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Major article

Identifying the psychological determinants of handwashing: Results from two cross-sectional questionnaire studies in Haiti and Ethiopia

Nadja Contzen PhD *, Hans-Joachim Mosler PhD

Environmental and Health Psychology Cluster, Department of Environmental Social Sciences, Eawag: Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland

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Background: Diarrheal disease kills around 760,000 infants every year. Many of these deaths could have been prevented by handwashing with soap. However, the whole range of psychological factors encouraging handwashing is not yet identified and handwashing campaigns are often limited to awareness-raising and education. The purpose of this article was to identify the psychological determinants of handwashing in Haiti (study 1) and Ethiopia (study 2).

Methods: Data were collected cross-sectionally by administering face-to-face interviews with the primary caregiver in a participating household ($N_{Haiti} = 811$; $N_{Ethiopia} = 463$). Hierarchical multiple regression analyses were performed on self-reported handwashing.

Results: In both countries, risk factors—meaning awareness and health knowledge—accounted for only 11%-19% of variance in handwashing and were not consistently associated with handwashing. The inclusion of additional factor-groups, namely attitude, norm, ability, and self-regulation factors, led to significant increases in explained variance ($P \leq .01$), accounting for 25%-44% of additionally explained variance. The attitude factor disgust, the norm factor, the ability factors motivational self-efficacy and perceived impediments, and the self-regulation factors coping planning and commitment emerged as especially relevant.

Conclusions: Handwashing campaigns should focus especially on attitudes and norms and not only on risk.

Diarrheal disease is the second leading cause of death in infants[1] and one of the most common causes of death during humanitarian disasters.[2] The single most effective prevention against diarrheal disease is the seemingly simple and relatively cheap act of handwashing with soap[3] (for simplicity, in this article, *handwashing* stands for handwashing with soap). Furthermore, regular handwashing effectively lowers rates of additional infectious diseases, such as respiratory illnesses[4] and nosocomial infections.[5]

Accordingly, the promotion of domestic handwashing is high on the agenda of development and relief organizations. However, these campaigns are rarely grounded in theory, often following a logic model and focusing on awareness-raising and knowledge-building (for an example, see the Global WASH Cluster[6]).[7] This is of particular concern in the light of the finding that even when the majority of a population is aware of the importance of handwashing (71%-84%), only a minority (14%-31%) regularly washed hands.[8] Moreover, other studies[9] showed that education-based campaigns may fail in boosting handwashing. Although education-based approaches might be a good starting point to promote handwashing, additional interventions are needed to spur regular handwashing.[7] However, the factors to be intervened on are underspecified; up to now, only a few scholars have addressed the determinants of domestic handwashing in developing countries.[7] Based on qualitative and quantitative research, habit, motivational (eg, disgust or attraction), and planned factors (eg, keeping good family health) have been suggested as handwashing determinants.[10] Others advocate the importance of opportunity (eg, access and norms), ability (eg, self-efficacy and social support), and motivational factors (eg, attitudes and threats).[11] Although these factors are a good starting point to investigate the drivers of handwashing, their

* Address correspondence to Nadja Contzen, PhD, Department of Environmental Social Sciences, Eawag: Swiss Federal Institute of Aquatic Science and Technology, Überlandstrasse 133, PO Box 611, 8600 Dübendorf, Switzerland.

E-mail address: nadja.contzen@eawag.ch (N. Contzen).

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classification lacks a comprehensive theoretical underpinning and the evidence base remains limited. Better explored are factors determining handwashing among health care workers in developing countries.[5,12,13]

The aim of our article was to identify the psychological determinants of domestic handwashing based on theory. Potential determinants were derived from a recent model of behavior change developed for the water, sanitation, and hygiene sector in developing countries; namely, the Risk, Attitudes, Norms, Abilities, and Self-Regulation of Behavioural Change (RANAS) model.[14] It integrates the psychological factors proposed by major theories of behavior change into a comprehensive model with five factor groups. In short, when exploring the determinants of handwashing, the RANAS model,[14] based on psychological theories of behavior change, suggests to examine not only risk factors (ie, awareness and health knowledge) but also attitude, norms, ability, and self-regulation factors. Table 1 provides an overview of the considered factors, their definitions, and the underlying theories.[15-18]

In line with the RANAS model, we addressed the following research question: Do additional factor groups; that is, attitude, norm, ability, and self-regulation factors, explain self-reported handwashing above and beyond risk factors? By answering this question, we hoped to enable a reflection on new and innovative handwashing campaigns in addition to awareness-raising and education.

Several scholars have previously emphasized the problem of inflated self-reports in terms of socially desirable behavior, including handwashing.[19] Whereas self-reports are prone to reporting bias, they have been found to be associated with child diarrhea[20] and child diarrhea mortality,[21] and are thus worthy of study.

METHODS

To answer the above research question, cross-sectional studies were conducted in Haiti and Ethiopia. For study 1, field research was conducted during 2011 in displacement camps and poor neighborhoods in Port-au-Prince and in rural areas in the West Department of Haiti during the recovery phase of the earthquake and cholera outbreak in 2010. For study 2, data were collected during 2012 in rural villages in the Borana zone of southern Ethiopia during the recovery phase of a major drought in the Horn of Africa during 2011-2012.

Procedure

Data were obtained by means of structured face-to-face interviews with the primary caregiver in a voluntary study household. Households were selected using a modified random route sampling.[22] That is, each site was subdivided into 10 areas to which the interviewers were randomly assigned. In each area one house was randomly selected as a starting point and the assigned interviewer was instructed to try to interview every third household when walking in a specified direction. Primary caregivers were interviewed because they are responsible for childcare and preparing food and thus have the highest chance of spreading diarrheal disease. In Ethiopia, in addition, only households with at least one child younger than five years of age were targeted because these children are most vulnerable to diarrhea.

Interviews took around 45 minutes to 1 hour and were carried out in the local language (ie, Haitian Creole in Haiti and Afaan Oromo in Ethiopia) by a team of 10 local students, scientists, and social workers. Before data collection, workshops were given to train the respective team in interviewing and team members were supervised by researchers and a local field research coordinator during data collection.

Sample

For the purposes of our studies, sample size estimation with G*Power 3.1[23] suggested to survey 400 households to detect small to medium changes in explained variance with a Type I error probability of 0.05 and a statistical power of 0.95. For study 1, however, we aimed for a larger sample size to allow the testing of additional research questions, presented elsewhere, requiring a larger sample size.[24] With 39 households in Haiti (4%) and 27 households in Ethiopia (5%) that refused to participate, the response rates were high. In study 1, the achieved sample size was $N = 811$, with the majority of study households located in Port-au-Prince ($n = 528$) and a smaller subsample stemming from the rural areas ($n = 283$). The respondents' ages ranged between 15 and 90 years (mean, 34.68 ± 12.90 years). In terms of gender, 713 interviewees were women (88%) and 98 were men. Whereas nearly half of the sample did not finish primary school ($n = 395$; 49%), almost one-quarter did not go to school at all ($n = 193$; 24%). The mean income per person, per day of $1.07 was slightly below the poverty line of $1.25.[25]

In study 2, a total of 463 respondents took part. The mean age of the sample was 34.27 ± 13.89 years, with a range of 15-90 years. The vast majority of respondents were women ($n = 450$; 97%) and only 13 were men. In terms of education, 98% ($n = 440$) did not attend school at all and 97% ($n = 449$) could neither read nor write. The mean income per person, per day of $0.17 was far below the poverty line of $1.25.[25]

Questionnaire and measures

The interviews were based on structured questionnaires developed for these studies. A large part of the items were built on recent work by Inauen et al[26] and Huber et al.[27] These were complemented with items from a questionnaire study on domestic handwashing determinants in a developing country.[10] The questionnaires covered sociodemographic characteristics, self-reported handwashing, and psychological factors. They were prepared in English, translated into the respective local language, and retranslated into English to ensure the quality of the translation. In both studies the questionnaire's applicability was verified in a pretest of $N = 20$.

Handwashing at key times was measured by means of self-reported answers to questions such as, "In general, how often do you wash your hands with soap before eating?" using 5-point Likert scales ranging from 0-4. Surveyed key times were: handwashing after defecation, wiping a child's bottom, and other kinds of contact with feces; before eating, preparing food, feeding a child, and handling water. In study 2, an additional key time was included; handwashing before breastfeeding. Exploratory factor analysis (study 1) and confirmatory factor analysis (study 2) proved that two different handwashing situations are distinguishable, stool-related handwashing and food-related handwashing. Whereas the former subsumes handwashing after defecation, wiping a child's bottom, and other kinds of contact with feces, the latter incorporates handwashing before eating, preparing food, feeding or breastfeeding a child, and handling drinking water. In both studies two mean scores were computed to represent the two factors and the scores were then used to test the handwashing drivers separately for stool- and food-related handwashing (Cronbach's alphas study 1, $\alpha_{stool} = 0.76$ and $\alpha_{food} = 0.81$; Cronbach's alphas study 2, $\alpha_{stool} = 0.88$ and $\alpha_{food} = 0.86$).

Psychological factors were measured according to suggestions in the RANAS approach.[14] For each behavior factor, one or more items were included in the questionnaire. If several items were used, where possible, these were combined into summary variables (supplementary material containing item wordings, Cronbach's alphas, and