Development and Testing of the Student Work Safety Assessment Tool (SWSAT)

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INTRODUCTION

Working and studying is a normal part of growing up for many teens and young adults in Canada. Studies have found work can be beneficial for youth, helping them to attain new skills, develop responsibility, self discipline, and meeting new people. However, research has reported teens and young adults are also more likely to sustain workplace injuries than older workers (Breslin et al, 2005).

Work site specific training is a legislative requirement, but many youth report not receiving such training (Breslin, Wood, Mustard, 2009). In spite of the risks associated with this population, a comprehensive assessment of workplace safety training for Canadian students is not available. In order to gain an understanding of workplace safety from young student workers' perspective, an instrument called the Student Work Safety Assessment Tool (SWSAT) was developed.

Purpose

The purpose of this study was to test the psychometric properties (reliability) of the Student Work Safety Assessment Tool (SWSAT). Reliability concerns the degree of dependability or accuracy with which an instrument measures the intended attribute. Reliability assessment is necessary to ensure the validity of future studies using this SWSAT. The SWSAT was designed specifically for future use because no other single instrument was found that would elicit information on the nature of work and workplace safety for our study population.

METHODS

Study Design & Sample

Recruitment for study subjects occurred via the Career Centre at the College. Participants completed the survey online during a workplace safety training session. A test -retest time series design was implemented, time 1(pre- training, n=35), time 2 (post-training, n=25).

Data Analysis

The reliability of the SWSAT was assessed using Exploratory Factor Analysis (EFA), Internal consistency reliability and Test-retest reliability.

Table 1. Construct 1: Stress

Num.	Text	Pattern Coefficient
14	Do you have any opportunity to influence your working conditions?	.78
12	Do you regard your work as interesting and stimulating?	.75
15	Do your fellow workers help you with problems you may have in your work?	.36
*13**	*Do you have too much work to do?*	

* = reversed-coded (if used); MSA = 0.59
Student response to above questions (1=often, 5=never): lower is better.

Table 2. Construct 2: Safety Knowledge

Num.	Text	Pattern Coefficient
21*	Do you feel you have knowledge of risks in your workplace?	.71
18*	Do you feel that you have enough information to work safely?	.67
19	Do you feel that you lack experience for working safely?	.57
20	*Do you feel that you excessively expose yourself to risks while working?*	

* = reverse-coded; MSA = 0.66
Student response to above questions (1=often, 5=never): higher is better.

Table 3. Construct 3: Prevention Beliefs

Num.	Text	Pattern Coefficient
41*	Most workplace injuries are preventable through education, training and proper supervision.	.70
42*	Working part-time has helped me gain a better understanding of workplace health and safety issues.	.44
43	People make too much of an issue about workplace safety.	.23
*40**	*Young workers need to become more aware of how to prevent work injuries*	

* = reverse-coded (if used); MSA = 0.54
Student Response to above questions (1=strongly agree, **5**=strongly disagree): higher is better

Table 4. Internal consistency reliability of the factors and their correlations: Pearson correlations (and p) between constructs, Cronbach alpha, and mean, time 1 and time 2

Constructs (min=3, max=15)	*Stress*	*Safety Knowledge*	*Prevention Beliefs*	Alpha	Mean
Stress *(lower is better)*					
T1 (N=35)	1.0			.64	6.4
T2 (N=25)				.67	6.0
Safety Knowledge *(higher is better)*					
T1 (N=35)	-.23 (.19)	1.0		.68	11.5
T2 (N=25)	-.20 (.34)			.56	11.3
Prevention Beliefs *(higher is better)*					
T1 (N=35)	-.29 (.09)	.35 (.04)	1.0	.38	11.8
T2 (N=25)	-.10 (.64)	.18 (.38)		.06	12.0

RESULTS

Many variables in the survey are correlated. The main purpose of factor analysis is to reduce a large set of variables into a smaller more manageable set. The EFA presented in the previous 3 tables contains the factor loadings ("pattern coefficient") of the items on the factors. Most analysts feel that pattern coefficients should be > 0.30 to justify placing an item into a factor. It was possible to get 3 items with loadings > 0.30 on 2 of the factors (Stress and Safety Knowledge). On the prevention factor there were only 2 items with loadings > .30; the loading for the third item (#43) was 0.23, which would be too low to retain under conventional (large sample size). The EFA results indicated that 1 item should be dropped from each construct. The dropped item is listed in italics in the bottom row of the tables 1-3.

There is a statistic reported below each table called MSA. It is Kaiser's 'measure of sampling adequacy.' It ranges from 0 to 1. MSA is a diagnostic statistic indicating if the variables in the construct are suitable for factor analysis. It is thought that MSA should be 0.60 or higher, but in some situations a more lenient minimum cutoff of 0.50 is adopted. The MSA statistics here are on the low end, but low values would be expected in this situation because of the very low sample size.

Reliability is a measure of consistency, the dependability of information from one respondent to another and for a single respondent from one time to another. Cronbach's alpha is the measure of scale reliability. In table 4, Alpha values were rather low. We would prefer to see them at 0.70 or greater. But, low alpha is not uncommon for small scales and small n. Small n tends to mean that more randomness exists in the data than is desirable. Alpha values are quite low for the Prevention Beliefs scale.

In table 5 the Pearson correlation between scores on the 3 scales for the 2 survey administrations, pre-training and post-training were calculated . The correlation coefficients are all statistically significant. The correlation between Stress at 2 times was large, 0.90, and moderate for the others, 0.68 and 0.47.

Table 5. Test-retest reliability: Pearson correlations (and p) for constructs, pre- and post-test

Construct	Pre-post Correlation
Stress (N=27)	.90 (.00)
Safety Knowledge (N=26)	.68 (.00)
Prevention Beliefs (N=25)	.47 (.01)

DISCUSSION

The SWSAT is a valid tool in measuring the two constructs of Stress and Safety Knowledge by the 6 items in Tables 1and 2. The construct Prevention Beliefs has poor psychometric characteristics. Additional questions to measure this construct will require further testing. Given the current climate of workplace safety in Ontario, developing a better understanding of young workers knowledge, attitudes and beliefs of safety is particularly relevant to health professionals and others who are committed to developing workplace safety programs for youth. Clearly, now is the time to build a culture of work safety for youth in order to continue to support safer work environments for not only youth but workers of all ages. With further refinement the SWSAT may assist with these endeavours.

The small sample size was a major limitation to establishing strong psychometric properties for all constructs within the SWSAT measure.

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