



Using the exhibited generalization approach to evaluate a carbon monoxide alarm ordinance[☆]



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ABSTRACT

Current interests in enhancing the focus of external validity or transferability call for developing practical evaluation approaches and illustrating their applications in this area for meeting the need. This study takes the challenge by introducing an innovative evaluation approach, named the exhibited generalization approach, and applying it in evaluating the carbon monoxide (CO) alarm ordinance passed by Mecklenburg County, North Carolina. The stakeholders specifically asked evaluators to determine the answers to the following two questions: (1) Does the alarm ordinance work? (2) What generalizable information can the Mecklenburg experience provide to other jurisdictions trying to decide if the alarm ordinance's planning, implementation, adoption, and outcomes are transferable to their communities? This study illustrates how to apply the exhibited generalization approach to provide the stakeholders with answers to these questions. Our results indicate that the alarm ordinance was effective in increasing CO alarm ownerships and reducing CO poisoning cases. The evaluation provides potential users and other interested parties with the necessary information on contextual factors and the causal mechanism underlying the CO alarm ordinance, so that these parties and users could decide whether the Mecklenburg alarm ordinance would be transferable to their own communities. Discussions include implications of this study for contributing in further advancing evaluation theory in addressing transferability or external validity issues.

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The purpose of this paper is to introduce the exhibited generalization approach for addressing issues on external validity and transferability and illustrate its application by an evaluation of a carbon monoxide alarm ordinance. Lessons learned from the application are discussed at the end.

1. Major issues on external validity and the exhibited generalization approach

This section will discuss major issues on external validity and explain why the exhibited generalization approach is useful in addressing external validity and transferability issues.

[☆] The findings and conclusions of the article are those of the authors and do not necessarily represent the official position of the Center for Disease Control and Prevention (CDC).

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1.1. Issues on external validity and transferability

Over five decades years ago, Campbell and Stanley (1963) proposed a validity model that has maintained a profound influence on research and evaluation. They identified two types of validity: internal and external. Internal validity asks whether, in this specific experimental instance, the experimental treatment made a difference. On the other hand, external validity, asks whether and experimental effect can be generalized, and if so, to what populations, settings, or treatment and measurement variables. Although both are crucial for research, Campbell and Stanley found an inverse relationship between the two: an increase of internal validity tends to decrease external validity, and vice versa. Thus in any study, this trade-off makes any attempt to maximize both internal and external validity extremely difficult. Campbell and Stanley accepted the tradeoff as axiomatic, and then forcefully argued for the primacy of internal validity. They viewed internal validity as the “*sine qua non*” of research. That is, the

legitimacy of any research finding rests first on internal validity, and all sources of spuriousness are carefully eliminated, thus producing a true result capable of generalization (Campbell & Stanley, 1963; Cook & Campbell, 1979; Shadish, Cook, & Campbell, 2002). Campbell and Stanley asserted that without internal validity, external validity would be misleading or irrelevant. This view has an intense impact on evaluation practices for heavily focusing on internal validity and neglect external validity issues (Chen & Garbe, 2011; Chen, 2010; Cronbach, 1982; Glasgow, Lichtenstein, & Marcus, 2003).

Advocates of using the Campbellian validity typology for evaluation, however, were not without their critics. There have been ongoing heated debates among evaluators on whether or not RCTs are the best method for evaluations (Donaldson, Christie, & Mark, 2008). Advocates of the experimentation evaluation approach insist they are, while critics especially from the qualitative camp disagree (Chen, Donaldson, & Mark, 2011). Critics argued that internal validity should not be the top priority; RCTs are not the best method for obtaining credible evidence about the kinds of questions evaluators should address; persuasion, interpretation and the subjective nature of conclusions should be emphasized, rather than validity. On the other hand, advocates of the experimentation evaluation approach disagrees the above criticism. They insisted RCTs are best method for providing credible evidence and challenged critics from the opposite camp to provide concrete alternative methods to provide credible evidence. Furthermore, the view of prime priority of internal validity has been further reinforced by the current evidence-based practice movement. In this movement, only interventions evaluated by RCTs are qualified for evidence-based interventions (Nutbeam, 1999; Speller, Learmonth, & Harrison, 1997; Stephenson & Imrie, 1998; Tilford, 2000).

However, lessons learned from evaluation practices in the last several decades have resulted in a growing recognition that the over-focus on internal validity and neglect external validity have reduced the usefulness of some research or evaluations and has led to a disconnect between academic and practical communities (Chinman et al., 2005; Cunningham-Sabo et al., 2007; Glasgow et al., 2003, 2006; Green & Glasgow, 2006; Miller & Shinn, 2005; Sandler et al., 2005; Spoth & Greenberg, 2005; Wandersman, 2003; Wandersman et al., 2008; Weiner, Helfrich, Savitz, & Swiger, 2007).

Furthermore, the current scheme ranking evidence by placing high value on RCTs is found to not fit well in the reality of policy intervention process. Few policy interventions can be assessed by RCTs (Brownson, Chiqui, Burgeson, Fisher, & Ness, 2010; Ogilvie, Egan, Hamilton, & Petticrew, 2005). Instead, a phenomenon of the “inverse evidence law” has been observed. That is, interventions most likely to affect whole populations are least valued in the current evidence scheme that emphasizing randomized designs (Ogilvie et al., 2005). In order to be relevant to practice, the scheme ranking evidence needs to be revised and expanded by taking evidence on external validity into consideration.

In order to address the predicament, as seen in editorials and journal articles, many advocate the importance of external validity in evaluation (Brownson et al., 2010; Klesges, Dziewaltowski, & Glasgow, 2008; Patrick, Scutchfield, & Woolf, 2008; Persaud & Mamdani, 2006; Steckler & McLeroy, 2008). It is encouraging to see the growing interest in external validity. However, in spite of the interest, there still lacks concrete, practical approaches for addressing external validity issues. In order to narrow the gap, this study proposes the exhibited generalization approach for evaluators to address issues of external validity and transferability.

1.2. The exhibited generalization approach

The exhibited generalization approach is part of a larger effort for developing practical approaches for balancing internal and external

validity in evaluating intervention programs in the real world (Chen & Garbe, 2011; Chen, 2010, 2014). Targeted generalization and exhibited generalization are proposed to address issues of external validity and transferability issues. Stakeholders sometimes have a particular real-world target population or setting to which they want to generalize the evaluation results. This relates to targeted generalization. Targeted generalization is the extent to which evaluation results can be generalized to a specific target population or real-world setting. On the other hand, exhibited generalization is an evaluation that provides sufficient contextual factors for an intervention to be successful in real world applications. Users can thereby assess its generalization potential with regard to their own populations and settings and decide whether to apply the intervention in their communities.

This study focuses on the exhibited generalization approach and its application. This approach indicates when stakeholders want an evaluation of their policy intervention or intervention program to provide generalizable information to potential users. To consider whether the policy intervention or intervention program is transferable to their communities, evaluators must ask the following two questions in the evaluation: (1) Does the intervention work? (2) If it works, what are the conditions that make it work? With the information from these two areas, potential users can decide whether the policy intervention or intervention program is transferable to their communities. The relevance and usefulness of the exhibited generalization approach in addressing the questions raised by the stakeholders are as follows:

1.2.1. Does an intervention work?

“Does an intervention work?” is an essential question for evaluating any policy intervention or intervention program. The answers to this question have been evolving in evaluation literature. Initially, the focus had been on whether an intervention affects desirable outcomes. Two types of evaluation was proposed for answering the question: efficacy evaluation and effectiveness (Glasgow et al., 2003). Efficacy evaluation uses randomized control trials (RCTs) to rigorously assess efficacy of an intervention at an ideal and control condition, while effectiveness evaluation is a non-randomized assessment of an intervention in the real world. The exhibited generalization uses the term, effectuality, to cover both efficacy and effectiveness.

Recently, there is a growing recognition that effectuality alone may be sufficient for answer the question of whether an intervention works in a research setting, but insufficient in a community setting (Chen & Garbe, 2011; Green & Glasgow, 2006). In a community setting, stakeholders also want to know an intervention’s sustainability, feasibility, and reach (Spencer & Associates, 2013). The exhibited generalization approach uses the term, viability, to synthesize these additional areas. Viability is an extent that an intervention is capable of being successful in the real world. No matter how rigorous the evidence indicating an intervention’s effectuality (efficacy and effectiveness) is, if the intervention is not viable in the real world, the intervention is not useful to stakeholders (Chen & Garbe, 2011; Chen, 2010). Since stakeholders were interested in sharing their intervention, they were interested in learning about the intervention’s viability with respect to potential users. The exhibited generalization approach argues evaluators must assess an intervention’s viability and effectuality in order to sufficiently answer the question of whether an intervention works.

1.2.2. If it works, what are the conditions that make it work?

Social betterment or health promotion programs are operating in an open system such as a neighborhood, community or society. Contextual factors such as culture, social norms, social support,

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