

Promoting solar water disinfection in rural Bolivia: Intervention effects and mediation by psychological constructs

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Introduction

In many parts of the world, water needs to be disinfected at the point of use. Mostly, this is done by boiling, which is expensive and pollutes the environment due to the burning of fuel. Solar water disinfection (SODIS) is an alternative that is environmentally friendly and cheap. However, diffusion of SODIS is slow and requires promotion campaigns.

This study investigates a campaign promoting SODIS in rural areas of Bolivia. The majority of the villages in this region are scarcely populated and of very basic living standard. A survey implemented before the campaign indicated positive attitudes towards SODIS. Thus, promotion techniques were selected that support the development of habits by reducing forgetting to perform the new behavior at the right moment: prompts (reminders), public self-commitments, and implementation intentions. This study quantifies the effects of these interventions and the mediation of these effects by psychological constructs.

Methods

In three panel-waves, data on behavior, attitudes, norms, habits, forgetting, and behavior control were gathered by face-to-face interviews. Based on these data, non-linear regression models were estimated that consider that the value range of the dependent variables is bounded. The results were used for calculating predictions on the effects of the interventions computed. The same non-linear models were used to explain behavior change by the changes of the psychological constructs. For the mediation analysis, two forecasts for behavior change were compared: a prediction of behavior change directly based on the intervention effects and one based on the intervention effects on the psychological constructs.

Results

Prompts were the most effective technique regarding both the diffusion success (54%) and the effect on behavior (expected change = 0.395 of maximal possible 2.0 for a change from -1 to +1). Public self-commitments were equally well distributed (56%) but had a weaker effect on behavior (0.249). However, combined with prompts, public self-commitments largely increased their effect (0.986). The effect of both techniques on behavior is mainly mediated by remembering but also effects on attitudes and norms were observed. Implementation intentions failed regarding the diffusion success (22%) but increased the effect of prompts (0.883). Also, repeating prompts (0.981) or public self-commitments (1.081) increases their effect.

Behavior change could be explained almost completely by the changes of the psychological constructs ($R^2 = 92\%$). The model was dominated by the effect of the attitudes. Both forecasts of behavior change mentioned above lead to the same result indicating complete mediation of the intervention effects by the psychological constructs. The psychological constructs explained more of behavior change than did the interventions. The surplus covariance could be attributed to the affective attitude towards raw water consumption.

Conclusion

For large-scale campaigns, easy to distribute and effective interventions like prompts or public self-commitments are recommended. Further, interventions should be combined and repeated. The proposed non-linear regression model and approach for mediator analyses proved to be fruitful leading to more accurate and informative results.