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Promotion of alternative-sized personal protective equipment

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ABSTRACT

Introduction: With more diversity in the workforce, companies are producing PPE such as hard hats, safety glasses, coveralls, foot protection, and safety harnesses for a larger range of body shapes and sizes. However, gray literature reports suggest that barriers exist to getting alternate sized PPE from the manufacturer to the workers who need it. The purpose of this study is to determine the extent to which alternative-sized PPE is marketed. *Method:* A web-based review of seven major manufacturers of PPE was conducted to determine: (a) whether or not they offer alternative-sized products, (b) if these products are clearly labeled, and (c) if images used to display PPE are representative of a diverse workforce. *Results:* Of the seven PPE manufacturers investigated, six had at least one product that was marketed as gender and/or size alternatives however, alternative sizes were more common for larger body types. Alternative-sized products rarely included size charts, and the models used to display PPE were overwhelmingly white males of average size. *Conclusions:* Despite the growing availability of alternative-sized PPE, it can be difficult to find these products, which suggests that they are rarely promoted or labeled as alternative-sized. Our study indicates that companies should expand their product lines and more aggressively market and promote these items. Guidance on how to properly fit their products would also be extremely helpful to the end-user. *Practical applications:* Manufacturers could improve the availability of alternative-sized PPE and increase their promotion of these products on their websites and in their catalogs. Individual companies and safety professionals may assist in this process by demonstrating demand for alternative-sized PPE.

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1. Introduction

Personal protective equipment (PPE) is often an essential component of worker safety. Until recently, PPE for workers has been developed based on measurements taken from military male recruits in the United States during the 1950s to 1970s (Spahr, Kau, Hsiao, & Zwiener, 2003). These data do not account for the range of body shapes and sizes of the modern civilian workforce, as they are based on men who were young, fit, and mostly white. The result is a decrease in the ability to achieve good fits for PPE for women, non-whites, and individuals with body sizes or shapes that do not conform to those of military recruits (i.e., those who are overweight, shorter than 5′5″ or taller than 6′; Hsiao, Friess, Bradtmiller, & Rohlf, 2009). For example, a number of studies (Goldenhar, Swanson, Hurrell, Ruder, & Deddens, 1998; Goldenhar & Sweeney, 1996; National Institute for Occupational Safety and Health [NIOSH], 1999) have identified poor-fitting PPE as an occupational hazard for women in construction, fire-fighting, and waste collection. Poor fit not only reduces the ability of the PPE to protect the worker as designed, but also may result in the worker choosing to reduce or eliminate its use because it is seen as either being ineffective or uncomfortable (Goldenhar & Sweeney, 1996). Often, workers who require alternative-sized PPE "make do" with standard PPE provided, which can lead to additional risks from the PPE fitting poorly (Walker, 2010), and negative attitudes about PPE use, in general.

The participation of men and women in previously gender-segregated fields (Sarkar, 2002; Walker, 2010), the aging workforce (National Research Council, 2012), and increased rates of obesity in the United States workforce, particularly among blue collar workers (Gu et al., 2014), are just some of the demographic trends that highlight the need for alternative-sized PPE. Perhaps most noticeable is the growing ethnic diversity in the United States, which has led to estimates that, by 2024, ethnic and racial minorities will make up nearly 43% of the civilian labor force (Toossi, 2015). This increase is particularly relevant to the need for alternative-sized PPE, as immigrants are overrepresented in dangerous jobs that most often require PPE (Orrenius & Zavodny, 2009). For example, according to the National Association of Home Builders (2015), in 2013, foreign-born workers accounted for roughly 23% of the construction labor force in the United States.

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With more diversity in the workforce, there has been an effort to expand the sizes offered in various types of PPE, and companies are producing PPE such as hard hats, safety glasses, coveralls, foot protection, and safety harnesses for a larger range of body shapes and sizes. While it is unclear how rigorous the design efforts have been in creating these products, they suggest a growing demand for alternative-sized PPE. Currently, there are efforts under way to develop better methods for ensuring that PPE are more inclusive such as the development of an evidence-based, conformity verification framework (NIOSH, 2013). Additionally, NIOSH researchers have been working to improve the fit of respirators and fall protection harnesses and expand options for a wider range of body shapes (Hsiao, 2013; NIOSH, 2013; Zhuang, Benson, & Viscusi, 2010). NIOSH research has been incorporated into the international standards for respiratory protection devices (ISO, 2015). NIOSH collected anthropomorphic data across three age groups (18–29 years, 30–44 years, and 45–66 years), two genders (male and female), and four racial/ethnic groups (white, African American, Hispanic, and other). Due to the multi-ethnic U.S. population, this sample was almost representative of the world's population.

However, producing alternate-sized PPE is just the first step. Walker (2010) suggests that barriers such as problems with supply chains, lack of promotion of alternative-sized PPE, and employers' lack of awareness of the need for alternative PPE all hinder getting alternative-sized PPE from the manufacturer to the workers who need it. There is a breakdown in the typical supply and demand marketing structure, because employers may not even be aware that such products are available, and manufacturers may, therefore, be unaware of the demand for alternative-sized products. These findings echo a growing recognition in the literature for the need to investigate factors that enhance and limit the development, transfer, and use of occupational safety and health information and technology (Desmarais & Lortie, 2011; NAS, 2009; Rantanen, 1999; Schulte et al., 2003). In response, this paper explores marketing practices as a potential barrier to widespread distribution and use of alternative-sized PPE.

A problem that may prevent workers from accessing alternative-sized PPE is that manufacturers may not aggressively promote their alternative-sized PPE products (Walker, 2010). This lack of marketing may be a barrier for employers, who would be potential promoters of these products for their diverse workforce if they were aware that these products exist. Formative research by NIOSH suggests that poor advertising to people with purchasing authority and restrictive (e.g., bulk) purchasing policies, that are fairly standard for organizations, impede workers access to alternative-sized PPE (DeLaney, 2012). However, this formative research found that anecdotal accounts from interviews with safety professionals appearing in trade journals have not yet been followed up with any systematic evaluation of how alternative-sized PPE is promoted. Building on these gray literature reports, this article takes a systematic look at the availability, labeling, and marketing of alternative-sized PPE by seven predominant PPE manufacturers.

2. Materials and methods

In order to determine the extent to which alternative-sized PPE is available, we conducted a web-based review of PPE manufacturers to determine: (a) whether or not they offer alternative-sized products, (b) if these products are clearly labeled, and (c) if models used to display PPE are representative of a diverse workforce.

The seven major manufacturers of PPE (who will not be named) reviewed here were initially identified as part of formative research effort by NIOSH (DeLaney, 2012). They were selected because they are well-known across industries with national distribution channels. The online product offerings (website and catalog, if available) of each manufacturer were reviewed to determine what types of products they offer. Then, we examined how many of those products were available in alternative sizes or mentioned being designed for different body shapes (e.g., respirators that were compatible with a variety of facial structures) We also observed how the products were marketed, specifically, how they were labeled (e.g., is there a size chart to assist the purchaser?). Finally, we documented the physical diversity of any models advertising the products. The specific physical characteristics of interest were sex (male or female), body size (average or overweight), and skin tone. For each manufacturer, we identified what types of PPE they make, how many alternative sizes are available, how many are labeled as alternative-sized and the wording used to indicate alternative sizes, the image used to accompany the PPE, and if a size chart is provided.

3. Theory

There is growing recognition in the OSH field that the simple act of building a better mousetrap does not guarantee that people will use it; that is, simply producing a new product or posting OSH information on the internet is not sufficient to affect adoption of OSH practices that will lead to improved outcomes (Desmarais & Lortie, 2011; NAS, 2009; Rantanen, 1999; Schulte et al., 2003). Translation research, a relatively new field in occupational safety and health research, explores how scientific innovations spread and become practical benefits to society. One area of translation research focuses on how technological innovations and scientific recommendations become well-accepted workplace safety and health practices that are communicated and used on a large scale (Lucas, Kincl, Bovbjerg, & Lincoln, 2014; Schulte, 2016). This paper explores how marketing practices may hinder the widespread use of alternative-sized PPE.

4. Results

4.1. Availability

Of the seven PPE manufacturers investigated, six had at least one product that was marketed as gender and/or size alternatives (see Table 1). The companies with the widest variety of alternative-sized products were Companies B (5 types of products), C (4 types), and E (4 types). The types of products that had the widest availability of alternative sizes often required a precise fit and close contact with the body (e.g., harnesses and gloves). Although four companies offer alternative-sized protective eyewear, protective eyewear had the smallest ratio of alternative sizes to total offered, meaning that there are very few options.

4.2. Labeling

Four hundred forty products had sizes defined, indicating that the product was available in something other than just “standard.” The sizing range (where labeled) on alternative-sized products ranged from extra-small (XS) to 5 extra-large (5XL) (see Table 2). There were 58 alternative-sized products that were not labeled according to that size range. The most common size range was small (S) to 2XL. The range of sizes can be categorized as average (medium [M] and large [L]), below average (XS and S), and above average (XL-5XL). The most common sizes are in the average category, comprising 43.0% of size-labeled products. Among sizes deviating from average sizes (in other words, alternative-sized), 22.3% of products are available in sizes below average and 34.8% in sizes above average. Even if the largest sizes (3XL-5XL) are removed, there are still more products offered in the above average category than the below average category. Therefore, it appears as though alternative sizes are more common for larger, more likely male, body types.

The companies that manufactured alternative-sized products rarely included size charts with their products. Nearly two-thirds (61.9%) provided no context as to what the sizes represent. Therefore, it is impossible for a purchaser to know whether sizes are the same across