


# BMJ Open Behavioural insights (BI) for childhood development and effective public policies in Latin America: a survey and a randomised controlled trial

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## ABSTRACT

**Objectives** We developed (a) a survey to investigate the knowledge of childhood health experts on public policies and behavioural insights (BI), as well as its use in Latin American and the Caribbean countries (LACs), and (b) an intervention (randomised controlled trial) to test the influence of nudges on the effect of a simulated public health programme communication.

**Participants and settings** A total of 2003 LACs childhood health professionals participated in the study through a Hispanic online platform.

**Primary and secondary outcomes** We used regression models analysing expertise-related information, individual differences and location. We extracted several outcome variables related to (a) 'Public Policy Knowledge Index' based on the participants' degree of knowledge on childhood health public policies and (b) BI knowledge, perceived effectiveness and usefulness of a simulated public programme communication. We also analysed a 'Behavioural Insights Knowledge Index' (BIKI) based on participants' performance in BI questions.

**Results** In general, health professionals showed low BI knowledge (knowledge of the term BI:  $\chi^2=210.29$ ,  $df=1$  and  $p<0.001$ ; BIKI:  $\chi^2=160.5$ ,  $df=1$  and  $p<0.001$ ), and results were modulated by different factors (age, academic formation, public policy knowledge and location). The use of BI principles for the communication of the public programme revealed higher impact and clarity ratings from professionals than control messages.

**Conclusions** Our findings provide relevant knowledge about BI in health professionals to inform governmental and non-governmental organisations' decision-making processes related with childhood public policies and BI designs.

## INTRODUCTION

An alarming rate of children living in Latin American and the Caribbean countries (LACs) lags behind in comparison to children living in developed countries,<sup>1 2</sup> since they are not receiving the required stimulation that ensures a proper cognitive and socio-emotional development.<sup>3</sup> In 2017, the proportion of children at risk of stunting or

## Strengths and limitations of this study

- This is the first study analysing Latin American child health professionals' knowledge and opinions about behavioural insights (BI).
- This study combines two quantitative methodologies assessing public policy engagement: a survey and a randomised control trial.
- The present study presents the common limitations involved in survey studies, with biases coming from self-reporting methods.
- We focused on expert professionals' opinions since they are the relevant population to implement BI methods in childhood public policies.
- There is also an imbalance in the sample regarding country participation. This may bias the results in terms of subtle regional differences.

extreme poverty in developing countries was 62.7%, and when low maternal schooling and child maltreatment were added, this proportion increased to 75%.<sup>4</sup> Both expert knowledge and effective interventions are crucial to prevent these adverse conditions. Standard economic models assume that people's decision-making processes are rational.<sup>5</sup> However, research on behavioural sciences suggests that this approach has serious weaknesses when predicting people's behaviour. As such, behavioural sciences incorporate insights from several disciplines, such as psychology, in the understanding of people's decisions.<sup>6</sup> Behavioural insights (BI) is the application of those insights drawn from behavioural science that complement the set of traditional tools available to governments when designing policies and communications.<sup>7</sup> According to Thaler *et al*<sup>5</sup> those who apply BI are choice architects, in the sense that they create environments in order to influence people's decisions. BI are widely applied to health settings,<sup>8 9</sup> showing its

usefulness in improving childhood programmes' effectiveness<sup>9 10</sup> (for additional applications of BI in childhood policy, see online supplemental references table A1). A growing number of BI-inspired initiatives have been directly applied to children<sup>11–13</sup> or their parents,<sup>14–18</sup> over the last years (see online supplemental references table A2). However, the use of BI for the improvement of health and development policies is still scarce in the region.<sup>4 19</sup>

Health development specialists represent a critical source in promoting the implementation of effective health programmes.<sup>20 21</sup> Parents prefer receiving health advice on their children from paediatric specialists rather than based on specialists from other disciplines,<sup>22</sup> while healthcare professionals have a pivotal role influencing parents on child vaccination.<sup>23</sup> Senior-level public health workers ascribe high degree of support for healthy public policies.<sup>24</sup> Still, to the best of our knowledge, the opinion of experts and specialists on the usefulness of BI in childhood policies has not yet been analysed. The opinion of health professionals regarding the efficiency, usefulness and real impact of BI in childhood development, particularly in LACs, remains largely unknown. Specifically, there are no clues about how age, expertise, academic degree and expert knowledge impact the perception and engagement with BI frameworks. This knowledge could help decision-makers target specific groups of professionals to improve the implementation of childhood policies. Accordingly, as our first aim, we investigated how these factors impact the knowledge of BI and childhood policies across experts working with children in LACs through a survey. Additionally, our second aim was to test whether applying BI in the communication of a simulated public programme would influence experts' appraisal of said programme.

The most common BI interventions in health settings are related to the reduction of drug prescriptions,<sup>25–27</sup> the promotion of evidence-based decisions,<sup>28</sup> the biases in diagnosis,<sup>29</sup> the improvement of clinical performance<sup>30–32</sup> and the screening and maintenance of hand hygiene.<sup>21 33</sup> Similarly, health professionals' developments of BI have been investigated across LAC related to drug prescriptions,<sup>34</sup> public policy knowledge about ageing<sup>35</sup> and clinical performance improvement.<sup>36 37</sup> However, no previous BI interventions have been specifically designed for health professionals working on childhood development.

In order to shed light on our understanding of the aforementioned issues, we developed a large-scale survey that was applied to 2003 expert health professionals working in child development across LACs. As our first aim, we collected professional appreciations about the knowledge, efficiency and usefulness of BI in childhood development. We applied different models to assess the impact of expertise-related aspects (experience and public policy knowledge), location (LAC-South and LAC-North) and individual differences (age and academic degree). In order to test experts' knowledge on public policies, we used The Public Policy Knowledge Index

### Box 1 Predictor variables. These sections from the survey were included as predictor variables for regression models

#### Predictor variables and questions

##### Sector

Q: Do you work in the public or private sector?

A: Public/private/both/I don't work

##### Experience

Q: How long (years) have you been working in the social development field?

A: Less than 2 years/between 3 and 6 years/between 6 and 10 years/more than 10 years

##### Academic degree

Q: What is your highest academic degree?

A: Doctoral degree/master's degree/medical specialisation/hospital concurrence/university or professional degree/associate degree/bachelor's degree/technicature/no formation in these subjects

##### Age

Q: How old are you?

A: Age (in years)

##### Country/region

Q: In what country do you live?

A: Country

##### Public Policy Knowledge Index

(PPKI), an index based on participants' degree of knowledge regarding childhood health public policies.<sup>35</sup> Since BI is not a widespread discipline in LACs, we predicted a general lack of knowledge of behavioural tools from child health specialists.

Our second aim was to apply an experimental paradigm aimed at understanding whether BI can enhance health professionals' acceptance and interest in child development public programmes. Thus, within the same survey, four communicational messages of a simulated public programme were developed using BI knowledge and were randomly assigned to different groups. Concerning this second aim, we expected that the BI-based messages would increase the perceived clarity, impact and interest in the policies, as described under previous BI literature.<sup>38–40</sup>

## METHODS

### Research design

This study combines a survey and a randomised controlled trial (RCT) presented at the last section of said survey. The first section of the survey remained equal for all participants (box 1) and collected professionals' opinions involving child development policies and BI (online supplemental material B S1). The last section of the survey included four different messages randomly assigned to each participant (online supplemental material C). Data were collected using a web-based tool between March 2018 and April 2019.

### Participants

The final sample (from an initial set of 2400 participants) comprised 2003 individuals (professionals working in development across LACs), with a mean age of 51.42

(SD=13.30), 55.62% being male. All participants were professionals and members of Intramed (www.intramed.net), an online portal that congregates a large community of health professionals. Within its 24 years of existence, Intramed has developed a user-friendly platform where approximately 950 000 professionals gather medical information and interact periodically. This platform has already been used as a venue for different academic studies involving surveys or RCTs.<sup>35 41 42</sup> By using the Intramed portal as the venue of this survey and recruiting experts that are already members of the platform, we guaranteed professionals were familiar with the platform. In addition, we developed a survey pilot to test its basic usability features (online supplemental material B S1). The sample included professionals working in child development coming from different specialties and educational backgrounds from 18 countries (see below). Participation was strictly voluntary. Participants had to accept an invitation sent through a newsletter posted on the main page of their Intramed profiles and gave their informed consent in accordance with the Declaration of Helsinki by pressing an 'I agree' button after an explanatory letter. The invitation was sent individually, and each respondent was allowed to complete the survey only once. This feature reduced the probability of contamination stemming from other respondents. Since participants were already members of the platform, we were able to access their relevant profile data automatically, which was then used to define variables for the modelling analysis of the participant responses, such as level of professional background and specific medical field of work. The institutional ethics committees of INECO Foundation and Intramed approved this study.

### Sample and sampling technique

The survey was distributed to participants through the Intramed online portal over a 13-month period. For the simulated public programme, each eligible participant was randomly assigned to one of four groups: control, simplification, social norm and visual information. The

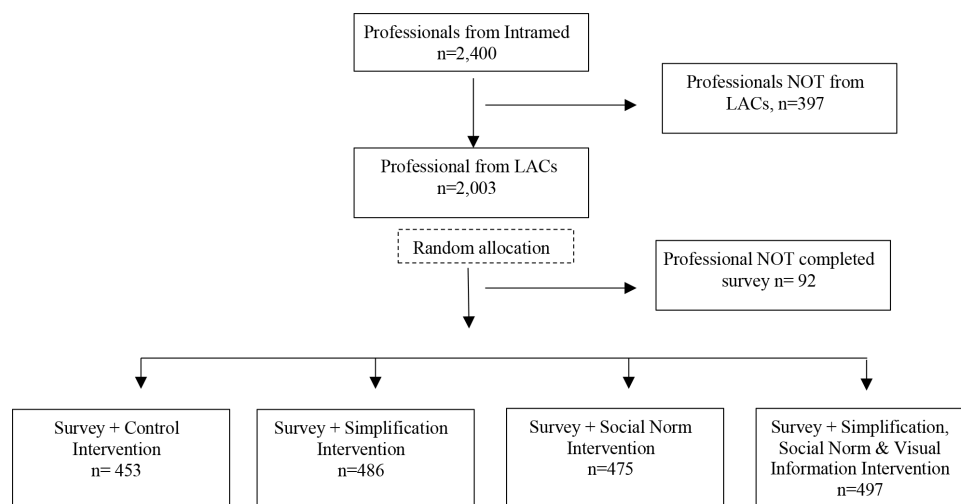
sample size was not initially restricted. We finished the experiment with 2400 total respondents. The answers were analysed in terms of region instead of country levels in order to avoid sample size issues. The final sample comprised 2003 professionals (see figure 1). In addition, together with significance analysis, size effects were calculated and discussed in the posterior analysis. ORs were calculated from the logits through exponentiation of the values as an effect size measure, and the Cox and Snell  $R^2$  included a likelihood function, which considered the sample size in the calculation (online supplemental material B S3).

The background on child development was asked with explicit questions in the survey but also traced through Intramed participants' profile. We included only those participants that demonstrated expertise in child development in both sources.

### The survey

The survey (box 1) collected professionals' opinions on child development policies and BI (online supplemental material B S1). It also included a section (online supplemental material C) testing different BI interventions that participants had to answer immediately after the previous sections. The survey presented five sections, lasting 10 min in total. The first four sections, as well as the last section, took 5 min to be completed. The first section asked general questions related to the participant's profile and working areas. The second section tested participants' knowledge of childhood public policies. The third inquired into their impressions of the accessibility of childhood public policies in their countries. The fourth section asked about their satisfaction with their country's ministerial initiatives in childhood development, and the fifth section was related to participants' BI knowledge. The last section is described in the following Development and implementation section.

We extracted several outcome variables related to (a) the participants' degree of knowledge on childhood health public policies (PPKI)<sup>35</sup> and (b) BI knowledge, perceived



**Figure 1** Participant flow chart. LACs, Latin American and the Caribbean countries.

effectiveness and usefulness and the 'Behavioural Insights Knowledge Index (BIKI) based on participants' performance in BI questions. As in a similar survey from our team,<sup>35</sup> several predictors were considered for different dependent measures such as work context (private, public or both), experience (years in the field), academic degree, age, PPKI and location (north vs south).

### Development and implementation

In the last section of the survey, we carried an experiment to assess the effect of BI on the perceived clarity, impact and interest of a simulated public programme for childhood development. For this purpose, we conceived a description of a child development programme with similar descriptive characteristics as those found in LACs public policies such as the government websites from Argentina and Chile.<sup>43 44</sup> The experiment compared four types of messages (interventions) that were randomly presented to each participant.

### Instrument

The control message included information on the characteristics of the programme. BI strategies were obtained from the Behavioural Insights Team's (BIT) Easy, Attractive, Social and Timely (EAST) framework<sup>39 40</sup> to design three intervention messages. The first intervention message (simplification) was a simplified version of the control message. According to the EAST framework, easy materials have more probability to be processed and understood.<sup>39</sup> Thus, in order to promote clear reading, we included bullet points, colloquial language and informative subtitles. The second intervention message (social norm) presented simplified content and included a message of social description, alluding that most professionals already participated in this public programme. This message was based on previous BI literature that suggests social comparison and the use of social norms can influence people's behaviour towards an initiative.<sup>45 46</sup> In the last intervention message (simplification, social norm and visual information), photos of children were added to the content in order to increase the impact of the message based on previous literature showing that images promote awareness and influence decision-making.<sup>39 47</sup> Once the first draft of the survey was developed, we implemented a first pilot (online supplemental material B S1) testing its usability features and perfected the instrument several times before its implementation. We then evaluated the effect of the four interventions based on their influence over contact (interested in being contacted), perceived impact (potential impact rating) and clarity (how clear is the message). Approximate translations of the questions and interventions are provided in the online supplemental material B S1.

### Data collection procedures

Participants' responses were automatically collected from the Intramed platform. Since the last part of the survey

consisted of an RCT, we collected the same type of variables for each group in the same portal.

### Patient and public involvement

The research question and outcome measures were based on previous studies related to health professionals' knowledge and use of BI and public policies.<sup>33</sup> There were no patients involved in the design, recruitment or conduct of this study. A global report is going to be released in <https://www.intramed.net>, the same platform where the study was developed, in order to disseminate the study results to participants.

### Data analysis

Data analysis was conducted in R.<sup>48</sup> We considered participants' region as the predictor variable, which comprised LAC-South (including Argentina, Bolivia, Chile, Colombia, Ecuador, Paraguay, Peru, Venezuela and Uruguay) and LAC-North (including Costa Rica, Cuba, Dominican Republic, El Salvador, Guatemala, Honduras, Mexico, Nicaragua and Panama). We created different scores for academic degree, experience and sector and composite scores for PPKI and BIKI (online supplemental material B S2).

### Models

To analyse statistical significant effects on dependent variables, we conducted regression and Analysis of Variance (ANOVA) models, with Tukey's test for post hoc analyses and Pearson's  $\chi^2$  test for count data. For the regression models, the predictor variables were sector (public and private), age, academic degree, experience degree, PPKI and location levels. The experimental section of BI included only location and intervention type variables as predictors.

To explore significant differences in proportion of responses for the BIKI, BI knowledge, efficiency and usefulness, Pearson's  $\chi^2$  test for count data was used. Also for these dependent variables, a likelihood-ratio test was conducted on the binary logistic regression model including all predictor variables to evaluate the difference between the null deviance and the residual deviance.<sup>49</sup> To test the effects of BI interventions, an ANOVA model was used, including the intervention variable and the location level. When significant group effects were found for intervention type, we performed a post hoc Tukey's test to analyse differences between interventions. We established a significance threshold of  $p \leq 0.05$ , and trends were reported. See online supplemental material B S3 for additional details.

## RESULTS

The sample was composed mostly by physicians of different specialties (93.46% physicians) and other professionals (0.05% administrates, 0.10% pharmacists, 0.15% speech therapists, 0.25% technicians, 0.25% kinesiologists, 0.25% biochemists, 0.45% nutritionists, 0.60% dentists, 0.95% nurses, 1.24% psychologists and 2.25% from other

disciplines). The sample included participants from eighteen LACs (Argentina, Mexico, Colombia, Peru, Ecuador, Uruguay, Chile, Paraguay, Bolivia, Costa Rica, El Salvador, Cuba, Guatemala, Honduras, Nicaragua, Panama, Dominican Republic and Venezuela). The participants' education degrees ranged from technicature degree (0.55%), tertiary degree (2.54%), undergraduate degree (23.91%), associate degree (3.10%), postgraduate specialisation (43.04%), master's degree (14.63%), PhDs (7.39%) and hospital interns (1.69%) to not having any education in the related fields (3.15%). In terms of years of experience, 5.09% presented less than 2 years, 11.93% reported between 2 and 6 years, 10.53% between 6 and 10 years and 72.44% more than 10 years. Regarding the work sector, 24.32% worked in the public sector, 10.72% worked in the private sector, 64.66% worked in both sectors and 1.03% reported they were not currently working.

## BI knowledge

### Knowledge of the term 'BI'

Most participants reported not knowing the meaning of the term 'BI'. There were significant ( $\chi^2=210.29$ ,

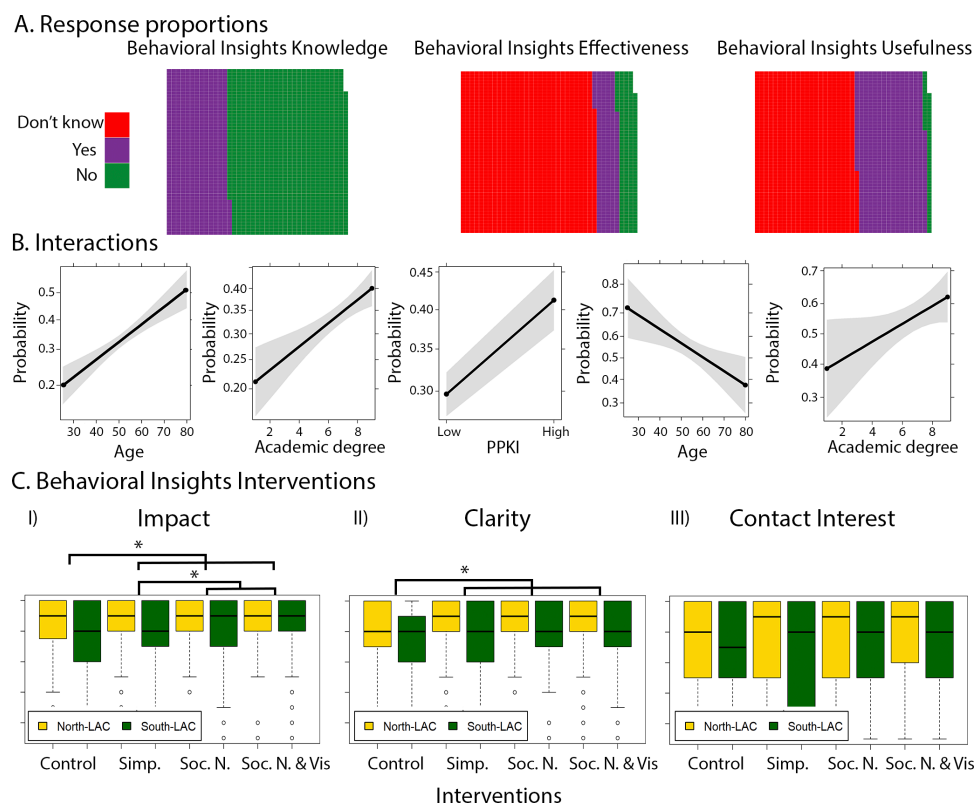
$df=1$  and  $p<0.001$ ) differences between responses ('no', 1326/66.20%; 'yes', 677/33.80%) (figure 2A). Regression models with the predictors were significant ( $\chi^2=108.54$ ,  $df=7$  and  $p<0.001$ ), presenting positive interactions (figure 2B) for higher BI knowledge related to older age, higher degree formation and higher PPKI (online supplemental material D table 1).

### Behavioural Insights Knowledge Index (BIKI)

Most participants presented a low BIKI. There were significant ( $\chi^2=160.5$ ,  $df=1$  and  $p<0.001$ ) differences between levels ('low', 1285/64.15%; 'high', 718/35.85%) (figure 2A). Regression models were significant ( $\chi^2=101.09$ ,  $df=7$  and  $p<0.001$ ) presenting positive interactions (figure 2B) for higher BI knowledge related to older age, higher degree formation, higher PPKI and LAC-North location (online supplemental material D table 2).

### BI effectiveness

Most participants did not know whether they considered BI effective. There were significant ( $\chi^2=1699.45$ ,  $df=2$  and



**Figure 2** Significant effects related to questions on behavioural insights (BI) knowledge, effectiveness and usefulness and BI interventions in a childhood public programme. (A) Response proportions. Proportion of answers associated to BI knowledge, effectiveness and usefulness. (B) Interactions. Significant effects obtained for regression models. (I) Probability of response frequency regarding high BI knowledge by age. (II) Probability of response frequency regarding high BI knowledge by academic degree. (III) Probability of response frequency regarding high BI knowledge by PPKI. (IV) Probability of response frequency regarding high effectiveness by age. (V) Probability of response frequency regarding high effectiveness by PPKI. (C) BI interventions. Intervention effects of the childhood public programme in health professionals' perceptions. Significant differences between interventions are highlighted with \*. Significant differences between Latin American and the Caribbean country (LAC)-North and LAC-South were found in the three outcome variables. (I) Impact response ratings by region and intervention type. (II) Clarity rating responses by region and intervention type. (III) Contact interest response ratings by location and intervention type. PPKI, Public Policy Knowledge Index; Simp, Simplification; Soc. N., Social Norms; Vis, Visual Information.

$p < 0.001$ ) differences between responses ('don't know', 1537/76.74%; 'no', 210/10.48%; 'yes', 256/12.78%) (figure 2A), showing that most participants do not know about the effectiveness of BI (online supplemental material D table 3). When comparing 'yes' and 'no' answers, a significant difference was found, showing that most participants considered BI as effective rather than not effective ( $\chi^2=4.54$ ,  $df=1$  and  $p=0.03$ ).

Regression models were significant ( $\chi^2=18.36$ ,  $df=7$  and  $p=0.01$ ) showing effects (figure 2B) related to higher perceived effectiveness associated with younger age and higher degree (online supplemental material D table 3).

### BI usefulness

Most participants reported not knowing whether applying BI to child development would be useful ('don't know', 1159/57.86%; 'no', 62/3.10%; 'yes', 782/39.04%) (figure 2A). These differences were significant ( $\chi^2=930.579$ ,  $df=2$  and  $p < 0$ ) (online supplemental material D table 4A,B). Regression models presented no associations for this variable.

In summary, this study found a general lack of knowledge related to BI, its effectiveness and usefulness in childhood policies. The factors that modulated such lack of BI knowledge were age, academic degree, PPKI and location.

### Experiment on BI messages

Participants that received messages with BI interventions were more likely to consider the public policy as impactful and clear. The more nudges (simplification, social norm and visual information), the more significant the effects found between these two variables. Also, differences between locations were observed showing higher perceived impact, clarity and contact interest related to LAC-North.

### Impact

Regarding the perceived impact of the programme, the ANOVA revealed significant group effects for intervention type ( $df=3$ ,  $F$  value=12.97 and  $p < 0.001$ ) and location ( $df=1$ ,  $F$  value=35.71 and  $p < 0.001$ ). Tukey's test for post hoc analysis showed a significantly lower perceived impact for control intervention compared with the other three interventions and significantly higher perceived impact for simplification, social norms and visual information interventions compared with simplification intervention (online supplemental material D table 5). These differences evidenced a higher perceived impact the more sophisticated the nudges in the message were (figure 2C) and a positive relation with the LAC-North location (online supplemental material D table 5).

### Clarity

In terms of the perceived clarity of the programme, the ANOVA analysis yielded a similar pattern, with significant effects based on intervention type ( $df=3$ ,  $F$  value=8.30 and  $p < 0.001$ ) and location ( $df=1$ ,  $F$  value=56.97 and  $p < 0.001$ ). Tukey's test for post hoc analysis presented a significantly lower perceived impact for control intervention in comparison to the other three interventions but significant for the other comparisons (online supplemental material D table

6). The differences imply a better perceived clarity of the programme (figure 2C) when nudges were present in the message and a positive relation with the LAC-North location (online supplemental material D table 6).

### Contact interest

Regarding the interest to be contacted for the programme, differences were less strong, yielding only a trend for group effect related to intervention type ( $df=3$ ,  $F$  value=2.27 and  $p=0.079$ ) and significant effects related to location ( $df=1$ ,  $F$  value=9.51 and  $p=0.002$ ). Tukey's test for post hoc analysis yielded no significant differences between interventions (online supplemental material D table 7). The results evidenced (figure 2C) significant increased interest to be contacted for the LAC-North location (online supplemental material D table 7).

## DISCUSSION

In the present study, we evaluated the knowledge and perception of BI in health professionals working with children across LACs. Also, to assess potential effectiveness of these BI techniques, we tested the effect of BI interventions on a public programme. Results revealed a general lack of knowledge surrounding BI, as well as a lack of estimation on its usefulness and effectiveness. The factors that modulate these variables were related to age, academic degree, PPKI and location. Being older, having a higher degree formation, being from LAC-North and having high PPKI predicted a higher BI knowledge. In contrast, being younger and having a higher academic degree predicted higher BI perceived effectiveness. The second part of the study aimed at testing the effect of employing BI interventions to design policy communications, evidenced that simplified messages and the use of visualisation and social norms promoted higher levels of clarity and perceived impact across professionals compared with control material. This set of results may help governments in LACs to improve the design and implementation of strategies for childhood health professionals.

Our survey suggested a poor knowledge of the BI term across the region, accentuated by demographics (younger people), academic formation (low degree) and public policy knowledge (low PPKI). Since experts' trainings<sup>50</sup> are essential to guarantee a proper implementation of public policies in the region,<sup>51 52</sup> our results highlight the importance of focusing specifically in younger, less trained professionals in order to tackle the knowledge gap found in the region.

Consistent with the results related to BI knowledge, most participants presented low BIKI. Factors accentuating the low BIKI were younger age, lower degree formation and lower PPKI. Based on these results, it may become useful to complement health professionals' trainings along with BI knowledge; after all, interdisciplinary knowledge is recommended to improve health outcomes.<sup>43 52</sup> Being part of LAC-North location was a predictor of high BIKI, which may relate to the fact that BI discipline has had an important development in North

America, spreading its influence to Mexico<sup>10</sup> through international programmes.<sup>53</sup>

Most participants had no knowledge on whether BI interventions are indeed effective, although more participants tend to consider them effective over those that do not. The lack of knowledge on BI effectiveness and usefulness may be explained by the low familiarity with BI and its related interventions. Low perceived effectiveness was accentuated by age (older professionals) and professional background (lower academic degrees). These results suggest a paradoxical effect of age: although older people know more about the discipline, they regard BI as less effective than younger people do. This suggests that the innovative aspects of BI, as well as its effectiveness, require increased public awareness to promote its implementation in childhood programmes.<sup>54</sup>

Finally, compared with standard public policy communications,<sup>43 44</sup> the use of different BI interventions improved the perceived clarity and impact of the policy among participants. In line with relevant literature,<sup>26 28 32</sup> our preliminary findings suggest that the use of nudges in policy messages can improve the perception across health professionals. However, the interventions did not significantly improve participants' interest in being contacted. In this sense, the awareness of being in a simulated intervention (lacking 'real-world' criteria) may have played a role in participants' limited willingness to participate. More public discussion may be needed to increase awareness of these methods, as well as including health professionals in the design of BI trials to let them use these initiatives firsthand.

Interestingly, while participants showed scarce knowledge of BI ideas, they were nevertheless influenced by the use of its principles when evaluating the messages about the public programme. This reinforces the idea that the messages were effective in moderating the impact and clarity of the messages through automatic, non-conscious evaluation processes as posited by the nudge theory.

### Limitations and further assessments

The main limitations of this study reside in the biases coming from the self-report surveys, where respondents tend to answer taking into account social desirability. However, this limitation is a general one for survey studies.<sup>55–57</sup> Nevertheless, we focused on professionals working in the field to maximise expertise in the issues and did not focus on socially undesirable questions that could affect the participants' answers in an evident fashion.

Another limitation of this study comes from the imbalance of samples across countries. Therefore, the present results should be extrapolated with caution. Notwithstanding, this is one of the largest LAC regional surveys of specialists working in child development. The consistency of responses in the different locations (LAC-North and LAC-South) and some expected discrepancies suggest our findings may have generalisability.

This study paves the way for future studies to analyse health professionals' knowledge on innovative strategies to implement public programmes in their communities. We

expect future studies to research similar questions across the globe.

### CONCLUSIONS

Our study on professionals working with children across LACs evidenced a knowledge gap on BI appraisal that may have an impact in the implementation of public programmes. Additionally, our BI interventions showed an encouraging approach to improve public policy communications in the field. Overall, our results can help to identify main factors related to knowledge needs, helping governments to optimise their public policy implementations.

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**Contributors** AMI designed the proposal. AAT provided the first complete draft under AMI's supervision. AAT, AMI, FT, EH and MD searched the literature. DF provided the platform for assessment and data collection. MD and EH performed the analysis under the supervision of AMI. All authors contributed to the draft, participated in discussing the content of the paper, contributed to editing and approved the final version of the article.

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