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Applying the Consolidated Framework for implementation research to agricultural safety and health: Barriers, facilitators, and evaluation opportunities☆

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ABSTRACT

Objectives: Within agriculture, forestry, and fishing safety and health research, little progress has been made to implement evidence-based interventions into practice. Beginning in the early 2000s, much work has been done to address the leading cause of agricultural fatalities: tractor overturns. In this time a Rollover Protective Structure Rebate Program has been developed to assist farmers in installing safety equipment to prevent these fatalities. In the current study, the Consolidated Framework for Implementation Research is adapted so that it may be used to evaluate and improve the scaling up of this intervention.

Methods: Each construct specified in the Consolidated Framework for Implementation Research was incorporated into a survey, which was distributed to a 77 member Coalition of agricultural stakeholders. Stakeholders were asked to rate each construct based on how important the individual felt it was to the implementation of the National ROPS Rebate Program on a scale of 1 (not at all important) to 5 (extremely important).

Results: Using the mean score for each construct as a starting point, 23 constructs were selected for inclusion in an evaluation tool which will be used, in future studies, to evaluate the implementation of the National ROPS Rebate Program.

Conclusions: Though the Consolidated Framework for Implementation Research was designed for use in the clinical setting, this study is a first step in applying it to occupational health and safety. The insight gained through this study will provide a foundation for future work on this initiative, as well as in public health.

1. Introduction

When it comes to appropriate integration of research results in the areas of occupational safety and health, there is often a disconnect between research and widespread implementation of evidence-based practices (Howard, 2009; Fiske and Earle-Richardson, 2013; Elkind, 2007; The National Academies, 2008; Bero et al., 1998; Gagliardi et al., 2015; Glasgow et al., 2003). In this case, we consider evidence-based practices that have proven to specifically minimize injuries and mortalities in the highest risk occupational sector in the United States: agriculture, forestry, and fishing. In order to bridge this gap, methods for guiding, informing, and evaluating widespread implementation efforts are needed. Though some of the earliest implementation studies began in agricultural settings (Rogers, 2003), researchers and practitioners in this field have not yet documented active pursuit of widespread implementation of health and safety related evidence-based practices according to a literature review conducted by Tinc et al. (Tinc et al., 2017).

Though there are few documented attempts to achieve widespread implementation of evidence-based practices in the agriculture, forestry, and fishing arena, there is evidence that researchers have applied implementation models in more localized settings. Recently, the RE-AIM framework (Glasgow et al., 2001) was used to implement a farm safety program, which originated in the mid-western United States, to South

☆ The findings presented in this manuscript have not been reported elsewhere nor is the manuscript under review elsewhere. The authors have full control of the data presented and are able to make it available in aggregate form as needed.

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Carolina (Storm et al., 2016). The authors of the study suggested that while RE-AIM was useful in its original form, the study would have benefitted from tailoring the framework to their specific implementation setting (Storm et al., 2016).

Given the lack of widespread agriculture, forestry, and fishing implementation examples, the authors have looked to the realm of clinical research for guidance in examining the process of widespread implementation. Within the clinical field, much work has been done in implementation science, which is defined as "the scientific study of methods to promote the systematic uptake of research findings and other evidence-based practices into routine practice, and, hence, to improve the quality and effectiveness of health services (Bauer et al., 2015)." As a result, several frameworks and theories for advancing the field have been developed (Glasgow et al., 2001; Damschroder et al., 2009; Rajan et al., 2012; Kilbourne AM, Neumann et al., 2007; Nilsen, 2015; Chamberlain et al., 2011; Feldstein and Glasgow, 2008; Tabak et al., 2012; Trochim et al., 2011; Waltz et al., 2014).

One such framework is the Consolidated Framework for Implementation Research (CFIR). Like RE-AIM, the CFIR provides a framework for researchers attempting to link implementation process to outcomes and a means of evaluating implementation of evidence-based practices. The CFIR combines twenty smaller implementation theories, into one comprehensive framework (Damschroder et al., 2009). The CFIR was designed so that it could be adapted and applied in a variety of settings to encourage consistency in evaluation and reporting of translational efforts (Damschroder et al., 2009). In addition to helping users understand what works, or doesn't work, in implementation research, the qualitative-based CFIR is unique in that it also helps researchers understand why and how implementation processes work (Damschroder et al., 2009; CFIR Research Team, 2017).

In total, the CFIR contains 26 constructs (three of which include a total of 14 sub-constructs) divided into 5 domains: characteristics of individuals, inner setting, intervention characteristics, outer setting, and process (Damschroder et al., 2009). In addition, seven supplemental outcome constructs were developed to help users more fully plan and evaluate implementation efforts (Proctor et al., 2011). These supplemental outcome constructs are divided into two domains: implementation outcomes and client outcomes (Proctor et al., 2011). Fig. 1 shows the distribution of domains and constructs for both the CFIR and supplemental outcome constructs. Throughout this manuscript, both constructs and sub-constructs will simply be referred to as constructs, and discussion of the CFIR will include not just CFIR constructs but also the supplemental outcome constructs.

1.1. Research context

This paper describes our application of the CFIR to the expansion of an evidence-based Rollover Protective Structure (ROPS) Rebate Program (Sorensen et al., 2009, 2014, 2010, 2008; Tinc et al., 2015, 2016; Center, 2017), which provides financial assistance to farmers who wish to install life-saving ROPS kits on their tractors. Among US farmers, tractor overturn fatalities are the number one cause of death each year (Murphy et al., 2010); when used with a seatbelt, ROPS are 99% effective in preventing these tragic fatalities (Swenson, 2004). Though ROPS are standard on newer equipment, tractors manufactured prior to 1985 did not include ROPS and must be retrofitted (Tinc et al., 2016; ASABE, 2014). Retrofit ROPS kits are available to farmers; however, barriers to retrofitting, such as cost and sourcing difficulties, stand in the way.

The ROPS Rebate Program was launched in New York in 2006 (Center, 2017). This program is voluntary and provides farmers with assistance identifying the proper ROPS kit for their specific tractor. The Program also provides a rebate of approximately 70% of the cost of the ROPS kit, shipping, and professional installation with a cap on out-of-pocket expenses (Sorensen et al., 2008; Center, 2017). In surveys conducted with every fourth participant approximately six months after completion of the ROPS installation, 99% say that they would recommend it to another farmer (National ROPS Rebate Program, 2017). Since launching in 2006, the ROPS Rebate Program has expanded to six additional states: Vermont, New Hampshire, Massachusetts, Pennsylvania, Wisconsin, and Minnesota. To date, more than 6200 farmers have signed up for the Program and more than 2300 farmers completed ROPS retrofits in these seven states (National ROPS Rebate Program, 2017). An additional 148 farmers have inquired about the Program from other states.

In 2014, ROPS Rebate Program facilitators, who administer the ROPS Rebate Program, invited a multi-sector group of agricultural stakeholders to a two-day Future Search workshop (Tinc et al., 2015). During this workshop, the group developed a joint plan for expanding the Program into the National ROPS Rebate Program. This group, which is now known as the National Tractor Safety Coalition, continues to work together to pursue this goal. The Coalition is populated with representatives from a wide range of sectors, including equipment manufacturers and dealerships, insurance agencies, health and safety organizations, agricultural organizations, government organizations, and media outlets, as well as farmers and farm safety advocates, university-based engineers, and ROPS Rebate Program experts. Given this expansive representation, the Coalition is well-positioned to encourage the launch of the National ROPS Rebate Program (Sorensen et al., 2014; Tinc et al., 2016). The Coalition is led by a 15-member steering committee, which is representative of the Coalition at large and includes the ROPS Rebate Program facilitators.

This study was designed to examine the efficacy of the CFIR as a framework for monitoring the implementation of an agricultural health and safety evidence-based practice, i.e. the National ROPS Rebate Program. This manuscript describes the first step of applying the CFIR to agricultural health and safety implementation studies, including: (1) determining which CFIR constructs are applicable in non-clinical

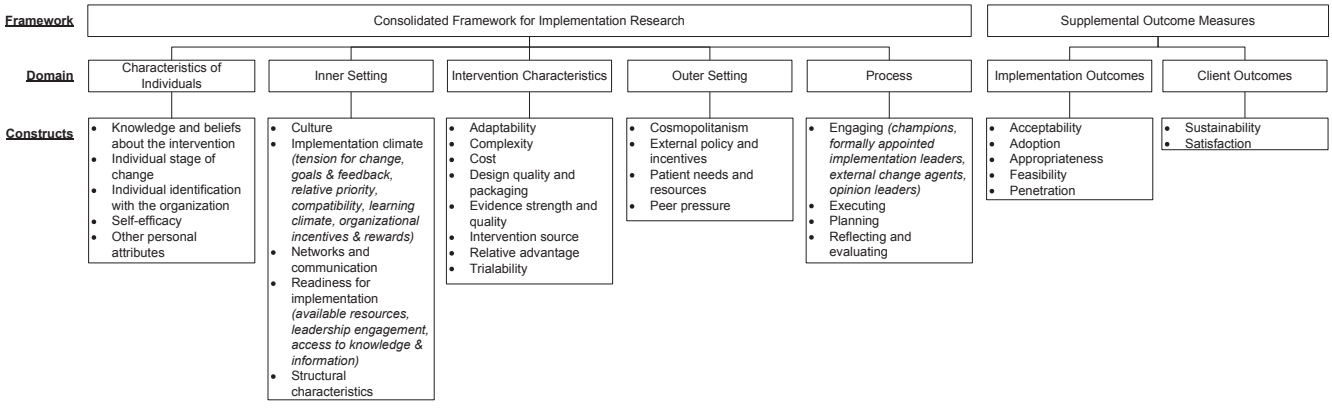

Fig. 1. Domains and constructs within the Consolidated Framework for Implementation Research (13) and supplemental outcomes (23).