Development and Reliability Analysis of the Work Productivity Short Inventory (WPSI) Instrument Measuring Employee Health and Productivity

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The Work Productivity Short Inventory (WPSI), also known as the Wellness Inventory, was developed to quickly assess the prevalence of medical problems that may influence work productivity and the financial implications of those problems. The WPSI asks respondents to note the amount of time missed from work resulting from 15 medical conditions and the amount of unproductive time spent at work when affected by the condition. Three versions of the WPSI were compared that differed according to the length of the recall period (12 months, 3 months, or 2 weeks). The reliability of the financial metrics generated from the WPSI was assessed for each version and found to be adequate, ranging from 0.66–0.74 in this application. The WPSI was found to be a highly reliable tool for estimating the prevalence of medical conditions that influence work productivity. The dollar impact of the associated productivity losses were found to be reliable enough to meet the instrument's intended purpose, which is to help employers understand relationships between disease and productivity, thereby contributing to the design of interventions to relieve these problems. The needs of the researcher should dictate which version of the WPSI to use. (J Occup Environ Med. *2003;45:743–762*)

The business community has become increasingly interested in understanding the relationship between worker health and productivity.[1,2] This interest has stemmed from a growing concern about large increases in employer healthcare costs and the value derived from increased spending directed at medical care.[3] For example, healthcare costs increased 14% in 2002 for the largest US health plan, the Federal Employees' Health Benefit Program, and premiums are projected to increase 25% in 2003 for the nation's second largest health plan, California Public Employees' Retirement System.[4] Some employers are wondering whether such increases are justified and whether providing good medical benefits produces a positive return on their investment in employee health and productivity.

Efforts are underway to examine this important issue. In particular, several occupational health professionals and researchers have begun to carefully research the productivity consequences of certain health risk factors and acute or chronic disease conditions. The first aim of this body of literature is to estimate the health and productivity cost burden of these health risk factors and disease conditions to "size" the opportunity for effective health and disease management programs. Second, once accurate measurement scales are developed, employers will be in a better

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position to judge the value of providing alternative health and disease management programs to their employees. Thus, the expense of providing various intervention programs can be weighed against the potential health and productivity cost savings derived from the programs, and a return on investment calculation can be formulated. Third, the measurement tools can be applied retrospectively, after the intervention program has been in place for some time, to measure and monitor the program's accomplishments in improving employee health and productivity.

The challenge to employers and researchers is to develop instruments and tools that measure worker health and productivity in a valid and reliable fashion so that the above objectives can be realized. This article describes the development of one such tool—a self-report productivity assessment instrument called the Work Productivity Short Inventory (WPSI). The WPSI been applied as part of a larger program called The Wellness Inventory, involving health education and risk assessment conducted at several employer locations. The tool is referred to there as the Wellness Inventory Survey,® but we use the WPSI label throughout this article.

The WPSI was developed to quickly assess the financial impact of worker absence and on-the-job productivity losses related to 15 common health conditions. It is intended to help employers find the most pressing productivity problems that might be targeted by disease management programs or other health management interventions. Below we describe the development of the WPSI and methods used to assess the reliability of the information obtained from this instrument, using alternative administration procedures.

Detailed methods to assess validity are available upon request. The validity research can be summarized by noting that the WPSI appears to have adequate content validity (it asks about conditions that appeared in the top 10 most prevalent and costly at the firm where reliability and validity analyses were conducted). It also has adequate construct validity (eg, prevalence rates for conditions reported on the WPSI were similar to those reported in medical claims data). Some evidence of predictive validity was found as well (ie, those who responded to the WPSI and indicated problems with absenteeism and presenteeism in the recent past often had lower perceived health status when answering the survey).

We separate the details of the reliability and validity of the WPSI into separate papers, for two reasons. First, in a typical, "real-world" organizational setting, the WPSI and other similar instruments are most often applied in studies using fairly small samples, usually amounting to just a few hundred employees who work in a particular company location. With samples that small, the potential for random error can be large. Reliability metrics derived from individual survey questions may vary significantly from one application to the next. With small sample sizes, outliers can be problematic, causing a lot of variability in survey responses. An investigation of variability is the crux of any reliability analysis and therefore deserving of some detailed discussion. The description of the methods and results from these reliability tests therefore requires some length, making the addition of validity metrics unwieldy for a single paper.

Second, like other instruments, the WPSI can be applied with a variety of timeframes in mind. To provide readers with a fuller appreciation of how the instrument may be used, we tested the reliability of three different versions of the WPSI; these varied according to the length of the recall period requested in the instrument. This also requires additional space, again making an added validity report too cumbersome for a single paper.

The WPSI

The WPSI was developed to gather information about absenteeism and productivity lapses at work. It was designed to gather information quickly and efficiently. Thus, it is a short instrument that is best applied as a directional and priority-setting device. The information contained in it may point to problems that should be more fully investigated in larger studies, either with administrative data or more extensive survey instruments, or both. Interventions can then be crafted for disease conditions with the greatest potential productivity impact. The WPSI is not meant to fully characterize the cost burden of illnesses. It is meant to help users consider the influence of major health problems that are among the most prevalent or expensive in most companies.[5]

The WPSI was designed to measure decrements in productivity when the worker is affected by various health problems. Unlike other instruments developed to assess productivity losses related to health, the WPSI attempts to assess the overall financial impact for a large number of health conditions likely to affect workers over a given time period, in addition to reporting their prevalence. Data collected by the instrument can be translated to easily understood metrics that provide medical directors and business executives with a monetary estimate of overall productivity losses related to these disease conditions. The data can also point to where attention should be directed in the form of effective health and disease management intervention programs. Thus, the tool can be used to estimate overall cost saving opportunities, and to identify health conditions deserving priority attention.

Earlier Attempts to Measure Health and Productivity in the Workplace and the Role of the WPSI

Several researchers have investigated the effects that certain health risk and disease conditions have on absenteeism and presenteeism outcomes. However, as Koopman et al. note, the measurement of on-the-job productivity losses is still in its infancy.[6] Instruments used to measure on-the-job productivity losses have included the Work Limitations Questionnaire,[7] Health and Labor Questionnaire,[8] Work Productivity and Impairment Questionnaire,[9] Endicott Work Productivity Scale,[10] Stanford Presenteeism Scale,[6] and the Word Health Organization Health and Work Performance Questionnaire.[11]

An extensive analysis of these instruments, including data regarding their validity and reliability, can be found in a monograph developed by Lynch and Riedel entitled, *Measuring Employee Productivity: A Guide to Self Assessment Tools.*[12] In general, these instruments were designed to assess employees' ability to concentrate, make decisions, get work done on time, and work with fellow team members when affected by certain health and disease conditions. The instruments rely upon respondents' self-report in assessing their productivity when suffering from a certain health condition (typically compared to when they are not suffering from that condition) over a given time period, generally ranging from 1 week to 1 month.

Given the availability of instruments to measure productivity losses at the workplace, why develop yet another tool to measure this concept? The WPSI was created to provide direction and strategic focus for employers considering alternative health and disease management programs. It was not designed to assess overall productivity losses associated with any given health issue in great detail. Unlike longer and more complex instruments, the WPSI is easy to administer and straightforward to complete. It is designed to assess a productivity cost burden over a time-period that is meaningful to most employers. It can be used to quickly assess and prioritize intervention opportunities based on the relative effects that certain disease conditions exert on workers. Finally, it can be used to estimate the productivity impacts associated with being in a caretaker role.

Current Investigation

The evolving literature on health-related productivity in the workplace illustrates the need to develop research instruments that consistently and accurately measure worker productivity losses resulting from certain health risk factors and disease conditions.[13] Ideally, these instruments would enable employers and health plans to determine the productivity impacts for different health and disease conditions when these coexist in a given population. Also, it would be useful to provide an annual estimate of productivity loss for each condition that would not be affected by seasonal influences. Finally, it would be best if the instrument overcame many of the shortcomings commonly associated with self-report measures.[14]

To overcome many common limitations associated with self-report measures, the instrument should: be brief and easy to understand; phrase questions to minimize socially desirable responses; use specific recall periods to improve recall of less recent events; ask respondents to provide exact rather than approximate answers to questions regarding continuous variables; and ensure that the questions have clear, exhaustive, and mutually exclusive response options. In addition, the self-reported responses should be verifiable using objective measures.[14]

Developers of the WPSI attempted to address many of the shortcomings noted above. By design, the WPSI tool is brief and easy to complete. It allows users to organize and prioritize various health and disease conditions based on which conditions cause the greatest amount of productivity loss for an individual or a population. Its wording is neutral and does not solicit systematically positive or negative responses. It asks for detail for a particular recall period. The issue of optimal recall period is then considered in an analysis in which multiple versions of the instrument are tested. This may help readers to determine the best recall period for their particular application.

Methods

Survey Development

In addition to asking respondents to note basic demographic information, the WPSI asks respondents to note their perceived health status, and the amount of absenteeism resulting from 15 medical conditions. It also inquires about the amount of unproductive time spent at work when affected by these conditions. The latter is referred to as presenteeism.

Eleven of the 15 conditions pertain to respondents themselves; these include allergies, respiratory infections, arthritis, asthma, anxiety disorder, depression and bipolar disorder, stress, diabetes, hypertension, migraine and other major headaches, and coronary heart disease/high cholesterol. The remaining four conditions pertain to caregiving provided by employees to their family members. Thus, the WPSI requests information about the productivity impact of providing care to elders with Alzheimer's and to children with allergies, otitis media, and respiratory infections.

The 15 conditions inquired about on the WPSI were chosen on the basis of informal consultations with employers and physicians and a brief review of the literature. With regard to the latter, Burton et al. found that an increase in pollen has been associated with a reduction in productivity for workers with allergies, and

medication may help to reduce productivity loss.[15] Experience with allergies is addressed on the WPSI.

The literature has also found significant reductions in productivity due to anxiety disorders and depression,[16,17] both of which are inquired about in the WPSI. Claxton et al. noted an improvement in absenteeism shortly following the onset of treatment for depression.[18]

The literature has also shown productivity impacts associated with migraine headaches, another condition noted on the WPSI. Fishman and Black[19] noted that productivity costs of migraine are substantial, and Schulman et al.[20] noted that treatment can reduce the at-work productivity loss.

Other conditions noted on the WPSI have been addressed in the literature on productivity change (see the article by Kessler et al.[21] for more examples). Evidence that the WPSI addresses "the right" set of conditions for the employer where this reliability study was presented can also be found in our companion work on validity.

Pretesting and Refinement

Once the WPSI was written and reviewed internally for content and clarity, it was pretested at a large company, not the one used for this reliability analysis. The pretest also asked respondents to comment on content, clarity, readability, and other aspects of the survey process. Results were reviewed and presented to the Human Relations Director of that company, and his views (along with those of the respondents) were considered as the instrument was revised again to assure clarity and readability.

Aside from edits to assure clarity and readability that were suggested by pre-test participants and the Human Relations Director, the analyses of the pretest suggested that inquiries about some conditions should be consolidated into single items on the WPSI. For example, depression and bipolar disorder, and migraine and other major headaches, were combined in single questions on the WPSI. This was done because prevalence rates for some of these costly conditions (eg, bipolar disorder) can be quite low, making separate study of them difficult. In addition, some conditions were grouped together because the pre-test showed it was often difficult for respondents to differentiate between bipolar disorder and major depression, between migraine and other major headaches, or between the cause of a condition (eg, high cholesterol) and the condition itself (eg, coronary heart disease). Thus, although the WPSI may lack clinical precision, it was not constructed for that purpose.

Three Versions Vary by Recall Period

For the reliability assessment, three versions of the WPSI were developed and distributed randomly to survey respondents who voluntarily participated in a health fair at a large manufacturing and communications firm. Each version of the survey included the same questions used to collect information on age, gender, job type, perceived health status, experience with several acute and chronic conditions, days of work lost due to those conditions, and unproductive hours spent at work because of them. The only difference between versions was the time period that subjects were asked to recall when answering the survey. One version asked respondents to consider the previous 12 months in their responses. Another asked them to consider the previous 3 months, and a third version asked them to recall the previous 2 weeks. The 12-month version of the WPSI is shown in the Appendix. All three versions have been copyrighted by Pfizer Inc., which funded this study.

Purpose of Reliability Testing

The purpose of the reliability assessment was to learn how much random noise was generated in the responses to the WPSI. One can think about reliability in terms of consistency—the more consistent the responses are to an instrument, the less "noise" is generated, and the more reliable the information obtained from that instrument will be.

Reliability assessment can be distinguished from validity assessment by noting that validity assessment focuses on bias—noise that is not random. Hence, the reliable application of a survey instrument may be consistent but still biased (ie, not valid), similar to a faulty bathroom scale that always reports the same body weight for an individual, even though that weight may be incorrect. Classical testing theory states that valid applications of an instrument must also be reliable, but reliable applications are not always valid.[22] Thus, reliability *and* validity testing should be conducted to assess the usefulness of any survey instrument. As noted earlier, we address validity in a companion paper.

Metrics

An important objective of the WPSI is to create metrics that denote the proportion of respondents who missed work or had reduced productivity due to several health problems. Another important objective was to estimate the financial impact of lost productivity due to those health problems. The reliability of these metrics is of primary concern.

One can begin by estimating the proportion of employees whose work was adversely affected by their health problems. We did this by counting the number and proportion of respondents who said they had any absenteeism or presenteeism losses associated with the 15 conditions listed on the WPSI form. Note that this may have understated the true prevalence of these diseases, because some employees may have had those conditions but never lost any work time or experienced any reductions in productivity because of these conditions. Since employers'

major concern is with productivity losses related to health conditions, such undercounting is probably not of major consequence. Methods to assess the reliability of the proportions of employees whose work was adversely affected by the 15 health problems are described below.

In addition to assessing these proportions, the data obtained from the WPSI survey responses were used to create three financial or "dollar" metrics for each disease or condition assessed. Since there were 15 diseases or conditions of interest, 45 dollar metrics were created for each survey instrument. These metrics estimated dollar losses due to absenteeism, presenteeism (reduced productivity at work), and the total loss from absenteeism and presenteeism combined. The formulas for these dollar metrics are as follows:

Absenteeism Dollars. Total days absent due to a condition (from question 7 on the survey) multiplied by 8 hours/day, in turn multiplied by an imputed hourly compensation for company employees of $34.25 per hour for salary and benefits. (See Goetzel et al.[23] for the derivation of the $34.25 figure.)*

Presenteeism Dollars. Total calendar days in which a company employee experienced the condition (from question 6 on the survey) multiplied by the ratio of 236.5/365 (to account for the fact that employees only work 5 days per calendar week, minus time off for vacations and holidays), minus the number of days absent with the condition (because an employee cannot be home sick and present at work at the same time), multiplied by the number of unproductive hours spent at work due to the condition (from question 8 on the survey), multiplied by $34.25 per hour.

Total Lost Productivity. Absenteeism $ + Presenteeism $

Reliability was assessed by focusing on the variability of these metrics, as noted below.

Reliability Testing

Only three survey questions were asked for each condition referenced on the WPSI. Respondents were asked to note their experience with the condition, the number of days of work lost, and the number of unproductive hours spent at work due to these conditions when the condition affected their work. Because the WPSI instrument was short and considered a variety of conditions that were not all likely to be problematic for each respondent, it was not feasible to construct detailed scales to assess overall experience with each condition. Thus, scale-based reliability metrics such as Cronbach's alpha[24] would not be useful to assess reliability. Next, only one application of the WPSI was feasible, making it impossible to use repeated measures testing to assess reliability. In light of these issues, reliability was assessed by using split-sample techniques focusing on the variability of the survey responses.

To apply the split-sample technique, respondents to each version of the survey were randomly divided into two equal-size groups. Reliability assessment was conducted by comparing metrics across the two groups of respondents. Once the proportion of employees whose work was affected by their health conditions was estimated, the reliability of this information was assessed by comparing these proportions across the two groups of respondents to each survey instrument. Z-tests for differences in proportions were used to establish whether the proportions differed by group, for each version of the WPSI.

Although the reliability of the proportions was of concern, of much greater concern was the reliability of the financial metrics that could be created from the WPSI. These are the metrics that may be of most use to an employer, so we focus most of our attention on them in the rest of this paper.

Five reliability criteria were established for the financial metrics, and the overall reliability of each WPSI instrument was estimated as the proportion of instances in which these criteria were met. Since the five criteria were applied to the 45 financial metrics, a total of up to 225 tests were conducted to assess reliability for each instrument.†

First, consistency in the dollar metric values across the two groups can be viewed by focusing on the correlation between the values of the two groups. This approach is of interest because many reliability metrics are based upon analyses of correlation coefficients.[24] If the two groups of respondents to each version of the WPSI provide consistent answers to the survey questions, the correlation between their responses should be high. Nunnaly[25] suggests that correlations exceeding 0.70 provide evidence of adequate reliability, so this was the first reliability criterion we used. We noted the number and proportion of times that the financial metrics were this highly correlated across the two groups of respondents, for each survey instrument. Kendall's tau was chosen as the correlation measure of interest, since this measure accounts for the direction as well as the magnitude of the differences between the dollar metric values for the two groups of respondents in each survey type.

* This estimate of hourly employee compensation was derived from data collected in a benchmarking study performed by Medstat.[23] It is also close to estimates prepared by the Bureau of Labor Statistics, which reported in March 2002 that "employer costs for employee compensation. . . averaged $23.15 per hour worked. . . . Wages and salaries, which averaged $16.76, accounted for 72.4 percent of these costs, while benefits, which averaged $6.39, accounted for the remaining 27.6 percent." (www.bis.gov, June 19, 2002).

† In several instances, reliability metrics, such as coefficients of variation or *t* tests, or correlations could not be calculated because denominators were equal to zero, and therefore fewer than 225 tests for any particular instrument may result.

Next, to provide confidence in the results from the correlation analyses, the estimated correlation coefficients should not only be high; they should also be significantly different from zero. This was our second reliability criterion, and we noted the proportion of instances in which correlations were significantly different from zero. A z-test was used to assess whether the correlation coefficient was significantly different from zero.

Having investigated reliability in terms of correlation coefficients, which is what many others have done,[12,26] it would be easy to stop here. However, in our view a focus on correlations does not provide as much information on the variability in the survey responses that employers should expect to see. The correlation analyses cannot show very well what the impact of naturally occurring outliers would be, for example. We therefore added three more reliability criteria.

Our third criterion was based upon the results of Student's *t* tests for differences in the average values of the dollar metrics across the two randomly divided groups. If the response patterns in the two groups were consistent, one would expect their average values to be about the same. Significant differences in mean values might therefore indicate a reliability problem. We noted the proportion of instances in which the average values were statistically similar (ie, the proportion of times that the *t* test *P* values exceeded 0.05).

Although the *t* tests provided additional information about the differences in responses across the groups, relying solely on *t* test responses would be insufficient, given the nature of how the two groups of respondents were generated. Using random assignment to generate the two groups would tend to equalize them, minimizing their differences and maximizing the chance that the *t* tests would find no significant differences. Thus, the test results might be able to indicate highly unreliable response patterns, but would probably miss moderately sized reliability problems. Moreover, dividing survey responses into two groups could lead to small sample sizes for some comparisons. One might therefore miss reliability problems simply because sample sizes were too small to find significant differences between the two groups.

To avoid these problems, we also noted the proportion of instances in which the differences in the mean values were large, regardless of statistical significance. For each version of the instrument, the term "large" refers to a situation in which the mean value for one group was at least twice the size of the mean for the other group. Thus, our fourth criterion for high reliability was that no group mean should be more than twice as high as its associated mean from the other group of respondents.

The fifth and final reliability criterion was based upon the coefficient of variation in the differences of the dollar metrics across the two groups. For this analysis, responses for each group were sorted from lowest to highest. The differences between the dollar metrics were then calculated as the group 1 dollar metric for each respondent minus the associated group 2 value. While the t-tests noted above were akin to testing whether the difference values that were obtained from this process had a mean that was equal to zero, the coefficient of variation focused more on the variability of the differences. If the responses were consistent, this variability should be small.

The coefficient of variation was defined as the standard deviation of the difference value, divided by its mean.‡ The coefficient of variation is an attractive measure to base a reliability criterion on because it incorporates information about the standard deviation of survey responses in the reliability criterion. This allows the researcher to investigate the notion of variance in survey responses directly, and this lies at the heart of reliability analysis. Financial metrics having high coefficient of variation values (ie, greater than 10.0) were flagged as having potential reliability problems.

‡ Since the mean of the differences between Group 1 and Group 2 values was exactly equal to zero in some cases, there were some instances in which trying to divide by zero to calculate the coefficient of variation was impossible. This happened more often in the 2-week instrument analyses.

Aggregating the Evidence for Reliability

Once the correlation analyses, *t* tests, comparisons of mean values, and the coefficient of variation analyses were completed, the results were aggregated by counting the number and proportion of times these reliability criteria were met. The overall reliability of each survey instrument was then cast in terms of the proportion of times that the dollar metrics were consistent with expectation. *Z* tests were used to determine whether the reliability estimates varied by recall period. Comparisons were also made within each survey type to assess the reliability of metrics related to absenteeism versus presenteeism.

Results

Sample Characteristics

Table 1 reports the demographic characteristics and perceived health status for each group of respondents who completed the three survey instruments. The randomization process worked well to equalize the groups with regard to these characteristics. The table shows no significant differences in age, gender, hours worked per week, or perceived health status between the two groups of respondents who completed each instrument, regardless of the survey instrument they completed.

The Prevalence of Work-Influencing Medical Conditions

Table 2 reports the proportion of WPSI respondents in each group who indicated that they had any absenteeism or presenteeism problems

TABLE 1
Demographics and Health Status by Survey Type and Group Membership

Variable	Group 1 (Mean)	Group 2 (Mean)	Difference Between Group	*T* Test or *Z* test *P* Value*
Survey type 1: past year (n = 106 per group)				
Age	47.89	47.27	0.62	0.66
Hours worked per week	42.90	41.36	1.54	0.41
Female gender	33.96%	28.30%	5.66%	0.46
Health status is excellent	5.66%	7.55%	−1.89%	0.58
Health status is very good	28.30%	31.13%	−2.83%	0.65
Health status is good	54.71%	52.83%	1.88%	0.78
Health status is fair or poor	11.32%	8.49%	2.83%	0.49
Weeks worked in year	35.66	35.30	0.36	0.90
Survey type 2: past 2 weeks (n = 103 per group)				
Age	47.41	48.97	−1.56	0.25
Hours worked per week	46.50	49.66	−3.17	0.38
Female gender	38.84%	26.21%	12.63%	0.07
Health status is excellent	7.77%	8.74%	−0.97%	0.80
Health status is very good	30.10%	27.18%	2.92%	0.64
Health status is good	46.60%	49.51%	−2.91%	0.68
Health status is fair or poor	14.56%	13.59%	0.97%	0.84
Survey type 3: past 3 Months (n = 96 per group)				
Age	45.52	46.88	−1.36	0.34
Hours worked per week	40.09	41.05	−0.96	0.71
Female gender	28.13%	33.33%	−5.20%	0.53
Health status is excellent	14.58%	8.33%	6.25%	0.17
Health status is very good	25.00%	26.04%	−1.04%	0.87
Health status is good	48.96%	61.45%	−12.49%	0.08
Health status is fair or poor	10.41%	4.16%	6.25%	0.10

* *T* tests adjusted for difference in variances were used to compare means. *Z* tests for differences in proportions were used to compare percentages.

associated with each health condition. Overall, 57% of the respondents reported at least one health condition, but there were only a few instances in which more than 5% of the respondents had any such problems; these were related to allergic rhinitis (12%), high stress (8%), migraine or major headaches (9%), and respiratory infections (9%). As one would expect, the prevalence estimates for these diseases tended to be highest in the 12-month recall period and lowest in the 2-week recall period, but this was not uniformly the case.

In terms of the reliability of these estimates, we found only one case in which the estimates differed significantly for the two randomly divided groups of respondents. This occurred for the 12-month version of the WPSI. For that application, the proportion of employees whose work was adversely affected by arthritis/rheumatism was much higher in group 2 (7%) than it was in group 1 (1%; z test P value = 0.0306). With only one significant difference out of 45 possible comparisons, we view the information about the proportions of employees with absenteeism or presenteeism problems to be quite reliable, and move on to consider other characteristics of the respondents and the reliability of the financial metrics.

Overall Absenteeism and Presenteeism Costs By Survey Type

Table 3 presents the average dollars for absenteeism, presenteeism and total productivity loss for each survey type. For example, for those who completed the 3-month version of the survey, the average absenteeism dollar value was $963.28 per person, and the average presenteeism dollar value was $352.73 per person, leading to a total productivity loss of $1316.01 per person over a 3-month period. (These numbers were obtained by summing data over the 15 conditions of interest) Similar calculations are provided for those who completed the other two survey instruments.

Taking a closer look at the data from all three surveys, one important concern arises. If all of these data were valid and reliable, one would expect the numbers from the 12-month version to be about four times as high as the numbers from the 3-month version, and the numbers from the 3-month version should be about six times as high as the numbers from the 2-week version. This pattern did not occur. As shown in Table 3, productivity loss estimates for those completing the 2-week instrument were about 1.67 times as high as expected (compared with the 3-month version),

TABLE 2
Proportion of Respondents Reporting Absenteeism or Presenteeism Associated with Each Condition, by Survey Type and Group

		1 Year		2 Weeks		3 Months	
Disease	Overall (n = 610)	Group 1 (n = 106)	Group 2 (n = 106)	Group 1 (n = 103)	Group 2 (n = 103)	Group 1 (n = 96)	Group 2 (n = 96)
Allergic rhinitis/hayfever	0.12	0.16	0.13	0.12	0.07	0.09	0.14
Anxiety disorder	0.01	0.01	0.03	0.01	0.00	0.03	0.00
Arthritis/rheumatism	0.04	0.01	0.07*	0.04	0.02	0.02	0.06
Asthma	0.02	0.01	0.05†	0.02	0.00	0.00	0.02
Coronary heart disease	0.01	0.01	0.03	0.00	0.01	0.00	0.01
Depression	0.03	0.02	0.04	0.02	0.03	0.03	0.03
Diabetes	0.02	0.01	0.02	0.01	0.01	0.01	0.04
High stress	0.08	0.09	0.08	0.10	0.07	0.09	0.04
Hypertension or hight blood pressure	0.03	0.03	0.00†	0.02	0.04	0.03	0.04
Migraine	0.09	0.16	0.12	0.06	0.06	0.05	0.06
Respiratory infections	0.09	0.23	0.14	0.06	0.03	0.03	0.02
Alzheimer's disease	0.01	0.03	0.03	0.01	0.00	0.01	0.01
Otitis media/earache	0.00	0.00	0.01	0.00	0.00	0.01	0.01
Pediatric allergies	0.01	0.03	0.01	0.00	0.00	0.02	0.01
Pediatric respiratory infections	0.02	0.02	0.04	0.01	0.00	0.02	0.05
Total	0.57	0.81	0.78	0.47	0.33	0.46	0.55

* Significantly different from group 1 value (ie, z test for differences in proportions, P value = 0.0306)
† Marginally different from group 1 value (ie, z test P value = 0.0976 for asthma and P = 0.0811 for hypertension
No other comparisons were statistically or marginally significant.

TABLE 3
Absenteeism, Presenteeism, and Total Productivity Loss Dollars by Survey Type

Metric	12-month (n = 212)	2-week (n = 206)	3-month (n = 192)
Mean absenteeism $	$1,221.37	$270.01	$ 963.28
Mean presenteeism $	$1,421.09	$ 96.24	$ 352.73
Mean total $	$2,642.46	$366.25	$1,316.01
Expected mean total $ based on 3-month version	$5,264.04	$219.34	$1,316.01
Ratio of mean total $ to expected total $	0.50	1.67	1.00

and the 12-month estimates were only about 50% as high as expected (again, compared with the 3-month version).

Why might this strange pattern of responses have occurred? One plausible explanation is that the data collected by different versions of the WPSI suffer from various reliability problems. Additionally, respondents' ability to accurately report on various health events may have varied based upon the recall period specified by the instrument. The information presented next seems to indicate that reliability problems are not the cause, and recall issues should be investigated further.

Reliability Criteria Findings

Table 4 shows that the three survey instruments rarely differed significantly with regard to the percentage of times the reliability criteria were met. The only exception occurred for the coefficient of variation analysis. For this analysis, the 3-month instrument performed best, followed by the 12-month instrument, both of which were statistically preferable to the 2-week version. With regard to the other criteria, the percentages shown in Table 4 seem fairly consistent, with the exception of the correlation analysis, which favored the 2-week instrument (though not significantly so).

Overall Reliability

Overall, the results presented in Table 4 show no clear favorite among the various recall periods examined. The reliability estimates for the 12-month and 3-month instruments were quite similar, at 0.72 and 0.75 respectively. Both of these were higher than the overall estimate for the 2-week version, which was 0.66. However, none of these differences were statistically significant, and only the difference between the 3-month version and the 2-week version came close (ie, z test P value = 0.0601). Thus, one may choose any particular version of the survey depending upon one's own time frame of interest, and reliability is not likely to suffer.

TABLE 4.
Number and Percent of Financial Metrics Meeting the Five Reliability Criteria, by Survey Type and Overall Reliability by Survey Type

Reliability Criteria	12-month	2-week	3-month
Kendall correlation >0.70	20 (64.5%)	16 (84.2%)	20 (66.7%)
P value for Kendall correlation <0.05	31 (100.0%)	19 (100%)	30 (100%)
Differences between group means were small (ie, group 1 mean/group 2 mean did not exceed 2.0, or vice versa)	15 (33.3%)	15 (33.3%)	12 (26.7%)
T test *P* value >0.05 for difference in group means	41 (100%)	37 (100%)	42 (100%)
Coefficient of variation for difference in values across the two groups <10.0	29 (70.8%)*†	17 (45.9%)	37 (92.5%)*
Overall Reliability (ie, percent of instances in which criteria were met, overall)	72.0%	66.2%	75.4%

Notes: Denominators may vary by survey type and reliability criteria. Denominators can be found by dividing numbers by percentages in the table (eg 20/(64.5) = 31 for the correlation analysis in the 12-month survey instrument).

* Significantly different from the 2-week value (ie, *z* test *P* value = 0.0237 for the comparison of the 12-month vs. 2-week instruments and $P < 0.0001$ for the comparison of the 3-month vs. 2-week instruments).

† Significantly different from the 3-month value (ie, *z* test *P* value = 0.0121 for comparison between 12-month and 3-month instruments).

Absenteeism, Presenteeism, and Total Productivity Loss

Finally, we conducted analyses to assess the reliability of the absenteeism and presenteeism dollar metrics, but these were not found to differ significantly by survey type. Absenteeism and presenteeism reliability estimates were similar in magnitude, so they are not presented here. Details are available upon request from the authors.

Discussion and Recommendations

The analyses presented here suggest that the WPSI is likely to produce highly reliable estimates of the proportion of employees with absenteeism or presenteeism problems related to the 15 conditions inquired about on that instrument. The WPSI is also likely to produce reliable estimates of the financial consequences of these conditions. While reliability varied somewhat according to recall period, the differences were not statistically significant, and, at least from a reliability perspective, these similarities may mitigate concerns about the impact of recall periods on survey responses.

We do believe, however, that recall should be considered when deciding which version of the WPSI instrument to implement. The degree of confidence workers have when speculating about their disease experiences may vary over the time periods requested in each version of the survey. Interestingly, however, a pair of studies of pain (one on migraine[26] and the second on low-back pain[27]) indicate that recall bias may be lessened by asking respondents to recall the frequency of painful events and how those influenced work productivity or usual daily activities (not just whether such events occurred or not). We cannot say for certain whether recall bias in the WPSI has been mitigated by the inclusion of questions about frequency of absenteeism or the extent of presenteeism problems.

The likelihood of suffering from the diseases of interest can also vary substantially over different time intervals (our later article on validity presents data on this issue).[5] For chronic conditions such as hypertension, arthritis, diabetes, asthma, coronary heart disease and high cholesterol, the recall period used in the survey should have little impact on productivity loss estimates, since these conditions can be uncovered regardless of when the question is asked. However, for acute problems such as otitis media or respiratory infections, the longer the time period under investigation, the more likely a disease will be found and that productivity loss estimates will be established.

However, the data reflecting a disease episode may be subject to memory distortions when questions are geared toward much longer time periods, such as a year. Our data (see Table 3) suggest that these possible distortions in perception may result in a conservative assessment of productivity losses in the 12-month version of the WPSI, since subjects tended to underestimate the impacts of diseases on their productivity the longer the time period they were asked to recall. This is a validity issue though, not a reliability (consistency) issue. Thus, for employers seeking conservative financial estimates of productivity losses related to certain disease conditions, the 12-month version of the WPSI would be the instrument of choice. If recall is deemed more important and seasonality is not an issue, the 3-month version may suffice. To take a snapshot of current experience, the 2-week version may be preferable.

In general, short recall periods (2 weeks or 3 months) may be adequate for chronic conditions. For intermittent or acute problems such as depression, allergies, migraine headaches, or stress, a longer time frame (12-months) for recall may be most useful.

Recommendations

To assess the overall productivity losses associated with a variety of health and disease conditions, we

recommend using the WPSI version which best meets the research needs of the user. We found no significant differences in reliability estimates among the three versions of the instrument. The dollar metrics for the WPSI were deemed reliable anywhere from 66.2% of the time for the 2-week instrument to 75.4% for the 3-month instrument, with the one year instrument falling in between, at 72.0% reliable. If one follows to the letter Nunally's assertion to that reliability estimates should exceed 0.70 (ie, 70%), then one may prefer either the 12-month or the 3-month version of the survey over the 2-week version. No instrument is perfect, and reliability may vary across applications. Thus, we also recommend efforts to increase reliability in future applications of the WPSI.

Two potential ways to increase reliability would be to (1) offer the WPSI in situations that produce larger sample sizes and (2) consider wording changes to some questions that appear problematic. In general, classical test theory suggests that the larger the sample size, the higher the reliability of survey responses.[24] With regard to question wording, one might focus on items related to depression, stress, diabetes, and hypertension, since these were associated with more outlier values on some of the mean expenditure metrics (details are available from the authors). Clarifying definitions for those diseases may help to reduce some of the variability in the survey responses. One might also focus on questions related to pediatric respiratory infections, since dollar metrics for those were problematic about 45% of the time (results are available upon request).

Finally, as noted earlier, reliability assessments focus on just one characteristic of a survey application – random noise in the responses. It is equally important to consider the potential for bias due to non-random response patterns. Thus, an assessment of the validity of the WPSI will be reported separately.

Conclusions

The three versions of the WPSI tested here were found to be highly reliable in terms of assessing the proportion of employees with 15 health conditions. In addition, reliability estimates for the productivity loss metrics ranged from 66.2% to 75.4%, depending upon the WPSI version used. Thus, the WPSI as applied here was reliable enough to meet its intended purpose.

None of the reliability estimates for any one version of the WPSI were significantly different than the others at the traditional 0.05 level. That having been said, it is worth noting that participation in the Health Fair where participants in the survey were recruited was voluntary. One might worry that healthier employees or those who are more motivated to care for themselves may have decided to participate, and that this might spuriously increase reliability by homogenizing the respondent sample. While we cannot eliminate this possibility, we do not think it should be a major concern in this application. Table 2 showed that the proportion of respondents who had absenteeism or presenteeism problems varied substantially by condition, suggesting that all respondents were not the same. Thus, we do not think that selection bias increased the reliability estimates, but self-selection into the survey process may have limited the generalizability of our findings to other employees at the company where the Health Fair was held.

The reliability estimates generated for the WPSI employed extensive and rigorous methods designed to put the data through an analytic "ringer" to show how variable responses may be when sample sizes are relatively small. Instead of relying on any single, imperfect reliability criterion, we relied on five. Admittedly these were arbitrarily chosen, but they were selected to provide employers with much more information about the variability of survey responses than is typically offered, and we think this information has value. Developers of other instruments often focus on simpler or less extensive sets of reliability metrics, limiting analyses to scale-based metrics like Cronbach's alpha or replications that focus on just correlation coefficients.[14] It would be useful to test the small sample properties of other instruments using multiple reliability metrics as well. This would provide a more complete picture of the variability one may find in typical applications.

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APPENDIX

WELLNESS INVENTORY

1. **What is your sex:**

MALE	FEMALE
○	○

2. **What is your age?** _____YEARS

3. **In general, would you say your health is...**

POOR	FAIR	GOOD	VERY GOOD	EXCELLENT
○	○	○	○	○

4. **Which of the following best describes your main occupational classification?**

	Mark One
A. MANAGERIAL AND ADMINISTRATIVE OCCUPATIONS	○
B. PROFESSIONAL, PARAPROFESSIONAL, AND TECHNICAL OCCUPATIONS	○
C. SALES AND RELATED OCCUPATIONS	○
D. CLERICAL AND ADMINISTRATIVE SUPPORT OCCUPATIONS	○
E. SERVICE OCCUPATIONS	○
F. AGRICULTURAL, FORESTRY, FISHING, AND RELATED OCCUPATIONS	○
G. PRODUCTION, CONSTRUCTION, OPERATING, MAINTENANCE, AND MATERIAL HANDLING OCCUPATIONS	○

5. **<u>During the past year</u>, approximately how many HOURS PER WEEK did you work in your job (include overtime, but do not include vacation time or other paid time off)?**

_____ HOURS PER WEEK

Wellness Inventory

The following questions are about the effect certain health conditions have had on your work during the past year. For example, if you experienced hayfever from August 1 to September 30 and during that time your work productivity in a typical day was half your usual level of productivity, you would answer 61 days for question 6A and 4 hours for question 6B. If you missed three days of work due to allergies, you would answer 3 days for question 6C.

6. **During the past year, did you experience ALLERGIC RHINITIS / HAYFEVER and related symptoms, such as sneezing attacks, stuffy nose, and itching of nose, eyes, ears, and throat?**

YES	NO
○	○

IF NO, SKIP TO QUESTION 7

A. **During the past year, estimate the total number of DAYS you experienced ALLERGIC RHINITIS / HAYFEVER and related symptoms** . . . . . _____**DAYS**

B. **During a typical 8-hour workday, estimate the total HOURS you were UNPRODUCTIVE because of ALLERGIC RHINITIS / HAYFEVER and related symptoms**. *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes. Do not include unproductive time that was caused by another health condition you were experiencing at the same time.* . . . . . _____**HOURS**

C. **During the past year, estimate the total DAYS you MISSED FROM WORK because of ALLERGIC RHINITIS / HAYFEVER and related symptoms**. *Include time you missed because you were sick, times you went in late or left early for doctors appointments, etc.* . . . . . _____**DAYS**

7. **During the past year, did you experience an ANXIETY DISORDER, such as Generalized Anxiety Disorder, Panic Disorder, Phobias, Obsessive Compulsive Disorder, or Post-traumatic Stress Disorder?**

YES	NO
○	○

IF NO, SKIP TO QUESTION 8

A. **During the past year, estimate the total number of DAYS you experienced an ANXIETY DISORDER**. . . . . _____**DAYS**

B. **During a typical 8-hour workday, estimate the total HOURS you were UNPRODUCTIVE because of an ANXIETY DISORDER**. *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes. Do not include unproductive time that was caused by another health condition you were experiencing at the same time.* . . . . . _____**HOURS**

C. **During the past year, estimate the total DAYS you MISSED FROM WORK because of an ANXIETY DISORDER**. *Include time you missed because you were sick, times you went in late or left early for doctors appointments, etc.* . . . . . _____**DAYS**

8. **During the past year, did you experience ARTHRITIS/RHEUMATISM and related symptoms, such as pain, swelling, stiffness and loss of function in joints?**

YES	NO
⬭	⬭

IF NO, SKIP TO QUESTION 9

A. **During the past year, estimate the total number of DAYS you experienced ARTHRITIS/RHEUMATISM and related symptoms**. . . _____**DAYS**

B. **During a typical 8-hour workday, estimate the total HOURS you were UNPRODUCTIVE because of ARTHRITIS/RHEUMATISM and related symptoms**. *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes. Do not include unproductive time that was caused by another health condition you were experiencing at the same time*. . . . . _____**HOURS**

C. **During the past year, estimate the total DAYS you MISSED FROM WORK because of ARTHRITIS/RHEUMATISM and related symptoms**. *Include time you missed because you were sick, times you went in late or left early for doctors appointments, etc*. . . . . _____**DAYS**

9. **During the past year, did you experience ASTHMA and related symptoms, such as shortness of breath, wheezing, coughing, and tightness in the chest?**

YES	NO
⬭	⬭

IF NO, SKIP TO QUESTION 10

A. **During the past year, estimate the total number of DAYS you experienced ASTHMA and related symptoms** . . . . . _____**DAYS**

B. **During a typical 8-hour workday, estimate the total HOURS you were UNPRODUCTIVE because of ASTHMA and related symptoms**. *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes. Do not include unproductive time that was caused by another health condition you were experiencing at the same time*. . . . . _____**HOURS**

C. **During the past year, estimate the total DAYS you MISSED FROM WORK because of ASTHMA and related symptoms**. *Include time you missed because you were sick, times you went in late or left early for doctors appointments, etc*. . . . . _____**DAYS**

10. **During the past year, did you experience CORONARY HEART DISEASE and related problems, such as angina (chest pain), high cholesterol, heart attack, or carotid artery disease (stroke)?**

YES	NO
⬭	⬭

IF NO, SKIP TO QUESTION 11

A. **During the past year, estimate the total number of DAYS you experienced CORONARY HEART DISEASE and related problems.** _____**DAYS**

B. **During a typical 8-hour workday, estimate the total HOURS you were UNPRODUCTIVE because CORONARY HEART DISEASE and related problems**. *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes. Do not include unproductive time that was caused by another health condition you were experiencing at the same time.* . . . . _____**HOURS**

C. **During the past year, estimate the total DAYS you MISSED FROM WORK because of CORONARY HEART DISEASE and related problems**. *Include time you missed because you were sick, times you went in late or left early for doctors appointments, etc.* . . . . . _____**DAYS**

11. **During the past year, did you experience DEPRESSION or other mood disorders, such as major depression, dysthymia, or bipolar disorder?**

YES	NO
⬭	⬭

IF NO, SKIP TO QUESTION 12

A. **During the past year, estimate the total number of DAYS you experienced DEPRESSION or other mood disorders** . . . . . _____**DAYS**

B. **During a typical 8-hour workday, estimate the total HOURS you were UNPRODUCTIVE because of your DEPRESSION or other mood disorder**. *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes. Do not include unproductive time that was caused by another health condition you were experiencing at the same time.* . . . . _____**HOURS**

C. **During the past year, estimate the total DAYS you MISSED FROM WORK because of your DEPRESSION or other mood disorder**. *Include time you missed because you were sick, times you went in late or left early for doctors appointments, etc.* . . . . . _____**DAYS**

12. **During the past year, did you experience DIABETES and related problems, such as hypoglycemia (low blood sugar), foot infections, vision problems, and frequent infections?**

YES	NO
○	○
	IF NO, SKIP TO QUESTION 13

A. **During the past year, estimate the total number of DAYS you experienced DIABETES and related problems** . . . . . _____**DAYS**

B. **During a typical 8-hour workday, estimate the total HOURS you were UNPRODUCTIVE because of your DIABETES and related problems**. *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes. Do not include unproductive time that was caused by another health condition you were experiencing at the same time.* . . . . _____**HOURS**

C. **During the past year, estimate the total DAYS you MISSED FROM WORK because of your DIABETES and related problems**. *Include time you missed because you were sick, times you went in late or left early for doctors appointments, etc.* . . . . . _____**DAYS**

13. **During the past year, did you experience HIGH STRESS?**

YES	NO
○	○
	IF NO, SKIP TO QUESTION 14

A. **During the past year, estimate the total number of DAYS you experienced HIGH STRESS** . . . . . _____**DAYS**

B. **During a typical 8-hour workday, estimate the total HOURS you were UNPRODUCTIVE because of HIGH STRESS**. *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes. Do not include unproductive time that was caused by another health condition you were experiencing at the same time.* . . . . . _____**HOURS**

C. **During the past year, estimate the total DAYS you MISSED FROM WORK because of HIGH STRESS**. *Include time you missed because you were sick, times you went in late or left early for doctors appointments, etc.* . . . . . _____**DAYS**

14. **During the past year, did you experience HYPERTENSION or HIGH BLOOD PRESSURE?**

YES	NO
○	○

IF NO, SKIP TO QUESTION 15

A. **During the past year, estimate the total number of DAYS you experienced HYPERTENSION or HIGH BLOOD PRESSURE**. . . . . _____**DAYS**

B. **During a typical 8-hour workday, estimate the total HOURS you were UNPRODUCTIVE because of your HYPERTENSION or HIGH BLOOD PRESSURE**. *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes. Do not include unproductive time that was caused by another health condition you were experiencing at the same time*. . . . . _____**HOURS**

C. **During the past year, estimate the total DAYS you MISSED FROM WORK because of HYPERTENSION or HIGH BLOOD PRESSURE**. *Include time you missed because you were sick, times you went in late or left early for doctors appointments, etc*. . . . . _____**DAYS**

15. **During the past year, did you experience MIGRAINES and related symptoms, such as major headaches, sensitivity to light or noise, nausea, and occasional vomiting?**

YES	NO
○	○

IF NO, SKIP TO QUESTION 16

A. **During the past year, estimate the total number of DAYS you experienced MIGRAINES and related symptoms** . . . . . _____**DAYS**

B. **During a typical 8-hour workday, estimate the total HOURS you were UNPRODUCTIVE because of your MIGRAINES and related symptoms**. *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes. Do not include unproductive time that was caused by another health condition you were experiencing at the same time*. . . . . _____**HOURS**

C. **During the past year, estimate the total DAYS you MISSED FROM WORK because of MIGRAINES and related symptoms**. *Include time you missed because you were sick, times you went in late or left early for doctors appointments, etc*. . . . . _____**DAYS**

16. **During the past year, did you experience RESPIRATORY INFECTIONS, such as pneumonia, bronchitis, strep throat, or tonsillitis?**

YES	NO
○	○

IF NO, SKIP TO QUESTION 17

A. **During the past year, estimate the total number of DAYS you experienced RESPIRATORY INFECTIONS** . . . . . _____**DAYS**

B. **During a typical 8-hour workday, estimate the total HOURS you were UNPRODUCTIVE because of your RESPIRATORY INFECTIONS.** *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes. Do not include unproductive time that was caused by another health condition you were experiencing at the same time.* . . . . _____**HOURS**

C. **During the past year, estimate the total DAYS you MISSED FROM WORK because of your RESPIRATORY INFECTIONS.** *Include time you missed because you were sick, times you went in late or left early for doctors appointments, etc.* . . . . . _____**DAYS**

17. **During the past year, how many DAYS did you MISS FROM WORK for *all* of the health conditions YOU EXPERIENCED (including other conditions not listed above)?** *Include time you missed because you were sick, times you went in late or left early for doctors appointments, etc.*

_____**DAYS**

18. **During the past year, were you a CAREGIVER for someone with ALZHEIMER'S DISEASE?**

YES	NO
○	○

IF NO, SKIP TO QUESTION 19

A. **During the past year, estimate the total number DAYS you were a CAREGIVER for someone experiencing ALZHEIMER'S DISEASE**. . . _____**DAYS**

B. **During a typical 8-hour workday, when you were a CAREGIVER for someone with ALZHEIMER'S DISEASE, estimate the total HOURS you were UNPRODUCTIVE because of providing care for the condition.** *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes.* . . . . . _____**HOURS**

C. **During the past year, estimate the total DAYS you MISSED FROM WORK because you were a CAREGIVER for someone experiencing ALZHEIMER'S DISEASE**. *Include time you were absent, times you went in late or left early for doctors appointments, etc.* . . . . . _____**DAYS**

19. **During the past year, were you a CAREGIVER for someone with OTITIS MEDIA/EARACHE?**

YES	NO
○	○

IF NO, SKIP TO QUESTION 20

A. **During the past year, estimate the total number DAYS you were a CAREGIVER for someone experiencing OTITIS MEDIA/EARACHE**. . . _____**DAYS**

B. **During a typical 8-hour workday, when you were a CAREGIVER for someone with OTITIS MEDIA/EARACHE, estimate the total HOURS you were UNPRODUCTIVE because of providing care for the condition.** *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes*. . . . . _____**HOURS**

C. **During the past year, estimate the total DAYS you MISSED FROM WORK because you were a CAREGIVER for someone experiencing OTITIS MEDIA/EARACHE.** *Include time you were absent, times you went in late or left early for doctors appointments, etc*. . . . . _____**DAYS**

20. **During the past year, were you a CAREGIVER for someone with PEDIATRIC ALLERGIES?**

YES	NO
○	○

IF NO, SKIP TO QUESTION 21

A. **During the past year, estimate the total number DAYS you were a CAREGIVER for someone experiencing PEDIATRIC ALLERGIES**. . . . _____**DAYS**

B. **During a typical 8-hour workday, when you were a CAREGIVER for someone who has PEDIATRIC ALLERGIES, estimate the total HOURS you were UNPRODUCTIVE because of providing care for the condition.** *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes*. . . . . _____**HOURS**

C. **During the past year, estimate the total DAYS you MISSED FROM WORK because you were a CAREGIVER for someone with PEDIATRIC ALLERGIES**. *Include time you were absent, times you went in late or left early for doctors appointments, etc*. . . . . _____**DAYS**

21. **During the past year, were you a CAREGIVER for someone with a PEDIATRIC RESPIRATORY INFECTION?**

YES	NO
○	○

IF NO, SKIP TO QUESTION 22

A. **During the past year, estimate the total number DAYS you were a CAREGIVER for someone experiencing a PEDIATRIC RESPIRATORY INFECTION**. . . . . _____**DAYS**

B. **During a typical 8-hour workday, when you were a CAREGIVER for someone with a PEDIATRIC RESPIRATORY INFECTION, estimate the total HOURS you were UNPRODUCTIVE because of providing care for the condition.** *Include time you were limited in the amount or kind of activities you could do, time needed for more frequent or longer breaks, and time spent on work that had to be redone because you made mistakes.* . . . . . _____**HOURS**

C. **During the past year, estimate the total DAYS you MISSED FROM WORK because you were a CAREGIVER for someone experiencing a PEDIATRIC RESPIRATORY INFECTION**. *Include time you were absent, times you went in late or left early for doctors appointments, etc.* . . . . . _____**DAYS**

22. **During the past year, how many DAYS did you MISS FROM WORK because you were a CAREGIVER for someone else (including other conditions not listed above)?** *Include time you missed because you were providing care, times you went in late or left early to take some for doctors appointments, etc.*

_____**DAYS**

THANK YOU FOR YOUR PARTICIPATION!