INTRODUCTION
Observation-based occupational safety programs have long recognized the critical interaction of environment and behaviour in the workplace [1]. While the veracity of these programs is questioned [2], their foundation in behavioural psychology connects to various theory-based paradigms for changing manual materials handling (and musculoskeletal loading, or ‘consequences’) by manipulating the perceivable environment (or ‘antecedent’). Possible approaches include directional cueing, pop-out patterning, visual biofeedback, or optical illusions. The purpose of the current research was to examine both affordance and postural mechanics for manual materials handling in a simulated baggage handling task that was embedded with an implicit directional cue.

METHODS
57 participants (37 females) were outfitted with 4 cm diameter colour contrast markers on the shoulder, distal posterior upper arm, distal dorsal forearm, iliac crest, popliteal fold, and shoe heel of their right side. Suitcases were marked on four sides with one of two implicit directional cues (UP, DOWN; Fig. 1), or with no cue. Cueing was randomly assigned, and participants were not aware of alternative cue types. Participants hoisted the suitcase (57 L) by the handle prior to testing to obtain a perception of both mass (8 kg) and distribution (uniform perimeter weighting).

Participants were read the fixed script of a manual material handling task (adapted from [3]), where that script defined job (airline baggage handler), task (pulling suitcases horizontally, with vertical support), task frequency (5 suitcase transfers per minute), and shift duration (8 hour shift with 1 hour of formal ‘break’). At the end of the script, participants were invited to choose the baggage handling height (vertical affordance; ATH) that would ‘allow them to handle the bags as safely as possible without causing pain or discomfort’. Participants were allowed to address the suitcase during affordance setting to reinforce perceptions [4]. Each participant then completed 5 isometric pulling trials at their vertical affordance while behaviour in frontal plane was recorded from posterior. Trial video data were clipped and postures were analyzed in frame of maximum shoulder joint abduction (DartFish™).

RESULTS
Cueing did not change perceptions of safe vertical affordance (Figure 2A), but cues did modify maximum shoulder abduction (Figure 2B; f(2,54)=3.595, p=.034) and maximum lateral trunk flexion (Figure 2C; f(2,54)=4.309, p=.018) during manual materials handling. Follow up post-hocs showed that the DOWN cue led to significantly greater shoulder abduction and lateral trunk flexion angles.

DISCUSSION & CONCLUSIONS
Implicit cues did not modify perceptions of safe affordance. DOWN cues did modify MMH behaviour, but not in a safe manner – working with greater shoulder abduction and/or greater spine flexion increases the risk of cumulative soft tissue injury in these areas. It is possible explicit cues and/or dynamic cues that are prominent during perception, absent during action, and simply processed [5] may be effective in safely modifying manual materials handling behaviour.

REFERENCES