high blood pressure, temporomandibular joint disorder, scoliosis,

endometriosis, gastroesophageal reflux disease, fibromyalgia, multiple sclerosis, epilepsy,

temporal lobe seizures, cystic fibrosis, acne, and back injury. In addition, one participant listed

"depression" and "anxiety" when asked to describe medical or physical problems. This

participant also listed these conditions when asked to describe mental health and emotional

problems.

Of the participants who endorsed having a mental health or emotional problem, four

listed one problem and seven listed two problems. When asked to list specific problems, eight of

the participants listed depression and five listed anxiety or stress. Other problems listed by

participants included the following: bipolar disorder, attention-deficit hyperactivity disorder, and

anger.

Descriptive Statistics

Descriptive statistics for total OQ score, SR and dependent variables are provided in

Table 2.

Table 2

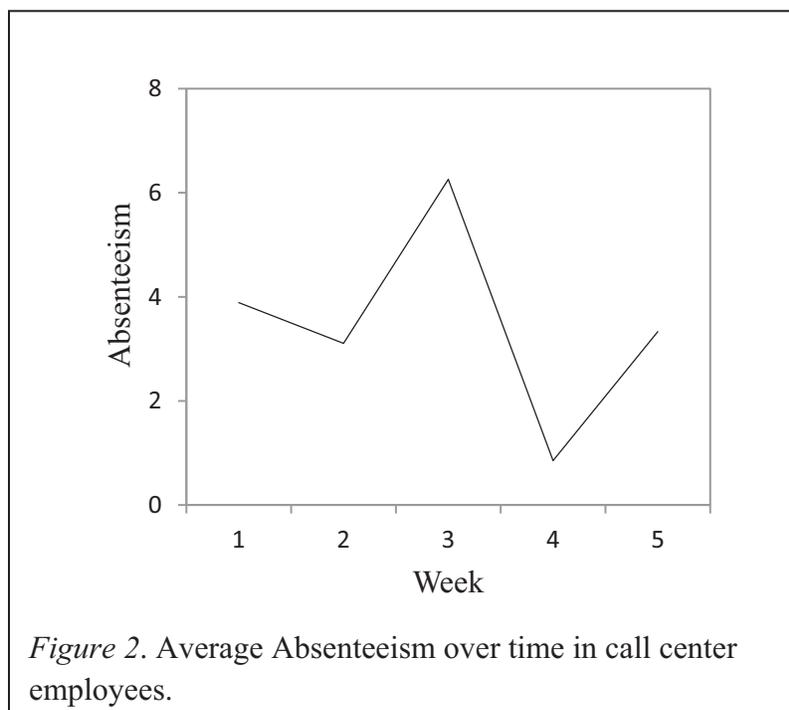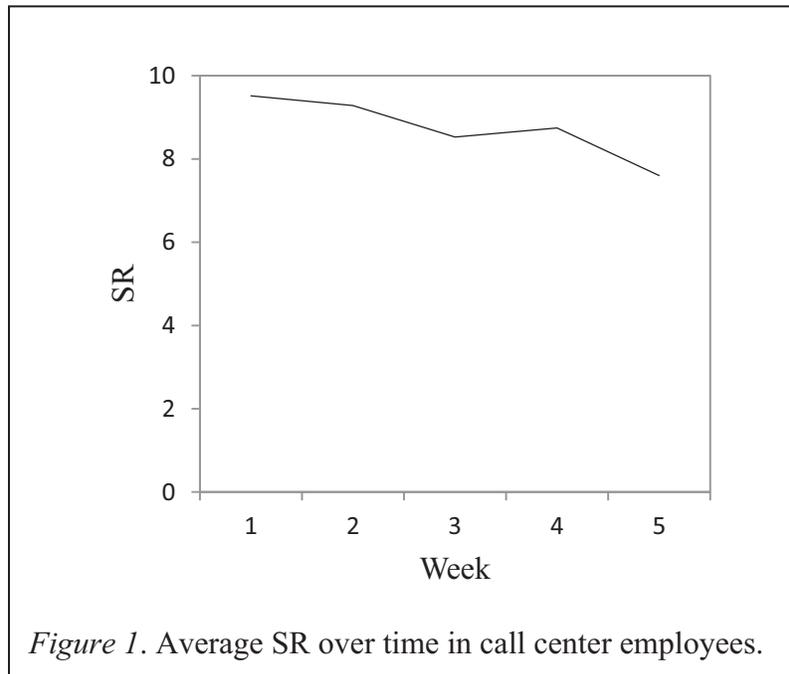*Descriptive Statistics for Total OQ Score, SR and Dependent Variables*

Variable	Min	Max	*M*	*SD*
Total OQ Score	0.00	180.00	46.16	23.33
Social Role Scale	0.00	36.00	8.96	4.52
Absenteeism	0.00%	82.76%	3.53%	11.16
Presenteeism	0.00%	100.00%	11.33%	17.53
Overall Work Impairment	0.00%	100.00%	14.36%	20.47
Activity Impairment	0.00%	100.00%	16.27%	21.84
Surveys Completed Ratio	0.25	1.50	0.99	0.18

Average SR decreased slightly over the course of the study, despite no intervention present. This movement was accompanied by decreases in averages of work productivity variables. The mean and standard deviation of total OQ scores across all observations in the current study ($M = 46.16$; $SD = 23.33$) were comparable to total OQ scores previously reported in a community sample of 815 adults ($M = 45.19$; $SD = 18.57$). Similarly, SR scores ($M = 8.96$; $SD = 4.52$) were comparable to scores from the community sample ($M = 9.56$; $SD = 3.87$; Lambert et al., 2004).

In WPAI:GH subscales, the current study reported lower means than those reported in an English-speaking subset of participants in a study by Gawlicki, Reilly, Pepielnicki, and Reilly (2006). Lower means were found in all four WPAI:GH subscales: Absenteeism (3.53% vs. 5.0%), Presenteeism (11.33% vs. 20.6%), Overall Work Impairment (14.36% vs. 23.5%), and Activity Impairment (16.27% vs. 24.0%).

Figures 1 through 5 show the average SR, Absenteeism, Presenteeism, Overall Work Impairment, and Activity Impairment over the course of the study. Generally speaking, all

variable averages decreased over the course of the study. A graph for average Surveys

Completed Ratio was not included because only minor deviations from the initial measurement

were expected since office averages were used in calculating individual Surveys Completed

Ratios. Correlations among SR and all dependent variables are reported in Table 3.

Figure 1. Average SR over time in call center employees.

Figure 2. Average Absenteeism over time in call center employees.
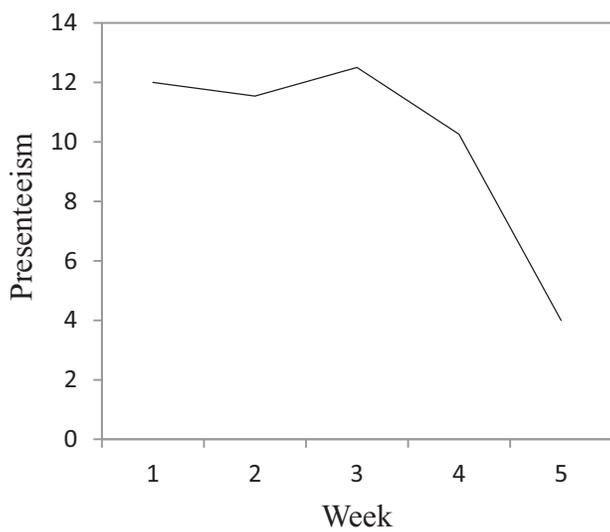
Figure 3. Average Presenteeism over time in call center employees.
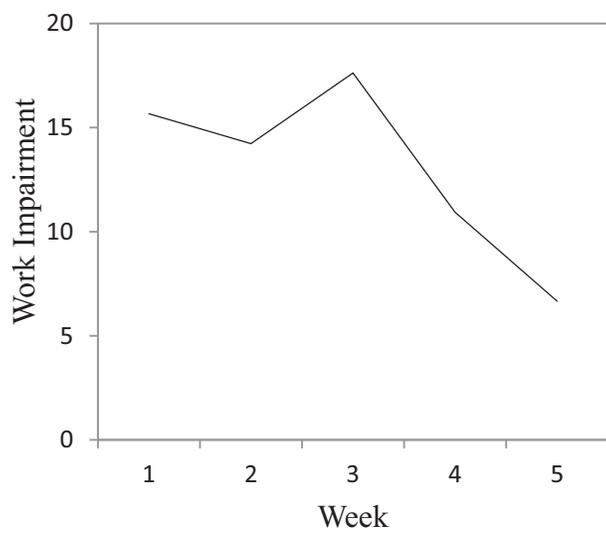
Figure 4. Average Work Impairment over time in call center employees.

Figure 5. Average Activity Impairment over time in call center employees.
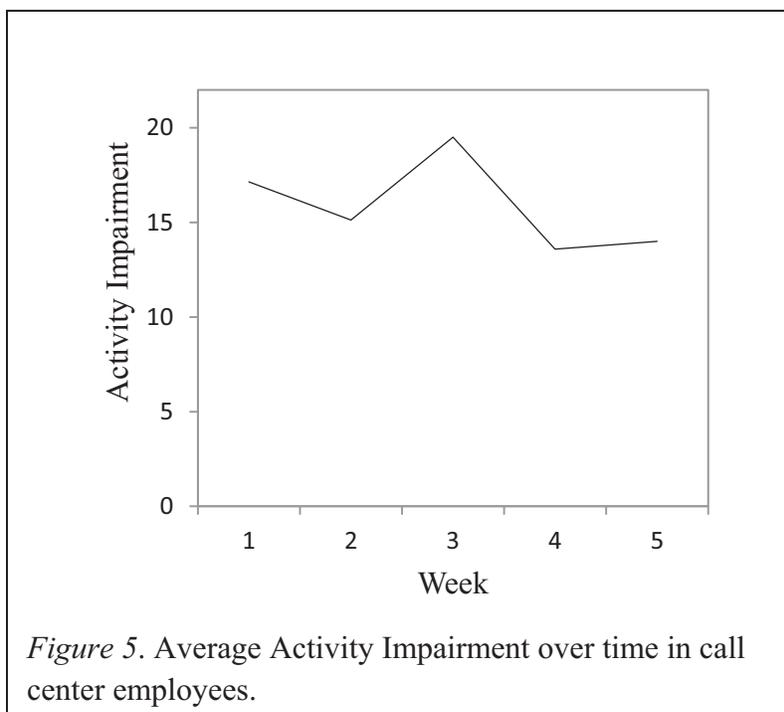
Table 3

Correlations among SR and Dependent Variables

	1	2	3	4	5
1. Social Role Scale					
2. Absenteeism	.10				
3. Presenteeism	.50**	.05			
4. Overall Work Impairment	.47**	.54*	.87*		
5. Activity Impairment	.44	.16	.75*	.71*	
6. Surveys Completed Ratio	-.13	-.13	-.17	-.21*	-.08

*$p < .05$. ** $p < .01$.

Mixed Models ANCOVA with Repeated Measures

The relationship between SR and work productivity variables was analyzed using a mixed models ANCOVA with repeated measures. This method of analysis was chosen to include both continuous and categorical variables and account for correlations within subjects

due to repeated measures. The effect of SR was tested separately for each of the five dependent variables. Three steps were completed in ANCOVA analyses to test the relationship between the variables.

Initial models. First, the effect of participant characteristic variables and work-time variables was tested for each dependent variable. Participant characteristic variables included age, language, gender, ethnicity, education, marital status, medical problems, and mental health problems. Work-time variables were total hours worked and time spent on qualified projects. Table 4 provides *F*-values for continuous variables in the initial models, while Table 5 provides *F*-values for categorical variables.

Table 4

F-values for Continuous Variables in Initial Models

Dependent Variable	Age	Work Hours	Percent Qualified
Absenteeism	0.16	3.90	1.55
Presenteeism	0.11	0.03	0.58
Overall Work Impairment	0.30	1.39	2.15
Activity Impairment	1.79	8.49**	0.09
Surveys Completed Ratio	0.19	2.80	27.91**

** $p < .01$.

Table 5

F-values for Categorical Variables in Initial Models

	GEN	ETH	LAN	MAR	EDU	MED	MEN
Absenteeism	0.30	0.31	0.83	0.22	0.82	0.92	0.69
Presenteeism	0.36	2.08	0.78	28.69**	12.98**	1.01	22.98**
Overall Work Impairment	0.03	1.07	0.01	19.30**	4.69**	0.06	16.89**
Activity Impairment	1.18	2.13	0.75	18.03**	5.57**	0.00	24.65**
Surveys Completed Ratio	2.94	0.24	1.68	1.20	2.55*	0.36	0.65

Note. GEN = Gender; ETH = Ethnicity; LAN = Language; MAR = Marital Status; EDU = Education; MED = Medical Problems; MEN = Mental Health Problems.
*p < .05. ** p < .01.

For initial models, several significant relationships between participant characteristic variables and dependent variables were observed. Work hours was significantly related to Activity Impairment such that participants who worked greater number of hours were more likely to report lower levels of Activity Impairment. Additionally, participants who produced higher percentages of time worked on qualified surveys were significantly more likely to produce higher Surveys Completed Ratios. Participants who identified their marital status as divorced reported the lowest levels of Presenteeism, Overall Work Impairment, and Activity Impairment followed by participants who identified their marital status as single, married, and "other," respectively. Participants who completed a high school degree reported the lowest level of Activity Impairment, while the participant who completed a technical degree reported the lowest level of Presenteeism and Overall Work Impairment relative to other categories. Participants who completed a high school degree produced the highest levels of objective work productivity followed by participants who completed the 11th grade and participants who completed a GED, respectively. Participants who endorsed having no mental health problems

were significantly more likely to report lower levels of Presenteeism, Overall Work Impairment, and Activity Impairment.

  Reduced models. In the second step of the analysis, reduced models were generated for each dependent variable by excluding non-significant variables, one at a time, from the model. This process started with excluding the least significant variable and discontinued when remaining variables were significant. Table 6 and 7 provide F-values for the reduced models.

Table 6

F-values for Continuous Variables in Reduced Models

Dependent Variable	Age	Work Hours	Percent Qualified
Absenteeism		7.93**	
Presenteeism			
Overall Work Impairment			3.72
Activity Impairment	3.57	9.02**	
Surveys Completed Ratio	3.57	4.01*	30.80**

$*p < .05.$ $** p < .01.$

Table 7

F-values for Categorical Variables in Reduced Models

	GEN	ETH	LAN	MAR	EDU	MED	MEN
Absenteeism							
Presenteeism		2.87*		30.74**	14.77**		37.55**
Overall Work Impairment				21.74**	6.07**		31.77**
Activity Impairment		2.12		18.47**	5.59**		39.00**
Surveys Completed Ratio			3.63	3.57*	2.85*		

Note. GEN = Gender; ETH = Ethnicity; LAN = Language; MAR = Marital Status; EDU = Education; MED = Medical Problems; MEN = Mental Health Problems.
$*p < .05.$ $** p < .01.$

In addition to significant relationships previously identified in initial models, the following relationships were observed in reduced models. Greater work hours were significantly related to lower levels of Absenteeism and higher levels of Surveys Completed Ratios. Ethnicity was associated with Presenteeism outcomes. The participant who identified as Pacific Islander reported the lowest level of Presenteeism relative to other categories, while the participant who identified as "Asian/American" reported the highest level. In addition, marital status was significantly related to Surveys Completed Ratios. Divorced participants produced the highest Surveys Completed Ratios, while participants who identified their marital status as "other" produced the lowest Surveys Completed Ratios.

Final models. In the third step of the analysis, the effect of SR was tested for each dependent variable. This was done by adding SR to the reduced model. Table 8 provides *F*-values and *p*-values for SR in each final model.

Table 8

Effects of SR in Final Models

Dependent Variable	*F*	*p*
Absenteeism	0.32	.57
Presenteeism	7.45	<.01
Overall Work Impairment	7.35	<.01
Activity Impairment	4.97	.03
Surveys Completed Ratio	1.49	.23

When added to reduced models, SR was significant for three of five dependent variables: Presenteeism, Overall Work Impairment, and Activity Impairment. Tables 9 and 10 provide *F*-values for all variables in the final models. With the exception of the relationship between ethnicity and Presenteeism, significant relationships in final models matched those previously

identified in the reduced models. The relationship between ethnicity and Presenteeism was not significant in the final model.

Table 9

F-values for Continuous Variables in Final Models

Dependent Variable	Age	Work Hours	Percent Qualified
Absenteeism		6.74*	
Presenteeism			
Overall Work Impairment			1.97
Activity Impairment	3.30	7.14**	
Surveys Completed Ratio	3.44	4.26*	32.25**

*p < .05. ** p < .01.

Table 10

F-values for Categorical Variables in Final Models

	GEN	ETH	LAN	MAR	EDU	MED	MEN
Absenteeism							
Presenteeism		2.38		19.12**	9.81**		33.37**
Overall Work Impairment				14.61**	3.86**		25.53**
Activity Impairment		1.86		11.87**	3.92**		34.71**
Surveys Completed Ratio	3.62		2.70	3.99*	3.16*		

Note. GEN = Gender; ETH = Ethnicity; LAN = Language; MAR = Marital Status; EDU = Education; MED = Medical Problems; MEN = Mental Health Problems.
*p < .05. ** p < .01.

To calculate effect sizes, omega squares, ω^2, were determined. This statistic is appropriate for ANCOVA analyses and is advantageous because it is not affected by sample size (Cohen, 1988). Omega squares were calculated using the following formula:

$$\omega^2 = \frac{SS_{effect} - df_{effect} * MS_{error}}{SS_{total} + MS_{error}}$$

where SS_{effect} is the sum of squares for SR, df_{effect} is the degrees of freedom for SR, MS_{error} is the

mean square of the error for the model, and SS_{total} is the total sum of squares for the model.

Effect sizes were calculated for SR in each model. Effect sizes for final models are reported in

Table 11. Classification of the size of the effect was taken from Cohen (1988).

Table 11

Effect Sizes for SR in Final Models

Dependent Variable	ω^2	Classification
Absenteeism	.010	
Presenteeism	.022	Small
Overall Work Impairment	.029	Small
Activity Impairment	.035	Small
Surveys Completed Ratio	-.003	

Analyses of Power

Analyses of power were performed for Absenteeism and Surveys Completed Ratio since

relationships between SR and these variables did not reach significance. At an acceptable level

of power (.80), an additional 27 participants were needed to achieve a reasonable likelihood of

detecting an effect for Absenteeism. This calculation was based on previous data reported by

Trotter et al., (2009). For Surveys Completed Ratio, an analysis of power was conducted using

data from the current study. In conducting this analysis, it was assumed that the size of the effect

observed in the current study represented an average effect for variables. To achieve a

reasonable likelihood of detecting an effect for Surveys Completed Ratio, an additional 95

participants were needed in the current study.

Latent Growth Modeling (LGM) Analyses

A second method of analysis was undertaken to understand the relationship between the changes observed in the independent variable and the changes in the dependent variables. These relationships were examined separately in a series of analyses using LGM. LGM is an extension of structural equation modeling (SEM) and shares fundamental advantages with this method of analysis (Duncan, Duncan, & Strycker, 2004). For the current analyses, SPSS Amos Version 20 was used. To estimate missing values, the full-information maximum likelihood (FIML) method was used. This method estimates missing values without excluding any observed values and is less-biased than other common methods such as pairwise deletion, listwise deletion or mean-imputation (Wothke, 2000). Only data from the first four weeks was used in LGM analyses due to misspecification problems when calculating estimates.

LGM was chosen to supplement the previous set of analyses for several reasons, several of which are explicated here. First, LGM is able to incorporate repeated measures by modeling the change of variables over time. Second, LGM can account for variation in individual trajectories of cases. This is done in the current analyses by creating two latent variables, intercept and slope, and constraining the direct relationships between latent variables and the dependent variable. Third, LGM can incorporate time-varying covariates, allowing for contributions of a second set of repeated measures to exist in the model. Fourth, LGM can test the contribution of exogenous variables such as gender, ethnicity, or education on individual trajectories of each case. Lastly, LGM allows for tests of the overall model fit.

Assumptions made in the LGM analyses included linearity and the effect of time. Individual trajectories were tested on the basis of linearity, that is, successive increments of change observed in variables were assumed to be uniform. Also, changes observed in LGM

analyses were assumed to be systematically related to the passage of time (Duncan et al., 2006).

Three steps were performed in conducting the LGM analyses.

Unconditional models. First, unconditional models were generated for each dependent variable (*Figure 6*). These models included four repeated measures of the dependent variable and two latent variables, slope and intercept. Specific sets of assumptions and initial constraints used in unconditional models are reported in Table 12.

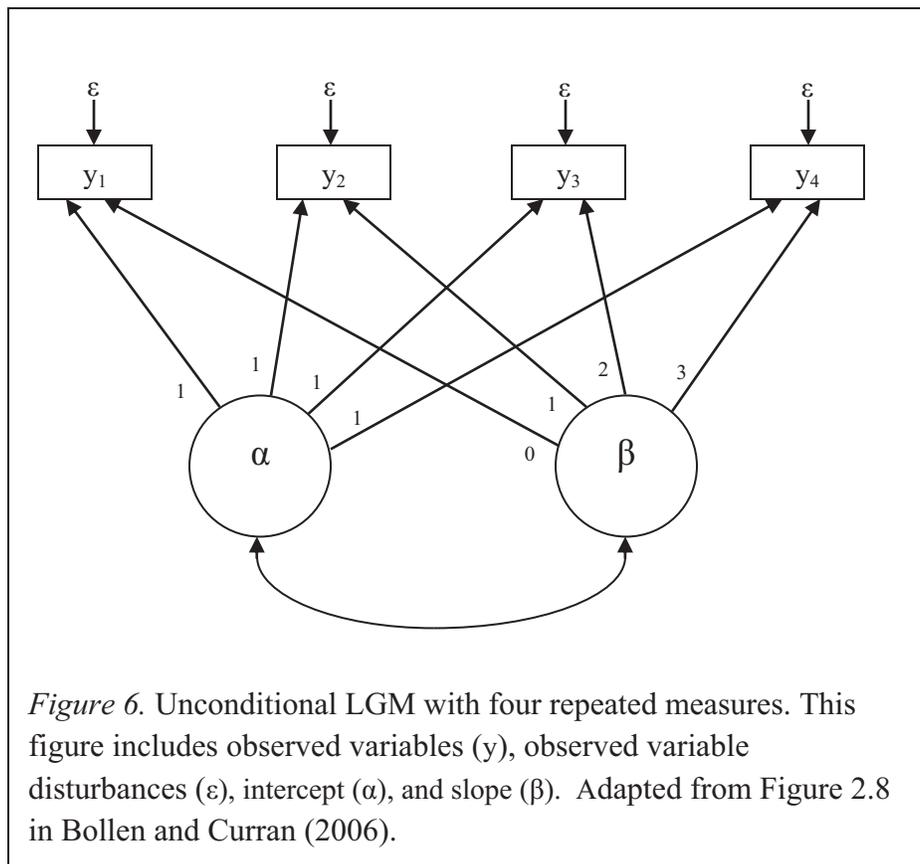*Figure 6.* Unconditional LGM with four repeated measures. This figure includes observed variables (y), observed variable disturbances (ε), intercept (α), and slope (β). Adapted from Figure 2.8 in Bollen and Curran (2006).

Table 12

Assumptions Used in Unconditional Models. Adapted from Table 2.1 Bollen and Curran (2006).

Assumption Set	Value
Means of trajectory variable disturbances across all cases and times	0
Means of intercepts across all cases	0
Means of slopes across all cases	0
Covariance of trajectory variable disturbances and disturbance deviations from the mean of intercepts across all times	0
Covariance of trajectory variable disturbances and disturbance deviations from the mean of slopes across all times	0
Covariance of disturbance deviations from the mean of intercepts across all cases	0
Covariance of disturbance deviations from the mean of slopes across all cases	0
Covariance of disturbance deviations from the mean of slopes and disturbance deviations from the mean of intercepts across all cases	0
Covariance of trajectory variable disturbances across all cases	0
Covariance of trajectory variable disturbances across all times	0

One additional constraint was imposed on one of the models (Absenteeism) in order to achieve minimization. This constraint was imposed by setting the covariance between the disturbance of the slope and the disturbance of the intercept to zero. Fit indices for the unconditional models are provided in Table 13.

Table 13

Fit Indices for Unconditional Models

	χ^2	p	CFI	RMSEA
Absenteeism	9.646	.140	.000	.113
Presenteeism	9.390	.094	.931	.135
Overall Work Impairment	6.927	.226	.943	.090
Activity Impairment	20.694	.001	.731	.256
Surveys Completed Ratio	9.352	.096	.801	.135

Conditional models. For the second step of the LGM analyses, conditional models were generated for each dependent variable to estimate the contribution of each participant characteristic variable as time-invariant covariates. Figure 7 provides a representation for a conditional model. Conditional models were generated by adding one participant characteristic variable to the unconditional model and then repeating the process, one at a time, with all other participant characteristic variables. Work-time variables (Work Hours and Percent Qualified) were not included in the conditional models since these variables were not time-invariant, but tended to fluctuate over the course of the study for each case. Also, work-time variables were not included as time-variant covariates in later models for model simplicity and minimization purposes. One additional constraint was imposed on one of the models (Activity Impairment) with one of the participant characteristic variables (Mental Health Problems) in order to prevent negative variances in the calculated estimates. This constraint was imposed by setting the covariance between the disturbance of the slope and the disturbance of the intercept to zero. Specific sets of assumptions and initial constraints used in conditional models are reported in Table 14. Unstandardized regression weights and standard errors for slopes and participant characteristic variables as well as intercepts and participant characteristic variables are provided in Tables 15 and Table 16, respectively.

Table 14

Assumptions Used in Conditional Models. Adapted from Table 5.1 in Bollen and Curran (2006).

Assumption Set	Value
Means of trajectory variable disturbances across all cases and times	0
Means of intercepts across all cases	0
Means of slopes across all cases	0
Covariance of trajectory variable disturbances and disturbance deviations from the mean of intercepts across all cases and times	0
Covariance of trajectory variable disturbances and disturbance deviations from the mean of slopes across all cases and times	0
Covariance of disturbance deviations from the mean of intercepts across all cases	0
Covariance of disturbance deviations from the mean of slopes across all cases	0
Covariance of trajectory variable disturbances and subsequent trajectory variable disturbances across all cases and times	0
Covariance of trajectory variable disturbances and covariate variable variances across all cases and times	0
Covariance of covariate variable variances and disturbance deviations from the mean of intercepts across all cases	0
Covariance of covariate variable variances and disturbance deviations from the mean of slopes across all cases	0

Figure 7. Conditional LGM with one covariate. This figure includes observed variables (y), observed variable disturbances (ε), intercept (α), slope (β), disturbance deviations from the mean of slopes and mean of intercepts (ζ), and a time-invariant covariate (x). Adapted from Figure 5.1 in Bollen and Curran (2006).
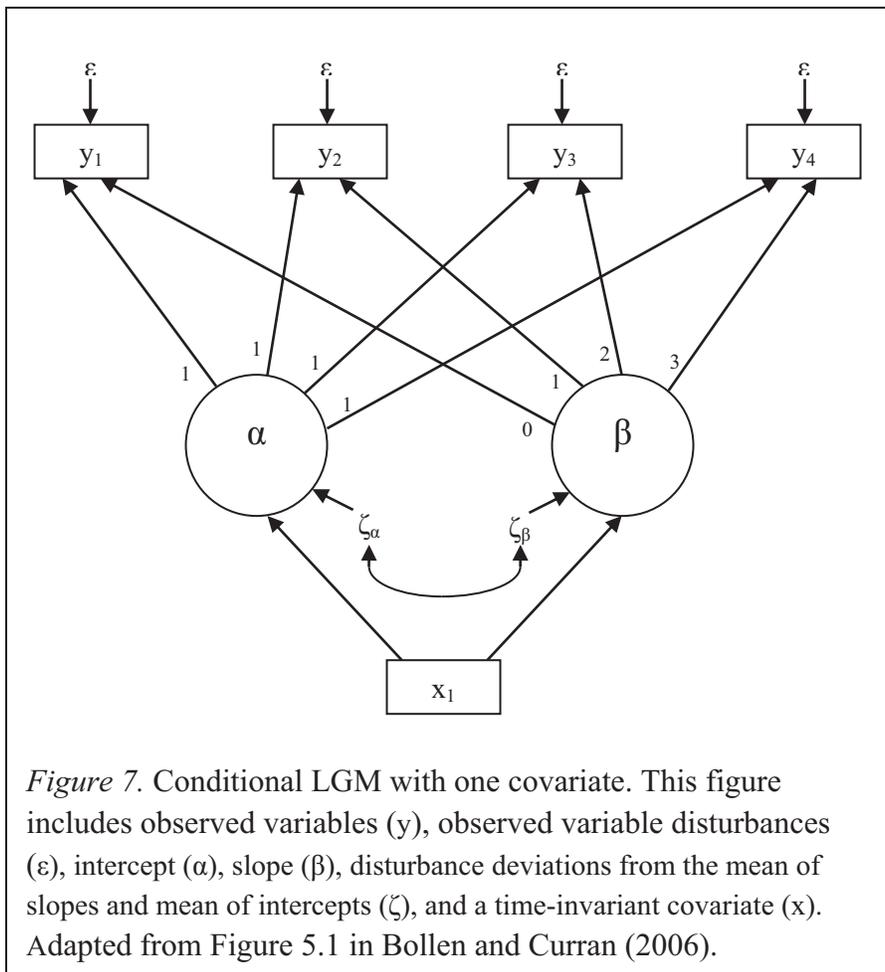
Table 15

Unstandardized Regression Weights and Standard Errors between Intercepts and Participant Characteristic Variables in Conditional Models

	Absenteeism	Presenteeism	Overall Work Impairment	Activity Impairment	Surveys Completed Ratio
AGE	-0.13 (1.6)	-0.05 (2.6)	-0.23 (3.1)	0.07 (2.9)	0.00 (0.03)
GEN	4.37 (1.6)**	-0.22 (2.6)	3.53 (3.1)	8.51 (2.7)**	-0.04 (0.03)
ETH	-2.89 (1.6)	2.98 (2.5)	-0.53 (3.1)	3.73 (2.8)	0.02 (0.03)
LAN	4.78 (1.6)**	13.05 (2.6)**	17.24 (3.1)**	18.11 (2.8)**	0.12 (0.03)**
MAR	2.04 (1.6)	1.34 (2.6)	3.61 (3.0)	0.63 (2.9)	-0.03 (0.03)
EDU	-1.22 (1.6)	6.35 (2.3)**	5.00 (3.0)	6.28 (2.6)*	-0.07 (0.02)**
MED	3.38 (1.6)**	-15.17 (2.4)**	-10.74 (3.1)**	-14.89 (2.7)**	-0.02 (0.03)
MEN	0.99 (1.6)	-27.37 (2.0)**	-27.05 (2.7)**	-30.75 (2.4)**	0.01 (0.03)

Note. GEN = Gender; ETH = Ethnicity; LAN = Language; MAR = Marital Status; EDU = Education; MED = Medical Problems; MEN = Mental Health Problems.
*$p < .05$. ** $p < .01$.

Table 16

Unstandardized Regression Weights and Standard Errors between Slopes and Participant Characteristic Variables in Conditional Models

	Absenteeism	Presenteeism	Overall Work Impairment	Activity Impairment	Surveys Completed Ratio
AGE	0.03 (0.65)	-0.05 (0.93)	-0.01 (1.1)	-0.09 (0.94)	0.00 (0.01)
GEN	-0.83 (0.64)	-0.39 (0.93)	-0.80 (1.1)	-3.22 (0.97)**	-0.01 (0.01)
ETH	1.14 (0.64)	-0.42 (0.95)	0.66 (1.1)	-0.36 (0.94)	0.01 (0.01)
LAN	-1.18 (0.65)	-0.06 (0.93)	-1.18 (1.1)	-0.68 (0.95)	0.01 (0.01)
MAR	-0.67 (0.64)	0.53 (0.94)	-0.03 (1.1)	0.92 (0.94)	0.00 (0.01)
EDU	0.23 (0.65)	-1.2 (0.90)	-1.01 (1.1)	-0.65 (0.88)	0.02 (0.01)
MED	-0.70 (0.65)	2.00 (0.97)*	0.79 (1.1)	1.90 (0.96)*	0.01 (0.01)
MEN	-0.01 (0.65)	3.97 (0.85)**	4.38 (1.1)**	3.25 (1.1)**	-0.01 (0.01)

Note. GEN = Gender; ETH = Ethnicity; LAN = Language; MAR = Marital Status; EDU = Education; MED = Medical Problems; MEN = Mental Health Problems.
*p < .05. ** p < .01.

Results of conditional models suggested that several participant characteristic variables influenced individual trajectories. Gender significantly influenced intercepts in the Absenteeism model as well as intercepts and slopes in the Activity Impairment model. Language significantly influenced intercepts in all models. Education significantly influenced the initial levels in Presenteeism, Activity Impairment, and Surveys Completed Ratio models. Medical problems significantly influenced initial levels of Absenteeism, Presenteeism, Overall Work Impairment, and Activity Impairment and slopes of Presenteeism and Activity Impairment models. Mental health problems significantly influenced initial levels and slopes of Presenteeism, Overall Work Impairment, and Activity Impairment models.
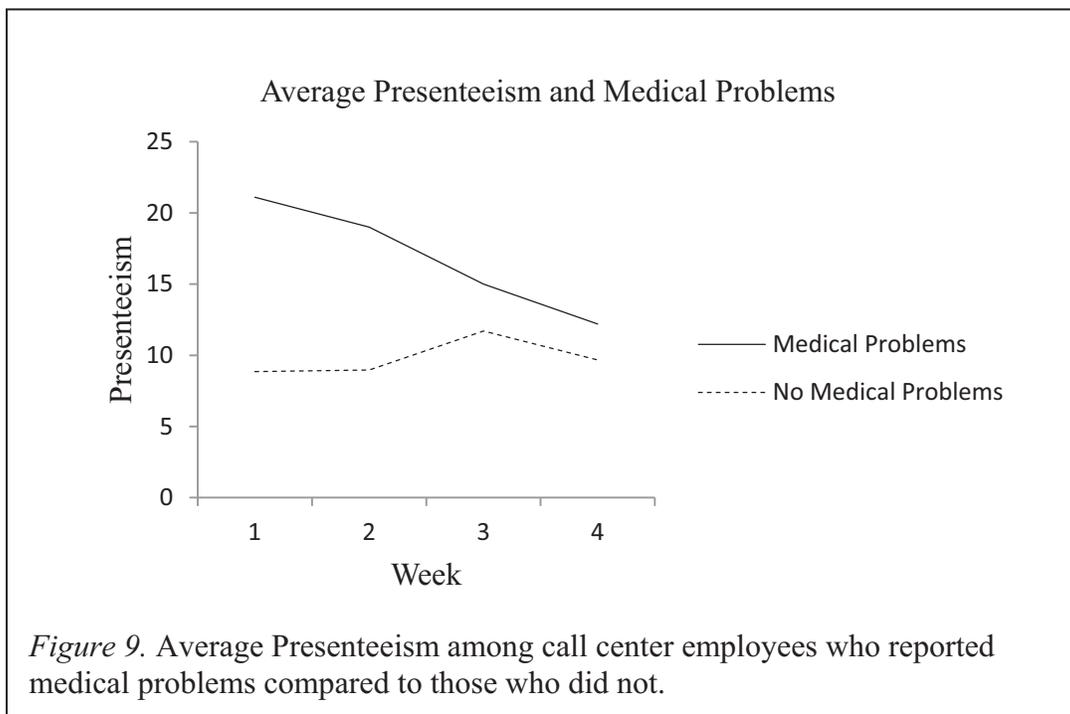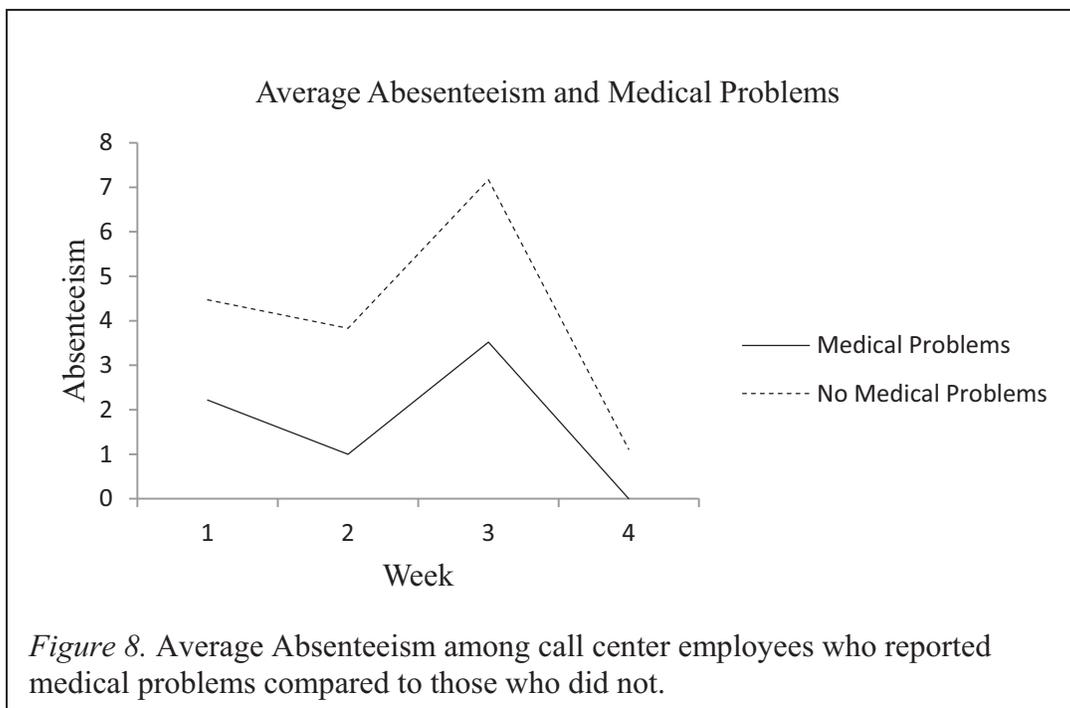
Table 17 provides a summary of significant participant characteristic variables for each conditional model. For significance, a level of 0.05 was used for unstandardized regression weights of slope or intercept. Figures 8 through 11 depict differences in average trajectories among participants who reported having medical problems compared to those who did not. Figures 12 through 14 depict differences among participants who reported having mental health problems compared to those who did not. These figures show averages for work productivity variables associated with significant regression weights (either intercept or slope) for the participant characteristic of interest. For these figures, only data from the first four weeks were included since the number of observations collected in the fifth week was substantially lower. It is important to note that data represented in these figures do not include estimations of missing values.
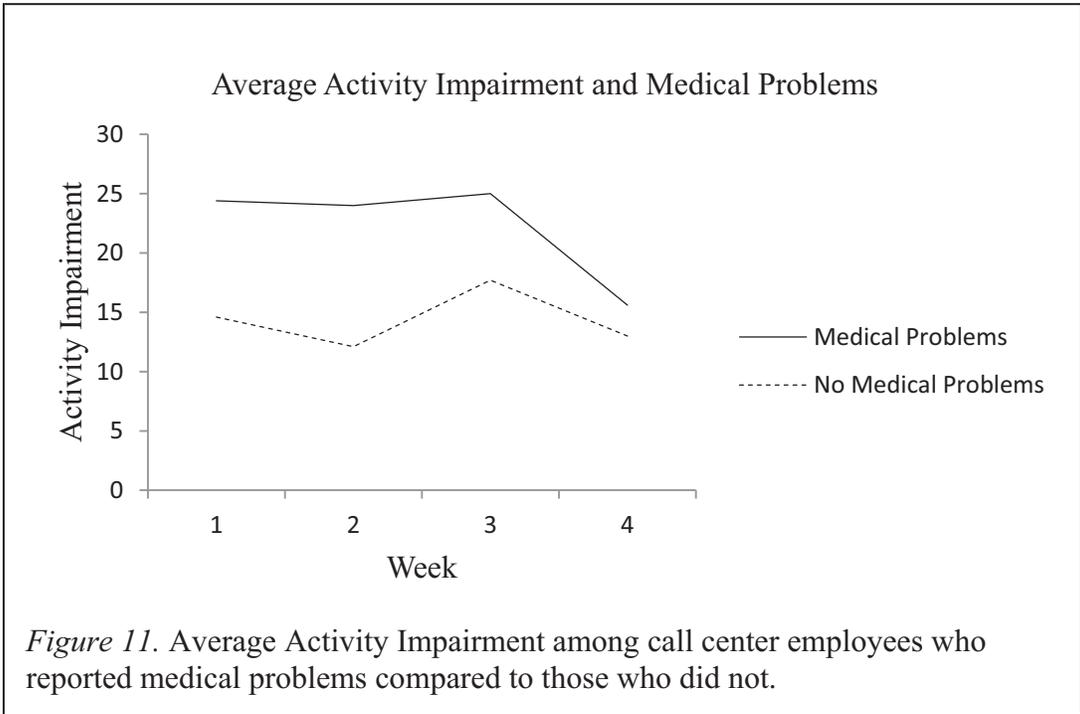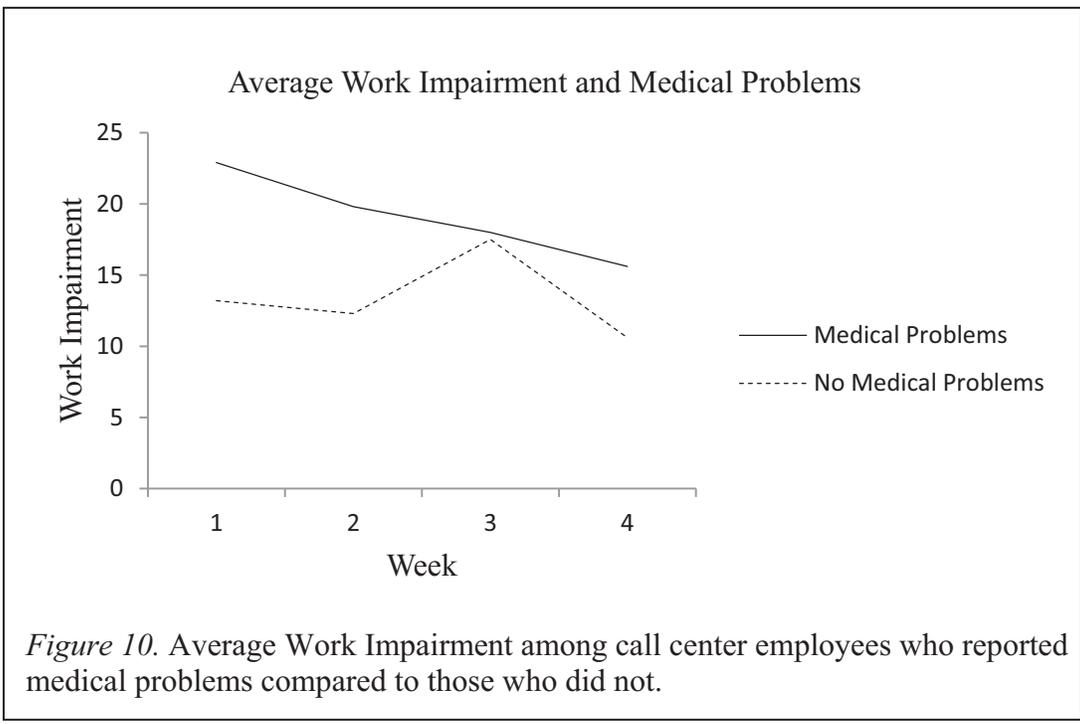
Table 17

Summary of Significant Participant Characteristic Variables (p = 0.05) for Conditional Models

Absenteeism	Presenteeism	Overall Work Impairment	Activity Impairment	Surveys Completed Ratio
Gender	Language	Language	Gender	Language
Language	Education	Medical	Language	Education
Medical	Medical	Mental	Education	
	Mental		Medical	
			Mental	

Medical = medical problems; Mental = mental health problems.

Figure 8. Average Absenteeism among call center employees who reported medical problems compared to those who did not.

Figure 9. Average Presenteeism among call center employees who reported medical problems compared to those who did not.

Figure 10. Average Work Impairment among call center employees who reported medical problems compared to those who did not.

Figure 11. Average Activity Impairment among call center employees who reported medical problems compared to those who did not.

Figure 12. Average Presenteeism among call center employees who reported mental health problems compared to those who did not.

Figure 13. Average Work Impairment among call center employees who reported mental health problems compared to those who did not.

Figure 14. Average Activity Impairment among call center employees who reported mental health problems compared to those who did not.
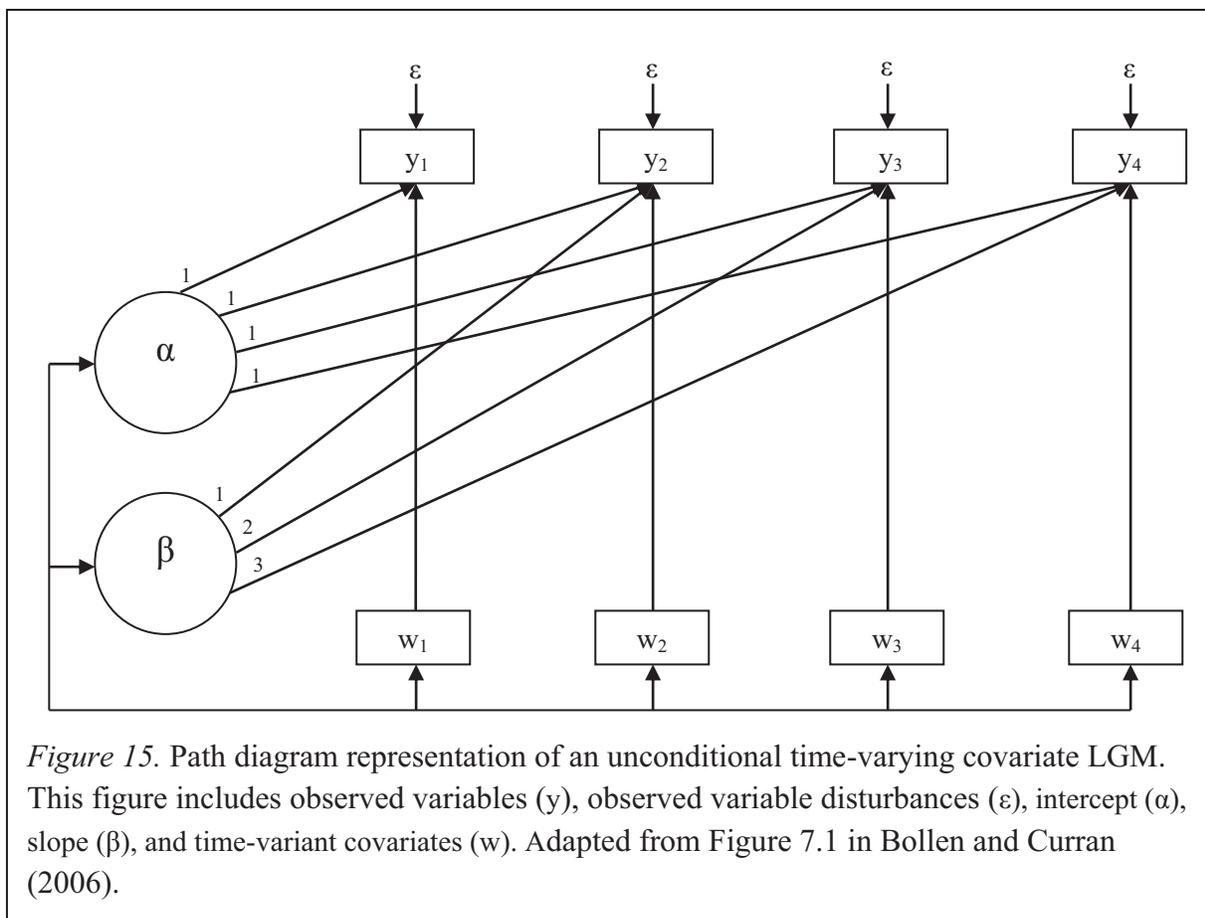
Unconditional models with SR. The last step of the LGM analysis was to generate unconditional models with SR as a time-varying covariate. This was done by including two sets of repeated measures within the model: SR and each dependent variable. Similar to previous steps in the LGM analysis, dependent variables were tested in separate models. Direct relationships between the two sets of repeated measures were established at each wave of data. Figure 15 provides a path diagram representation of an unconditional time-varying covariate LGM. A path diagram representation was used for purposes of simplicity. Specific sets of assumptions and initial constraints used in unconditional models with SR as a time-varying covariate were reported previously in Table 6.

Figure 15. Path diagram representation of an unconditional time-varying covariate LGM. This figure includes observed variables (y), observed variable disturbances (ε), intercept (α), slope (β), and time-variant covariates (w). Adapted from Figure 7.1 in Bollen and Curran (2006).

Additional constraints were imposed on three of the models. To achieve minimization for the Absenteeism model, constraints were placed on eleven parameters: slope variance (constrained value = 0.001), intercept variance (0.001), slope/intercept covariance (0), SR/slope covariance at each wave (0), and SR/intercept covariance at each wave (0). For the Activity Impairment model, constraints were placed on six parameters: slope variance (0.001), slope/intercept covariance (0), and SR/slope covariance at each wave (0). For the Surveys Completed Ratio model, constraints were placed on two parameters: slope variance (0.001), and SR/intercept covariance at wave 2 (0). Fit indices for unconditional models with time-varying covariates are reported in Table 18.

Table 18

Fit Indices for Unconditional Models with SR as a Time-Varying Covariate

	χ^2	p	CFI	RMSEA
Absenteeism	19.283	.503	1.000	.000
Presenteeism	20.205	.017	.942	.161
Overall Work Impairment	6.969	.640	1.000	.000
Activity Impairment	35.707	.002	.884	.170
Surveys Completed Ratio	28.991	.002	.851	.185

Standardized coefficients, or effect sizes, for time-varying coefficients of each model are reported in Table 19.

Table 19

Standardized Coefficients for Unconditional Models with SR as a Time-Varying Covariate

	Absenteeism	Presenteeism	Overall Work Impairment	Activity Impairment	Surveys Completed Ratio
$SR_1 \rightarrow y_1$	.003	.161	-.026	.251*	-.228
$SR_2 \rightarrow y_2$	.062	.029	.031	.377**	-.162
$SR_3 \rightarrow y_3$	.200*	-.054	.178	.344**	.108
$SR_4 \rightarrow y_4$	.227	-.350	.212	.503**	.258

Note. SR = Social Role Scale; y = dependent variable.
*$p < .05$. ** $p < .01$.

Discussion

Summary of ANCOVA Analyses

Although Hypothesis 1 was not fully supported, the results of final ANCOVA models produced significant relationships between SR and three of the dependent variables: Presenteeism, Overall Work Impairment, and Activity Impairment. These findings corresponded to results found in a study of employees and inpatients at a state hospital in the western United

States (Trotter, et al., 2009). The size of the effect for each of the three significant dependent variables was small.

The relationship between SR and Absenteeism was not significant in final ANCOVA models. Although this finding was similar to results presented by Trotter and colleagues, it was contrary to other lines of research on Absenteeism (Darr and Johns, 2000; Koopmans et al., 2008; Munce et al., 2007; Serxner et al., 2001). One possible explanation for this finding is informed by the work of Markussen and colleagues (2011). It is reasonable to presume that the policies and culture of the organization in the current study may have confounded the results. As previously mentioned, participants in the current study were allowed to take up to three non-planned absences every two months. Thus, it is possible and even likely that participants used absences for reasons other for reasons due to health. Conversely, it is also possible that participants experiencing health problems postponed using absences in consideration of the policy, potentially augmenting work productivity loss in other variable categories (e.g., Presenteeism). Additionally, factors common to call centers (e.g., low task control, low participation, and feelings of being replaceable) may further enable the use of absences for reasons not linked to health (Hauptfleisch & Uys, 2006; Zapf et al., 2003).

It should be noted, however, that although SR and Absenteeism did not appear to be strongly related, one of the WPAI:GH subscales related to SR, Overall Work Impairment, was calculated using Absenteeism as an input. Thus, the two variables were moderately correlated ($r = .538$; $p < .01$) with higher levels of Absenteeism producing higher levels of Overall Work Impairment. In this sense, the results suggest that absenteeism may be an important variable to consider in evaluating the relationship between mental health and work productivity in some work settings.

The relationship between SR and Surveys Completed Ratio, the objective measure used to quantify the work productivity of each call center employee, was not significant in final ANCOVA models, although Surveys Completed Ratio was negatively and significantly associated with other dependent variables such as Presenteeism ($r = -.166$; $p < .05$) and Overall Work Impairment ($r = -.206$; $p < .01$). These results warrant the examination of the two methods of data measurement used in the current study: objective measurement and self-report. It is important to note that the difference found between these two methods may relate to previous findings of the mental health and work productivity relationship. In their study of call center and returns department workers, Lerner and colleagues (2003) found that depression symptoms were significantly related to subscales of the WLQ, but not objective work productivity measures. Darr and Johns (2000) reported that, on average, self-report measures produced stronger outcomes than objective measures, at least for one work productivity variable, in their meta-analysis of 153 studies. As Prasad and colleagues (2004) discussed, objective indicators have several limitations (e.g., not accounting for work productivity losses due to specific conditions, not accounting for impairment occurring outside of the workplace) that prevent these measures from accounting for variability more easily assessed through self-report methods (Allen & Bunn, 2003a).

Summary of LGM Analyses

As previously described, LGM was used to supplement the ANCOVA analyses in order to account for differences in individual trajectories among two sets of repeated measures. Results of unconditional models indicated that, prior to the inclusion of SR, the data provided an acceptable fit for Overall Work Impairment as the observed variable in the model (MacCallum, Browne, & Sugawara, 1996). This finding suggested that a model accounting for variability in

individual intercepts and slopes as well as observed variable disturbances produced a satisfactory description of the Overall Work Impairment data. Unconditional models for Absenteeism, Presenteeism, Activity Impairment, and Surveys Completed Ratio produced poor fits for the data.

After SR was added to unconditional models as a time-varying covariate, fit indices for the models generally improved. Two of the models, Absenteeism and Overall Work Impairment, produced good fits for the data. It should be noted, however, that eleven constraints were imposed on parameters in the Absenteeism model in order to achieve minimization. At wave three, the standardized regression weight between the time-varying covariate and the Absenteeism was significant ($p < .05$). In the Overall Work Impairment model, none of the standardized regression weights between time-varying covariates and dependent variables were significant. After SR was added to the unconditional model for Presenteeism, model fit indices yielded mixed results. Although the CFI increased and approximated an acceptable fit for model, the RMSEA also increased and indicated that the fit was poor (McCallum et al., 1996). Although Hypothesis 2 was not supported, the LGM analysis of the Overall Work Impairment model with SR as a time-varying covariate produced a good fit without the use of additional constraints.

Summary of Participant Characteristic Variables in ANCOVA Analyses

It should be noted that some fundamental differences existed between participants in the study and employees in "typical" call centers. For comparisons, results of a large-scale international study of 2,477 call centers were used (Holman et al., 2007). First, most of the participants (55%) in the current study were male, but Holman and colleagues reported that 69% of call center employees are female. Second, participants in the current study initiated outbound

telephone calls, but 78% of call centers interact with customers using inbound calls. Third, most of the participants reported having completed some college, but only 32% of US call centers are comprised primarily of employees with at least two years of post-secondary education or 4 years of post-secondary education. Lastly, most call centers (approximately two-thirds) serve in-house customers, while the call center in the current study was a subcontractor. Despite these differences, the call center used in the current study was similar to "typical" call centers in terms of number of employees, market base (e.g., national versus international), customer segmentation (e.g., mass market versus business), and mode of customer interaction (e.g., telephone versus other forms). It is suggested that these differences and similarities be taken into account when considering the issue of generalizability. In other words, the findings of the current study were obtained from data of a specific type of call center and may not be representative of all call centers.

It is important to note that the statistical analysis used in the current study does not effectively measure effects of characteristics linked to naturally occurring groups (e.g., demographic variables) as discussed by Miller and Chapman (2001). Taking this into consideration, the following results are provided for descriptive purposes only; descriptions of differences observed in participant characteristic variables are not intended to authenticate observed effects between naturally occurring groups. Analyses of participant characteristic variables and work-time variables showed that the following variables were associated with work productivity variables in final models: mental health problems, marital status, education, hours at work, and percent time spent on qualified surveys. Participants who reported having mental health problems were more likely to report lower levels of work productivity, corresponding to a large body of research as previously described.

Marital status was linked to work productivity variables as well. Divorced participants produced higher Surveys Completed Ratios and reported the lowest levels of Presenteeism, Overall Work Impairment, and Activity Impairment compared to their counterparts. Participants who were married or in a relationship reported the highest levels of Presenteeism, Overall Work Impairment, and Activity Impairment. These results are at odds with the work productivity hypothesis which holds that marriage causes individuals to be more productive, but coincide with the possibility that relationship distress can lead to impairment in the workplace (Chun & Lee, 2001; Forthofer, Markman, Cox, Stanley, & Kessler, 1996).

Interestingly, Surveys Completed Ratios tended to be higher for participants who reported lower levels of completed education. While this trend did not seem to be as evident in other work productivity variables, the pattern is intriguing, especially since the trend conflicts with classic human capital theories which suggest that education enhances work productivity (Becker, 1962; Chevalier, Harmon, Walker, & Zhu, 2004; Schultz, 1963). The work of Grebner et al., (2003) and Dysvik et al., (2011) highlights the importance of the work environment in the relationship between educational level and work productivity. Psychosocial factors often found in call centers, characteristics such as low job control and low task complexity, may provide some explanation. It is possible that higher-educated participants may have been more likely to negatively perceive job tasks in their work and struggle to produce the same outputs as their counterparts. This explanation corresponds to the Tsang-Levin model of production which holds that overeducation negatively impacts work productivity through the mediating influence of job satisfaction (Tsang, 1987).

Work-time variables (i.e., work hours and percent qualified) were related to a number of work productivity variables. Several possible explanations for the relationships are offered. Not

surprisingly, greater work hours were significantly related to lower levels of Absenteeism. Similarly, work hours were negatively related to Activity Impairment. While it is possible that participants who worked greater hours had less opportunity to experience impairment in daily activities, it may also be true that participants who experienced less impairment may have been more motivated to spend more hours at work. Lastly, participants who reported more work hours and more hours completing surveys were more likely to produce higher Surveys Completed Ratios. These relationships may have occurred because participants who spent more time in work tasks may have had greater opportunities to improve performance. It is also possible that participants may have extended hours at work in response to performing well. It is important to note that the employment policies in effect at the site of data collection may have influenced the relationship between work hours and work productivity. Participants were provided with some flexibility in deciding how many hours they would like to work per week and were provided with financial incentive to be more productive. Reinforcement for work productivity may have influenced the number of hours worked by call center employees.

Surprisingly, medical problems were not significantly associated with any of the work productivity variables. One finding of note is that participant characteristic analyses suggested that mental health problems may be more strongly associated with work productivity losses compared to medical problems. This finding corresponds to previous studies which reported that mental health problems were linked to greater decreases in work productivity (Kessler et al., 2008; Wang et al., 2003b). It should be noted, however, that participants in the current study reported medical problems in response to a single item, a distinction from several studies which make comparisons between the past and present findings difficult to interpret. Also, some evidence suggests that medical and mental health problems cannot be considered highly distinct

constructs in the examination of work productivity loss (Croghan et al., 1998; Hankin et al., 1983; Kessler et al., 2003; Parker et al., 2009; Rosenchek et al., 1999).

Summary of Participant Characteristic Variables in LGM Analyses

Results of conditional models suggested that several participant characteristic variables significantly influenced intercepts and slopes of individual trajectories. These variables included gender, language, education, medical problems, and mental health problems. For slope, mental health problems and medical problems appeared to influence individual trajectories to a greater extent than all other participant characteristic variables. Generally speaking, participants who reported experiencing medical problems or mental health problems tended to have higher initial scores for Presenteeism, Overall Work Impairment, and Activity Impairment compared to their counterparts. In addition, participants who reported these problems appeared to be more likely to improve in Presenteeism, Overall Work Impairment, and Activity Impairment over the course of the study. This finding was unexpected given the absence of any intervention to improve productivity. One explanation for this finding relates to the accumulation of participants throughout the course of the study. The open nature of the study allowed for a dynamic composition of the groups of participants who reported experiencing medical problems or mental health problems. Since these groups of participants were smaller in number compared to those who did not report problems, the averages of productivity variables likely had a higher propensity to experience corrections in averages.

Interestingly, this pattern did not hold true for the association between medical problems and Absenteeism. On average, participants who reported having medical problems reported lower levels of Absenteeism than their counterparts. Two possible explanations for this finding are considered. First, it is possible that participants who reported having medical problems may

have compensated by being more cautious in taking absences and "save" absences for future time periods. Possible financial differences between the two groups provide a second explanation. Participants with greater medical expenses may have a greater incentive to remain at work.

Implications of Findings

The results of the current study add to a growing body of evidence regarding the positive association between mental health and work productivity (Allen et al., 2010; Hilton et al., 2008; Lerner et al., 2004; Stewart et al., 2003). Specifically, the results add further validation for the use of the SR in estimating workplace productivity losses as well as impairment outside of the workplace. This validation is particularly important given the utility of the OQ in managed-care settings and the opportunity for the measure to be used in conjunction with delivering business-driven initiatives to improve employee well-being. The OQ is regularly used in managed-care settings for purposes of accountability, cost-effectiveness, and quality improvement (Burlingame, Lambert, Reisinger, Neff, & Mosier, 1995; Umphress, Lambert, Smart, Barlow, & Clouse, 1997). In addition, the OQ was designed to be used repeatedly over the course of an individual's treatment to enhance the effectiveness of mental health services (Shimokawa, Lambert, & Smart, 2010). These factors suggest that the SR may possess an important advantage over work productivity-related measures not adaptable to or not currently used in managed-care settings.

From an employer standpoint, the SR may be instrumental in enhancing both employee well-being and bottom-line results. Regular assessment of employee responsiveness to mental health services could be used to estimate changes in work productivity and inform decisions related to the interface between employers and employees, an interface which is crucial in

improving mental health in the workplace (Allen, 2004; Anderzen et al., 2005; Billings et al., 2008; Dunnagan et al., 2001; Schwartz & Riedel, 2010; Wang et al., 2006). The SR could also be used along with other work productivity-related measures to monitor and evaluate the impact of business-driven initiatives aimed to improve workplace psychosocial factors such as employee well-being and engagement (Grebner et al., 2003). In addition, the SR and OQ could be used as a screening tool in identifying employees who may benefit from mental health treatment (Burlingame et al., 1995).

Limitations

One limitation evident in current study was the small sample size. This limitation was related to problems with power to detect important relationships. An analysis of power indicated that many more participants were needed to detect an effect in SR for Absenteeism and Surveys Completed Ratio. Sample size also influenced LGM analyses in the current study. This limitation was addressed in the interpretation of model fit indices. Given the small sample size of the current study and the increased likelihood of type 1 errors, the chi-square statistic was not considered sufficient for determining model fit. Instead, the CFI was used since it has been recognized and performs well even when sample size is small (Hooper, 2008). Small sample size in the current study was related to errors in estimation. Some of the models produced negative sample estimates of the variances of disturbances. These situations, known as Heywood cases, called for additional constraints to be imposed (Kolenikov & Bollen, 2007). The process of imposing additional constraints was undertaken to minimize the amount of total constraints on the model. However, it should be noted that in some cases, a large number of constraints were imposed on unidentified models in order to achieve minimization.

Due to the scope of the current study, some factors known to influence work productivity, including psychosocial variables, were not examined. However, it should be noted that in addition to social role functioning, several other variables were taken into account including participant characteristic variables, medical problems, mental health problems, and work-time variables. Decisions regarding the number of variables to be examined were made with respect to limitations of sample size. Because sample size was small, it is likely that introducing additional parameters into LGM analyses could have complicated processes of estimation and created an increased need to impose additional constraints to the model. Although psychosocial factors were not measured, several important psychosocial factors were considered in the literary analysis and discussion sections. This was done in order to refer to factors previously observed in work environments similar to the current participant sample.

Several limitations were noted in the analyses of the current study. First, LGM analyses did not use all observations used in ANCOVA analyses. Due to a high number of missing values in the fifth wave of data collection, only four waves of data were included in LGM analyses. Also, some variables were not included in LGM analyses due to limitations related to sample size. Work-time variables were not included as a second set of time-varying covariates. In addition, participant characteristic variables were not included in models which incorporated SR as a time-varying covariate.

Employer-related factors such as employee assignment and alterations to work-related tools lead to limitations in interpreting the Surveys Completed Ratio variable. Although all participants in the study completed the same measured tasks, employees were assigned to specific projects by call center managers. Also, participants were occasionally assigned to activities other than completing surveys (e.g., data cleaning, monitoring other employees).

Although these extracurricular assignments were excluded from the data, measurement modifications could not prevent the occurrence of practice effects or, conversely, "burnout" effects. To control for these confounds, work-time variables were measured and included in ANCOVA analyses.

A second employer-related confound emerged because managers occasionally implemented changes in interviewing tools used by employees in order to increase the quality of data obtained. For example, managers may have altered the wording of questions or the order of questions, possibly affecting the likelihood of employees to complete surveys. These changes were not tracked during the course of the study and were not accounted for in the analyses. This potential confound was controlled for, at least in part, by accounting for call center averages on a weekly basis in Surveys Completed Ratio calculations.

One limitation emerged by virtue of using two different modes of data collection: paper and electronic. Although the measures of these two modes did not differ by content, data collected electronically added the functionality forced response, preventing the occurrence of missing values. While this complication could have threatened the internal validity of the study, the effect of this limitation was minimized by ensuring that all participants responded to every item when turning in paper copies of the survey.

Future Research

Future research could improve on limitations of the current study. Larger sample size would allow for more confidence in detecting effects in mental health-work productivity relationships that were not significant in the current study. Also, LGM analyses with larger sample sizes could include psychosocial variables in models of mental health and work productivity without greatly increasing the likelihood of estimation errors. Similarly, larger

sample size could allow for analyses of models which include participant characteristic variables or work-time variables in models with time-varying covariates.

Several related questions could be considered in future studies of work productivity and mental health, as measured by the OQ. Further research could be conducted to investigate the relationship between SR and Absenteeism by drawing stronger distinctions between absences due to mental health problems and absences due to other reasons. In addition, the relationship between the OQ and measures of objective work productivity could be further examined. For example, future research could examine whether the relationship between mental health and objective work productivity might be mediated by factors such as presenteeism or Overall Work Impairment.

Alternative research designs and participant samples could be used to further investigate the utility of the OQ in measuring work productivity. Since the OQ was designed to track an individual's response to mental health interventions, the measure is suitable for treatment-based analyses of mental health-work productivity relationships. Second, the OQ could be evaluated for its utility as a screening tool in workplace environments by identifying individuals who are at-risk for future work productivity declines. Also, future research could examine the utility of the OQ in monitoring and evaluating employer initiatives to improve the mental health and work productivity of employees.

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Appendices

Appendix A

Work Productivity and Activity Impairment Questionnaire:

General Health V2.0 (WPAI:GH)

The following questions ask about the effect of your health problems on your ability to work and perform regular activities. By health problems we mean any physical or emotional problem or symptom. *Please fill in the blanks or circle a number, as indicated.*

1. Are you currently employed (working for pay)?   ____ NO   ____ YES
    If NO, check "NO" and skip to question 6.

The next questions are about the **past seven days**, not including today.

2. During the past seven days, how many hours did you miss from work because of <u>your health problems</u>? *Include hours you missed on sick days, times you went in late, left early, etc., because of your health problems. Do not include time you missed to participate in this study.*

    _____HOURS

3. During the past seven days, how many hours did you miss from work because of any other reason, such as vacation, holidays, time off to participate in this study?
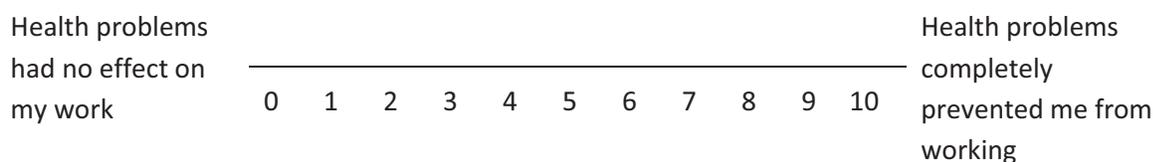
    _____HOURS

4. During the past seven days, how many hours did you actually work?

    _____HOURS *(If "0", skip to question 6.)*

5.   During the past seven days, how much did your health problems affect your productivity <u>while you were working</u>?

Think about days you were limited in the amount or kind of work you could do, days you accomplished less than you would like, or days you could not do your work as carefully as usual. If health problems affected your work only a little, choose a low number. Choose a high number if health problems affected your work a great deal.

Consider only how much <u>health problems</u> affected
productivity <u>while you were working</u>.

| Health problems had no effect on my work | 0   1   2   3   4   5   6   7   8   9   10 | Health problems completely prevented me from working |

CIRCLE A NUMBER

6.   During the past seven days, how much did your health problems affect your ability to do your regular daily activities, other than work at a job?

By regular activities, we mean the usual activities you do, such as work around the house, shopping, childcare, exercising, studying, etc. Think about times you were limited in the amount or kind of activities you could do and times you accomplished less than you would like. If health problems affected your activities only a little, choose a low number. Choose a high number if health problems affected your activities a great deal.

Consider only how much <u>health problems</u> affected your ability
to do your regular daily activities, other than work at a job.

| Health problems had no effect on my daily activities | 0   1   2   3   4   5   6   7   8   9   10 | Health problems completely prevented me from doing my daily activities |

CIRCLE A NUMBER

Appendix B

Outcome Questionnaire (OQ®-45.2)   Name:_____   Date:____/____/_____

	Never	Rarely	Sometimes	Frequently	Almost Always
1. I get along well with others	O	O	O	O	O
2. I tire quickly	O	O	O	O	O
3. I feel no interest in things	O	O	O	O	O
4. I feel stressed at work/school	O	O	O	O	O
5. I blame myself for things	O	O	O	O	O
6. I feel irritated	O	O	O	O	O
7. I feel unhappy in my marriage/significant relationship	O	O	O	O	O
8. I have thoughts of ending my life	O	O	O	O	O
9. I feel weak	O	O	O	O	O
10. I feel fearful	O	O	O	O	O
11. After heavy drinking, I need a drink the next morning to get going. (If you do not drink, mark "never")	O	O	O	O	O
12. I find my work/school satisfying	O	O	O	O	O
13. I am a happy person	O	O	O	O	O
14. I work/study too much	O	O	O	O	O
15. I feel worthless	O	O	O	O	O
16. I am concerned about family troubles	O	O	O	O	O
17. I have an unfulfilling sex life	O	O	O	O	O
18. I feel lonely	O	O	O	O	O
19. I have frequent arguments	O	O	O	O	O
20. I feel loved and wanted	O	O	O	O	O
21. I enjoy my spare time	O	O	O	O	O
22. I have difficulty concentrating	O	O	O	O	O
23. I feel hopeless about the future	O	O	O	O	O
24. I like myself	O	O	O	O	O
25. Disturbing thoughts come into my mind that I cannot get rid of	O	O	O	O	O
26. I feel annoyed by people who criticize my drinking (or drug use) (If not applicable, mark "never")	O	O	O	O	O
27. I have an upset stomach	O	O	O	O	O
28. I am not working/studying as well as I used to	O	O	O	O	O
29. My heart pounds too much	O	O	O	O	O
30. I have trouble getting along with friends and close acquaintances	O	O	O	O	O
31. I am satisfied with my life	O	O	O	O	O
32. I have trouble at work/school because of drinking or drug use (If not applicable, mark "never")	O	O	O	O	O
33. I feel that something bad is going to happen	O	O	O	O	O
34. I have sore muscles	O	O	O	O	O
35. I feel afraid of open spaces, of driving, or being on buses, subways, and so forth	O	O	O	O	O
36. I feel nervous	O	O	O	O	O
37. I feel my love relationships are full and complete	O	O	O	O	O
38. I feel that I am not doing well at work/school	O	O	O	O	O
39. I have too many disagreements at work/school	O	O	O	O	O
40. I feel something is wrong with my mind	O	O	O	O	O
41. I have trouble falling asleep or staying asleep	O	O	O	O	O
42. I feel blue	O	O	O	O	O
43. I am satisfied with my relationships with others	O	O	O	O	O
44. I feel angry enough at work/school to do something I might regret	O	O	O	O	O
45. I have headaches	O	O	O	O	O

Appendix C

Consent to be a Research Subject

Purpose

You have been invited to participate in a study conducted by Aaron Allred, a doctoral candidate in the Clinical Psychology Department at Brigham Young University. The study is being conducted as part of Mr. Allred's doctoral dissertation. The purpose of the study is to further determine the relation between psychological functioning and an individual's ability to work.

Procedures

Upon consent to participate in the study you will be asked to complete a series of questions via a Qualtrics® survey a total of four times. It is estimated that completion of the first series of questions will take approximately 20 minutes. It is estimated that the second, third, and fourth series of questions will take approximately 15 minutes. The items in the survey will ask you about several things including your personal assessment of your recent production at work, your current emotional/mental state and demographic information (age, gender, race, etc.).

Risks/Discomforts

Although your risks for participating in this study are estimated to be minimal, it is possible that some participants may experience feelings of discomfort and embarrassment when answering questions about their mental health. In addition, answering questions about recent performance at work may be uncomfortable to some participants. As with any research study, there is a potential for confidentiality breach. However, several steps are described below to prevent this from occurring.

Benefits

Participation in the study is not likely to lead to improvements in your mental health or work ability. However, the results will likely be beneficial to employers, employees, mental health professionals, and future researchers. You will receive a $5 gift card to Walmart® Stores for each survey completed. You may choose to receive the gift card in person at a designated location within your employment facility. Or, if desired, you can provide a mailing address where you would like the gift card to be mailed. A gift card will be mailed within two business days of completing the survey if you choose this option. You will be prompted to provide your preference of compensation delivery towards the end of the survey.

Total compensation will result as follows:

1 survey completed   = $5 in Walmart® gift cards
2 surveys completed = $10 in Walmart® gift cards
3 surveys completed = $15 in Walmart® gift cards
4 surveys completed = $20 in Walmart® gift cards

Confidentiality

Your responses to all questionnaires will be kept confidential throughout the study. Your individual responses will not be released to any individual within the company. Only the primary researcher will have access to your individual responses. Although an online survey provider will be used to manage the administration of the surveys, all data with identifying information (i.e., names) will be removed within three months of the completion of the study.

Participation

Participation in this research study is voluntary. You have the right to withdraw at anytime or refuse to participate entirely. Refusing to participate in the study will have no consequences to your standing with your employer.

Questions about the Research

If you have questions regarding this study, you may contact the researcher directly at the address below. Also, you may choose to contact the researcher by the phone number or email address listed below.

Aaron Allred at BYU Comprehensive Clinic
1190 North 900 East
Provo, UT 84602-3536
Phone: (801)422-7759
Email: aaron.m.allred@gmail.com

You also have the option of contacting Michael Lambert, Ph.D, the primary research mentor for this project, at the phone number or email address below.
Phone: (801) 422-6480
Email: michael_lambert@byu.edu

Questions about your Rights as Research Participants

If you have any questions regarding your rights as a participant in this research project, you may contact the Administrator of the Institutional Review Board using the following information: A-285 ASB Campus Drive, Provo, UT 84602; (801)422-1461; irb@byu.edu.

I have read the description of this study and I freely volunteer to participate. I understand that I can withdraw from the study at any time and that my current standing at my current employer will not be negatively affected in any way by my decision to withdraw. In addition, I grant Aaron Allred to access my company performance data.

Also, I understand that my individual responses will be kept confidential and that my individual responses will NOT be released to any individual within the company.

Printed name: _____

Signature: _____   Date: _____

Appendix D

Research Profile and Demographics Form

Instructions: For questions 1 and 2, please write your name and age in the spaces provided.

1. Name_____

2. Age _____

Instructions: For questions 3 – 7, please fill in the circle beside your answer. If your answer is "Other," please write the correct information on the line.

3. What is your first (native) language?
   - o Mandarin
   - o Spanish
   - o English
   - o Hindi-Urdu
   - o Arabic
   - o Bengali
   - o Portuguese
   - o Russian
   - o Japanese
   - o Punjabi
   - o Other _____

4. What is your gender?
   - o Male
   - o Female

5. What is your Race/Ethnicity?
   - o Asian
   - o Black or African American
   - o Hispanic
   - o Native American
   - o Pacific Islander
   - o White or Caucasian
   - o Other_____

6. What is the highest level of education you completed?
   - o Some High School
     - Specify last grade you completed: _____
   - o GED
   - o High School Degree
   - o Some College
   - o Technical Degree
   - o University (4-year) Degree
   - o Graduate Degree
   - o Other_____

7. What is your marital status?
   - o Divorced
   - o Married
   - o Separated
   - o Single
   - o Other _____

Instructions: For questions 8 and 9, please mark "Yes" or "No" and then list the requested information on the lines provided

8. Do you suffer from any medical/physical problems that you know of?
    o Yes
    o No

If "Yes", please list all medical/physical problems that you suffer from.

_____
_____
_____
_____
_____

9. Do you suffer from any mental health/emotional problems that you know of?
    o Yes
    o No

If "Yes", please list all mental health/emotional problems that you suffer from.

_____
_____
_____
_____
_____