Using Mediation Analysis to Uncover Psychological Mechanisms of Attitude Change in a Development Volunteer Program

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Abstract

One aim of development volunteer services is to foster positive attitudes in participants toward those they encounter in their host countries. However, the psychological mechanisms underlying such attitude change remain underexplored. This is true despite intergroup contact theory proposing that contact between groups causes more positive intergroup attitudes through the mechanism of increased mutual knowledge, improved perspective-taking, and higher levels of empathy. A theory-based multi-method evaluation of the German weltwärts development volunteer service included a quasi-experimental component to address the question of whether and how development volunteering contributes to such attitude change. Part of this component was the specification of a multiple-mediator model based on intergroup contact theory to investigate the mechanism that brings about attitude change at a critical juncture of the program theory. The evaluation observed a highly significant small-to-medium-sized effect of development volunteering on intergroup attitudes ($\beta = .19$). The analysis revealed that this effect was fully mediated by changes in the mediational pathways of knowledge, perspective-taking, and empathy. The mediation analysis thereby lent strong support to the validity of causal hypotheses derived from intergroup contact theory in the context of development volunteering.
It also substantially increased the explanatory strength, utility, and policy relevance of the evaluation. Based on these evaluation findings, development volunteer services should be designed such that they allow for the identified mechanism to fully unfold in order to increase program effectiveness. The chapter ends with a discussion of limitations and future directions concerning the use of mediation analysis in program evaluation. © 2020 The Authors. New Directions for Evaluation published by American Evaluation Association and Wiley Periodicals LLC.

Introduction: Mechanisms and Mediation Analysis

Applications of mediation analysis in development evaluation literature are rare. Despite an intensive discourse on mechanisms and respective analytical strategies, mediation analysis does not seem to have reached mainstream evaluation practice yet. This is true, notwithstanding some recent isolated examples from the health (Anselmi, Binyaruka, & Borghi, 2017) and nutrition sectors (Zongrone et al., 2018). We present a mediation analysis that gauges a causal mechanism implemented in our evaluation of the weltwärts development volunteer service as a test case to encourage more extensive use of mediation analysis in the investigation of mechanisms in development evaluation.

Mechanisms are often conceptualized as rather elusive “hidden” or “invisible” phenomena (Pawson, 2008). Some even claim that “mechanisms may not be observable, at least in a direct, empirical sense” (Astbury & Leeuw, 2010, p. 369). At the same time, there are many (sub-)disciplines within the social sciences—for example, social psychology as well as dynamically evolving strands within sociology, economics, and education—that largely focus on questions of “mechanisms” using empirical inquiry. In terms of the classification of causal mechanism approaches guiding this issue, these (sub-)disciplines usually approach behavioral mechanisms from a variance-based perspective (Schmitt, this issue).

Within social psychology in particular, the primary analytical tool to examine mechanisms is (causal) mediation analysis. It is hard to overstate the prominence that mediation analysis has reached within the past four decades. Indeed, up until 2016, the seminal paper on the “moderator–mediator variable distinction” by Baron and Kenny (1986) was the most cited social science journal article (Green, 2016), and currently shows 90,748 citations in Google Scholar and counting (retrieved 12/03/2020).

We consider mediation analysis as being very closely aligned with a mechanisms perspective on social phenomena: “Mediation analysis is a family of methods designed to extract information about the causal mechanism(s) by which a predictor affects an outcome” (Preacher, 2015, p. 625). A potential mechanism as we use the term here is a mediational
hypothesis (including one or more parallel or sequential mediators) derived from causal reasoning as to how X may affect Y. This is in line with Chen’s (1990) notion concerning mechanisms that an “evaluator can rely upon existing theory and knowledge [i.e., causal reasoning] to specify the intervening processes that mediate between the treatment and outcomes” (p. 155). As such, we concur with Gerring (2010) that there is “nothing particularly new or different about a mechanism-centered explanation” as each of the thus-defined mechanisms could be “referred to as a theory, theoretical framework, or model, depending on one’s predilection” (p. 1503). What a mechanism perspective does, then, is to zoom in on one particular causal relationship (X–Y) and theorize and examine the intermediate step(s) – or mediators M_i. Of course, this does not exclude zooming in more closely and identifying further mechanisms still, thereby, for example, moving from group and social phenomena to behavioral, psychological, physiological, neuro-psychological levels down to even the cellular level, and so forth.

In short, then, mediation analysis aims to empirically examine the reasoning of how X causes Y through the intermediate mechanism consisting of one or more mediators M_i. Mediation analysis, therefore, allows experimental or quasi-experimental evaluation designs to not only address the question as to if an intervention X had an effect on the desired outcome Y but also—given a substantive theory linking X to Y—to address how X affects Y (Baron & Kenny, 1986). It, therefore, addresses concerns with experimental and quasi-experimental evaluation designs and illuminates the intermediate causal step(s) in evaluation designs sometimes (disparagingly) labeled “black box evaluation” (Patton, 2010, p. 137).

In light of the Causal Mechanism Claim (see Schmitt, this issue), this chapter investigates whether analyzing a causal mechanism using mediation analysis increases the capacity of an evaluation to uncover causal relationships between an intervention and observed changes in outcomes and whether these can, in turn, lead to formulating more policy-relevant and useful recommendations. We illustrate the utility of applying a multiple-mediated model to empirically assess the assumptions of a program theory, using the case of the evaluation of the weltwärts development volunteer service, one of the largest development volunteer services worldwide, both in terms of participant numbers and funding volume.

The chapter continues by briefly describing the weltwärts program, and the mediation analysis we implemented. We then detail the methodological approach, discuss the results, and offer some concluding remarks. By showing how we tested scientifically informed hypotheses through a multiple-mediated model within a quasi-experimental component of a broader theory-based evaluation, this chapter seeks to facilitate the wider application of mediation analysis in development evaluation, evaluation of international volunteering, program evaluation, and beyond.
Mediation Analysis in the Evaluation of the weltwärts Development Volunteer Service

We applied causal mediation analysis in a comprehensive theory-based evaluation of what is known as the North–South component of the weltwärts development volunteer service (Polak, Guffler, & Scheinert, 2017a, p. 22/23). Roughly 180 civil society organizations assign volunteers from Germany to placements in countries in the Global South, where they are mentored in situ by partner organizations. Placements are offered in such areas as education, environment, health, arts, and culture, or human rights (weltwärts, 2020b). The average duration of stay is about one year (AKLHÜ, 2019; Polak, Guffler, & Scheinert, 2017a). Since its inception in 2008, approximately 40,000 volunteers have participated in the weltwärts North–South component (weltwärts, 2020a). Assignment costs for the North–South component in 2015 (the year for which the evaluation calculated a detailed breakdown of costs) were approx. 35 million euros. Thus, measured in terms of both the number of annual assignments and the volume of funding, weltwärts is the largest international youth volunteer service in Germany and one of the largest development volunteer services for young adults worldwide (for more information, see weltwärts, 2020b).

weltwärts emphasizes “learning” of all those involved rather than “helping” as its overarching motto (see Scheinert, Guffler, Polak, & Bruder, 2019, for more details). However, at the outset of the evaluation, there was no consensual program theory supporting this overarching narrative. The evaluation team—on the basis of program documents and in consultation with those responsible for the weltwärts program—therefore set out to develop a detailed program theory. The theory was enriched by the development volunteering and exchange program literature as well as literature on personality and attitude change. The evaluation thus engaged in theory knitting (Lemire, Whynot, & Montague, 2019) and worked “with tested and robust explanatory theories from the (social, behavioral and policy) sciences add[ing] crucial insights about mechanisms and contexts” (Leeuw & Donaldson, 2015, p. 472).

Figure 9.1 outlines the basic elements of the program theory and situates the focus of the mediation analysis (highlighted in gray) in the larger context of the overall evaluation of the weltwärts program (Polak et al., 2017a, pp. 22/23).

Within the rather complex program theory, we identified the gray area highlighted in Figure 9.1 as being of critical concern. In particular, attitude change was clearly of high relevance within the program theory. Changing attitudes toward those living in the Global South are likely key to later engagement for global solidarity and corresponding action in German society. Intergroup contact theory (Allport, 1954), one of the most prominent social psychological theories, seemed suitable in helping to theorize the mechanism that brings about personal change in attitudes. It formulates
assumptions about whether and how contact between different groups can change the attitudes of members of these groups toward one another and has been shown to be effective in improving inter-ethnic attitudes in real-world settings (Lemmer & Wagner, 2015). Applied to the case of weltwärts, intergroup contact theory suggested the hypothesis that contact between volunteers and host country residents positively influences both volunteers’ and host country residents’ attitudes toward each other. When theorizing the (psychological) causal mechanism of attitude change at the micro-level, we derived more specific hypotheses from intergroup contact theory (Pettigrew & Tropp, 2008). Specifically, the intergroup contact engendered by participation in weltwärts should have effects through multiple parallel mediational pathways, including (a) knowledge about the host country, (b) perspective-taking, (c) empathy vis-à-vis host country residents. These mediators, in turn, should affect the outcome of (d) positive intergroup attitudes toward those living in the host country (see Figure 9.2 in the following section for a visualization of the multiple-mediator model proposed by intergroup contact theory). Thus, we hypothesized three parallel mediational pathways to explain the effect of the participation in weltwärts (i.e., the intervention) on participants’ attitude change in more detail. This multiple-mediator model constitutes the psychological mechanism tested within the evaluation.

Methods and Results

The weltwärts evaluation followed a theory-based approach (Funnell & Rogers, 2011). It featured substantial quantitative data collection (online surveys of all departing and returned volunteers; online surveys of...
volunteers’ parents and friends, of a comparison group, and of sending organizations) as well as qualitative data collection (group discussions with returned volunteers, key stakeholder interviews; full details of the methodological approach are laid out in the evaluation report; Polak et al., 2017a).

In terms of identifying and explaining the individual-level effects of participating in weltwärts (the gray area in Figure 9.1), facilitating sound causal attribution was a major concern. The evaluation team, therefore, chose the design that would afford them the most robust causal attribution under the given real-world constraints (e.g., development volunteers could not be chosen at random as required by an experiment; time constraints did not allow for longitudinal measurement). Drawing on the surveys of departing and returned volunteers, the evaluation used propensity score matching (Rosenbaum & Rubin, 1983) to create “statistical twins,” and thus, a quasi-experimental design. The intervention group consisted of returned volunteers that had already been exposed to the “weltwärts experience.” The comparison group consisted of departing volunteers who had not yet commenced their stay abroad.

Both groups took the respective online survey within similar time windows between July and October 2016. Only those participants that completed at least 50% of the survey items were retained. In total, \(N = 1,475\) departing volunteers and \(N = 1,354\) returned volunteers completed the survey. The response rate was 42.3% for departing and 43.3% for returning volunteers. Volunteers were on average 19 and 20 years of age (\(M_{\text{departing}} = 18.9\), \(SD_{\text{departing}} = 2.0\); \(M_{\text{returned}} = 19.9\), \(SD_{\text{returned}} = 2.0\)), respectively. Gender composition was 71.3% female and 28.7% male for departing volunteers and 76.1% female and 23.9% male for returned volunteers. Prospective and past host countries were predominantly in Africa (39.1% and 32.5%,...
respectively), Latin America and the Caribbean (40.2% and 47.3%, respectively), and Southern Asia (18.8% and 19.3%, respectively).

The evaluation team matched departing and returned volunteers with each other on the basis of observable socio-demographic characteristics. These included gender, education, parents’ education, origin, religion, disability, and residence in eastern or western Germany. The matching was done with the “nearest neighbor” matching algorithm using a logistic regression model to generate propensity scores (details of the matching procedure are available in the online appendix of the evaluation report; Polak, Guffler, & Scheinert, 2017b).

Because the resulting groups were again matched with comparison groups from the general population in a subsequent step outside the scope of this chapter, the sample size was further reduced. The mediation analysis was conducted on \( n = 466 \) participants in each group.

Data on the constructs of interest were collected using the following survey instruments (for further details, see Polak et al., 2017b): knowledge (two-item scale developed by the evaluation team), perspective-taking (three-item scale adapted from Davis, 1980), empathy (two-item scale adapted from Gutenbrunner & Wagner, 2016), intergroup attitudes (three-item scale adapted from Wagner, Schmidt, & Kauff, 2014). Participants responded to the questions using five-point Likert scales ranging from do not agree at all to fully agree (or equivalent).

Figure 9.2 visualizes the multiple-mediator model that was estimated to gauge (a) the total effect of intergroup contact on volunteers’ intergroup attitudes before including the mediators; (b) the indirect effects of intergroup contact on intergroup attitudes mediated by knowledge, perspective-taking, and empathy; and (c) the direct effect after including the mediators. The model was computed using the bootstrapping approach implemented in Hayes’ (2013) PROCESS macro. The standardized regression coefficients depicted in Figure 9.2 demonstrate that all mediators as well as intergroup attitudes were significantly affected by the intergroup contact over the course of time spent participating in the weltwärts program.

The total effect of contact on the positivity of intergroup attitudes before including the mediators is \( \beta = .19, SE = .04, p < .001 \), confidence interval (CI) [lower limit confidence interval (LLCI) = .10, upper limit confidence interval (ULCI) = .28]. All three indirect effects analyzed are significant, that is, the confidence interval does not include 0. There is thus an indirect effect through knowledge (\( \beta = .04, SE = .02, CI [LLCI = .003, ULCI = .07] \)); an indirect effect through perspective-taking ability (\( \beta = .06, SE = .01, CI [LLCI = .04, ULCI = .09] \)); and an indirect effect through empathy (\( \beta = .03, SE = .01, CI [LLCI = .02, ULCI = .05] \)). The remaining direct effect after including the mediators is not significant (\( \beta = .06, SE = .04, p = .176, CI [LLCI = -.03; ULCI = .15] \)). According to Baron and Kenny (1986), this pattern constitutes full mediation of the causal effect of intergroup contact on intergroup attitudes by the mediators included in the model.
To address questions about the effect of the weltwärts program on volunteers, substantial qualitative data were also collected. We used real-world groups of returned volunteers participating in follow-up seminars after their stay abroad to collect qualitative data in five group discussions with $N = 53$ participants. With respect to intergroup attitudes, the results of the group discussions were mostly consistent with the findings based on quantitative data. In particular, increased knowledge, perspective-taking, and more positive intergroup attitudes were explicitly mentioned as self-reported positive change associated with a weltwärts stay abroad. The issue of empathy did not arise spontaneously in the group discussions. The evaluation report contains more detailed descriptions of the qualitative results (Polak et al., 2017a).

**Discussion and Conclusion**

Based on the case of the weltwärts volunteer service, we demonstrated that mediation analysis can go a long way in illuminating causal mechanisms. We defined our potential mechanism as a mediational hypothesis of three parallel mediational pathways explaining how intergroup contact affects intergroup attitudes through changes in knowledge, perspective-taking, and empathy. We based the causal reasoning underlying this hypothesis on intergroup contact theory (Allport, 1954).

The analysis of our multiple-mediator model revealed that the model was consistent with the empirical data. Each mediational pathway was significant, and each explained a unique part of the variance of the total effect of intergroup contact on intergroup attitudes. The mediation model demonstrated full mediation, thereby suggesting that the proposed mechanism encompasses all relevant pathways. Thus, weltwärts participation did affect relevant changes in attitudes in the expected direction and through the expected mediational pathways of the proposed mechanism.

These findings speak to both parts of the Causal Mechanism Claim guiding this issue (see Schmitt, this issue). One part of the claim concerns the positive effects of a mechanism perspective on the causal capacity of evaluations. Indeed, the mediation analysis of the psychological mechanism linking intergroup contact to attitude change substantially increased the explanatory strength of the weltwärts evaluation. We were able to use theory knitting to integrate the hypothesized mechanism into a quasi-experimental component of the broader theory-based evaluation of the weltwärts program at a critical juncture of the program theory. By doing so, we could open the “black box” between intergroup contact and attitude change and identify three discernible mediational pathways. These were fully in line with established social psychological theory on attitude change in intergroup contexts. Thus, (a) sound causal reasoning based on established theory in combination with (b) rigorously assessing the relevant constructs and (c) using mediation analysis to test the relevant hypotheses made our
causal claim as to whether and how the participation in weltwärts affects intergroup attitudes substantially more convincing. It also allowed us to contribute to the broader scientific literature on intergroup contact effects, thereby not only using social science to inform evaluation but also making evaluation a more relevant part of the scientific endeavor. Thus, in line with one part of the Causal Mechanism Claim, the causal capacity of our evaluation was increased by taking a mechanism perspective.

The other part of the Causal Mechanism Claim asserts that understanding mechanisms also increases the policy-relevance and utility of evaluations. This part of the claim was borne out within the weltwärts evaluation in two distinct ways. First, the result of the mediation analysis contributed critical evidence to one of the central recommendations of the evaluation, which focused on extending and improving contact opportunities in host countries. According to the recommendation, program managers should design their program such that it allows volunteers to increase their knowledge about host country residents, to see the world through their eyes (i.e., increase perspective-taking), and to establish emotional connections with them (i.e., increase empathy). Thus, program managers need to be mindful not only of the goal of their intervention (i.e., facilitating attitude change), but also of the mechanism generating such change. The mediation analysis allowed getting inside the “black box” and thinking creatively about targeted activities to increase knowledge, perspective-taking, and empathy rather than focusing on the desired outcome of attitude change alone. By detailing how intergroup contact changes attitudes, the mechanism perspective increased the policy-relevance and utility of the evaluation. Second, the close integration with established social psychological theory also generated further policy-relevant hypotheses about additional effects likely to be triggered by development volunteering. These could also be used in further developing the weltwärts program. They include both possible positive effects such as increased investment in the fate of an outgroup (in this case, host country residents; Tropp & Barlow, 2018) and negative effects such as exclusionary attitudes (Enos, 2014).

Two limitations of our approach are most relevant. First, at a rather superficial level, mediation analysis and the underlying statistics are difficult to fully understand for stakeholders not trained in statistics; this constitutes a challenge when communicating evaluation results. This challenge is not specific to mediation analysis but is true for advanced statistical analyses in general. Nonetheless, the challenge to express mediation in ways that are readily understood while still being factually correct, is important. In our evaluation, communicating results was complicated by the fact that the model included latent psychological constructs. Pictograms, which use simplified graphics to depict the components of the mechanism, can be helpful tools in illustrating causal chains and facilitating communication with stakeholders.
Second, causal reasoning in mediation analysis is fraught with uncertainties. In particular, though, experimental and quasi-experimental designs—if their assumptions are met—are able to establish a causal link between X and Y. Usually (as in our case), the mediator M is measured rather than manipulated (so-called measurement-of-mediation designs; Spencer, Zanna, & Fong, 2005). Thus, whereas random assignment or valid matching enables causal interpretation of the X to Y and the X to M relationships, the causal nature of the Y to M relationship cannot be ascertained but only be assumed. This is because participants self-select to levels of the mediator and therefore other variables could confound the essentially correlational relationship between M and Y (Pirlott & MacKinnon, 2016). Other, more complex designs in which the mediator is experimentally manipulated within one study or in subsequent studies (so-called (concurrent) double randomization designs; Pirlott & MacKinnon, 2016) may help to address such uncertainties in highly controlled situations allowing for experimentation. In many evaluation settings, a certain degree of uncertainty will be virtually unavoidable. In order to increase validity, it will be helpful to closely integrate into established social-scientific literatures. These can lend credibility to the causal sequence based on more rigorous study designs in more controlled settings.

Despite its opportunities for the analysis of causal mechanisms, mediation analysis is used only sporadically in evaluations (e.g., Kisbu-Sakarya, MacKinnon, & O’Bourke, 2015). This is a missed opportunity, as causal mediation analysis is a highly active field of research constantly pushing the conceptual and statistical boundaries of the approach. Of particular interest for evaluations based on observations in complex settings are approaches that can account for so-called exposure-mediator interaction in their effect on the outcome (i.e., X and M are not independent in their effect on Y) because this will be a ubiquitous setting in the real world (Valeri & VanderWeele, 2013). Also, moderated mediation models can capture the idea that context matters for mediation (Muller, Judd, & Yzerbyt, 2005). If moderation holds, the mediational pathway X–M–Y is stronger or weaker depending on the context captured by a moderator W. Moderated mediation, therefore, in a covariational logic mirrors the context/mechanism/outcome- or CMO-configurations of realist evaluation (see Lemire et al., this issue; Pawson & Tilley, 1997; Renmans et al., this issue; Vogel & Punton, this issue). They are both based on the notion that a certain mechanism (or mediator M) linking a cause (X) to an outcome (Y) may exist or not exist—or be stronger or weaker—within a particular moderating context as compared to another (W). Evaluation practice may, therefore, be an area allowing for the use of methods following a case-based as well as a variance-based logic in an integrated fashion (see Barrett et al., this issue, who combine a quasi-experimental design with realist evaluation).

In conclusion, we regard (causal) mediation analysis as a highly promising tool that allows for examining critical mechanisms at various
levels in evaluations of complex programs. This chapter described the application of mediation at the micro-level, identifying a psychological mechanism detailing the causal relationship between contact between groups and changing intergroup attitudes. However, the approach is also applicable to the meso- or macro-level phenomenon, as long as sufficient cases for statistical analysis exist. Thus, within the limits (and possibilities) of a variance-based approach to mechanisms, mediation analysis can be applied in evaluations with diverse evaluands. Basing mediation analysis on hypotheses derived from sound social science theory can help to address concerns about the proposed causal sequence. Current methodological developments will contribute to making mediation analysis an even more versatile tool when it comes to investigating mechanisms in dynamic and interactive contexts.

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