



Capacity and needs assessment of the implementation of the toddler oral health intervention at well-baby clinics

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Objective: To conduct a capacity and needs assessment identifying important factors for the successful implementation of an oral health coach (OHC) at well-baby clinics. This Toddler Oral Health Intervention (TOHI) provides oral health promotion to parents to prevent early childhood caries. **Methods:** A two-round Delphi study was conducted with an expert panel consisting of OHCs and paediatric staff. The survey was based on the Consolidated Framework for Implementation Research (CFIR), consisting of 39 constructs divided over 5 domains: intervention characteristics (8), inner setting (14), outer setting (4), characteristics of individuals (5) and the process of implementation (8). **Results:** Constructs relating to the inner setting, outer setting and implementation process were identified as essential. Availability of resources, information on how to execute or facilitate the intervention, and the integration of the intervention into existing work tasks were also essential. Alignment and partnership between OHCs and paediatric staff, along with the prioritization of parents' and children's needs were emphasized. A formally appointed internal implementation leader within each organization, capable of transferring their enthusiasm to the team, and regular meetings for progress and experience sharing were considered essential. **Conclusion:** Specific strategies are needed in the implementation phase to increase the adoption, implementation and maintenance of the TOHI, ultimately leading to improved oral health in children. This study provides valuable insights into important factors for implementation of an oral health intervention in a public health setting.

Keywords: needs assessment, oral health, public health, implementation science

Introduction

Dental decay is a major public health problem. Approximately half of preschool children worldwide are affected by early childhood caries (ECC) (Uribe *et al.*, 2021). Untreated dental caries can affect the overall growth and development of the child (Goswami, 2020). Dental caries is preventable by twice daily tooth brushing with fluoride toothpaste and by reducing the frequency of sugar intake (Duijster *et al.*, 2015). However, adherence to these measures can be challenging. Dental education and raising awareness alone are not sufficient. More attention needs to be paid to the underlying determinants of (oral) health behaviour, such as parental and family-related factors (de Jong-Lenters *et al.*, 2019).

The Toddler Oral Health Intervention (TOHI) was developed to address oral health behaviour challenges in children and to prevent ECC (van Spreuwel *et al.*, 2022). Within this intervention, face-to-face consultation with an oral health coach (OHC) is offered to parents visiting the well-baby clinic for a regular health check-up of their children between the ages 6 to 48 months. A consultation with an OHC includes a child's caries risk assessment, according to a non-operative caries treatment and prevention (NOCTP) protocol (Vermaire *et al.*, 2014). Subsequently, the OHC adapts the oral health promotion to this risk by targeting the determinants according to the Health Action Process Approach (HAPA) and using Motivational Interviewing (MI) (van Spreuwel *et al.*, 2022). Consultations are provided by

an OHC, usually a dental hygienist, seconded from a private dental practice to the locations of youth public healthcare. This close collaboration is new for both oral health professionals and paediatric staff. Multiple elements of the TOHI as a new intervention (the setting and the collaboration between parties from private and public health) fit it within the definition of complex intervention (Skivington *et al.*, 2021).

Complex interventions have no linear relationship between cause and effect. Due to the interaction between multiple components, the intervention and setting merge. Evaluating the success in implementing such healthcare innovation within integrated organizations is complex, especially in a randomized controlled clinical trial (RCT) (Bird *et al.*, 2011). The aim of a RCT is to isolate and identify the specific effects of an intervention. This is difficult, given the complexities of the practice and organization of healthcare, and in the context of research in real life. Therefore, a more flexible approach is often needed (van Oers *et al.*, 2021).

The TOHI was developed in 2017 and tested until 2022 in a RCT on caries incidence as the main outcome (van Spreuwel *et al.*, 2022). Data were gathered on the adoption and execution of the intervention and experiences with the OHCs and the intervention among parents and paediatric staff. The results of the ongoing process evaluation show that parents consider OHC consultations to be a child-friendly and accessible route for oral health prevention, and they value the integration of OHC consultations within regular health check-ups at well-baby clinics. In the

study of van Spreuwel et al. (2021), the paediatric staff lacked time and/or knowledge of oral health promotion. The OHC at the well-baby clinic was therefore seen as an added value. However, a few problems emerged. First, there were problems of adoption of the TOHI, with a low turn-out among the target population, namely children from a low socioeconomic position (SEP). Second, execution of the intervention varied due to lack of staff and physical space and differing levels of staff involvement.

Pending the results on the effectiveness of TOHI, but following positive reactions from parents and paediatric staff and the persistently high prevalence of caries among children in the Netherlands (Van Meijeren-van Lunteren *et al.*, 2021; Verlinden *et al.*, 2019), two municipalities, Tilburg and Heerlen, implemented OHCs at well-baby clinics as usual care in 2021. Considering the experiences during the RCT it is important to study the mechanisms that influence the implementation of the TOHI.

In the last decade, implementation science has emerged as a potential solution for translating research into practice to increase the adoption, implementation and maintenance of healthcare innovations (Eccles & Mittman, 2006; Fernandez *et al.*, 2019). Various theories, models and frameworks have been introduced to describe and/or guide the process of translating research into practice; to understand and/or explain what influences the implementation and to evaluate the implementation (Nilsen, 2015). One framework is the Consolidated Framework for Implementation Research (CFIR) (Damschroder *et al.*, 2009). Whereas many existing theories and frameworks focus on 'what works', CFIR combines constructs from existing theories and provides a list of constructs to promote further theoretical development about 'what works, where and why, in different contexts'.

The most underestimated value of implementation science lies in the pre-implementation phase, where CFIR can give early insight into barriers and facilitators of implementation. Based on these barriers and facilitators, CFIR can also help recalibrate implementation strategies and adjust the intervention before implementation (Kirk *et al.*, 2016). There is evidence of the usability of CFIR in different settings, including low-income groups and in complex interventions (Damschroder *et al.*, 2009).

Thus, this study aimed to conduct a capacity and needs assessment in the pre-implementation phase, using CFIR to identify important factors for the implementation of OHCs at well-baby clinics in two municipalities in the Netherlands. Insights from this study can be used to adjust the TOHI with specific strategies to address identified needs before implementation of other programmes to increase the adoption, implementation and maintenance of the OHC.

Methods

A two-round Delphi panel survey was conducted with an expert panel of OHCs and paediatric staff members to identify barriers and facilitators for the implementation of OHCs at well-baby clinics, according to the CFIR. This framework consisted of a total of 39 constructs divided over 5 domains: intervention characteristics (8), inner setting (14), outer setting (4), characteristics of the individuals (5) and the process of implementation (8) (Table 1) (Damschroder *et al.*, 2009).

The Delphi questionnaire was developed using the interview guide tool of the CFIR website (cfirguide.org/cfirguide.org), offering an example question for each construct. The questions were subsequently adapted to the TOHI setting. To decrease the number of items, single items were not included for three constructs: *implementation climate*, *readiness for implementation* and *engaging*. Instead, the focus was only on the targeted questions for all the underlying constructs. As a result, single questions were formulated for 36 constructs of the CFIR for the oral health coaches. Considering the slightly limited role of the paediatric staff in the implementation of TOHI, a separate questionnaire of 26 constructs was developed. During the clinical trial, semi-structured interviews asked five paediatric staff members from different well-baby clinics about their knowledge, attitude, performance of preventive tasks, opportunities and barriers in preventive oral health and their views on the TOHI. Based on these findings, some constructs were excluded as not relevant (Table 1). The questionnaires were reviewed and adapted by all co-authors.

An expert panel of 18 participants (10 OHCs, 5 paediatric nurses, 1 paediatrician and 2 team assistants from 9 different well-baby clinics) were involved in the clinical trial of the TOHI. The participants were invited to answer the questionnaire on an online survey platform for Delphi studies (Welphi. <https://www.welphi.com>).

Consensus was considered to have been reached when most the participants rated a construct as *important*; therefore, the predetermined threshold of 67% was established before the study. In the first round, participants indicated on a 10-point Likert scale (1, not important at all to 10, very important), to what extent a construct is *important* for implementing an OHC at well-baby clinic. A construct was considered *important* when 67% of the participants scored six or higher on the construct.

In the first round, participants mainly chose the extremes of the scales. To discern what is essential for implementation, a 5-point Likert scale (1, not essential to 5, essential) was used in the second round. In the second round, only the constructs identified as *important* were presented again. A construct was considered *essential* when 67% of participants scored a four or higher. In both rounds, the participants were given the opportunity to explain their answers.

The results are presented descriptively per CFIR domain and separately for the OHCs and the paediatric staff.

This research was conducted and reported in accordance with the Dutch Code of Conduct for Research Integrity. No medical procedures were performed on patients, and therefore the study was not within the scope of the Dutch Medical Research Involving Human Subjects Act (WMO). A waiver was obtained from the Ethical Committee Research of HU University of Applied Sciences Utrecht (reference number: 123-000-2020).

Results

Thirteen of 18 experts gave informed consent to participate in the Delphi panel. Two paediatric nurses, 1 team assistant and 7 OHCs participated in rounds 1 and 2 (Figure 1). The remaining experts sent no response to the survey.

Table 1. Consolidated Framework for Implementation Research constructs and domains (Damschroder et al., 2009).

<i>Domain 1</i> <i>Intervention characteristics</i>	<i>Domain 2</i> <i>Inner setting</i>	<i>Domain 3</i> <i>Outer setting</i>	<i>Domain 4</i> <i>Individual characteristics</i>	<i>Domain 5</i> <i>Process</i>
Intervention source	Structural characteristics ¹	Patient needs and resources	Knowledge and beliefs about the intervention ¹	Planning
Evidence strength and quality	Networks & communication	Cosmopolitanism	Self-efficacy ¹	<i>Engaging</i> ² Opinion leaders
Relative advantage	Culture	Peer pressure	Individuals stage of change ¹	Formally appointed internal implementation leaders
Adaptability ¹	<i>Implementation climate</i> ² Tension for change	External policies and incentives	Individual identification with organization	Champions
Trialability	Compatibility		Other personal attributes	External change agents
Complexity ¹	Relative priority			Executing
Design quality and packaging ¹	Organizational incentives and rewards ¹			Reflecting and evaluating
Costs ¹	Goals and feedback			
	Learning climate ¹			
	<i>Readiness for implementation</i> ² Leadership engagement			
	Available resources			
	Access to knowledge and information			

¹not included in the paediatric staff questionnaire based on the results of previous interviews

²items on these overarching constructs excluded from the questionnaire

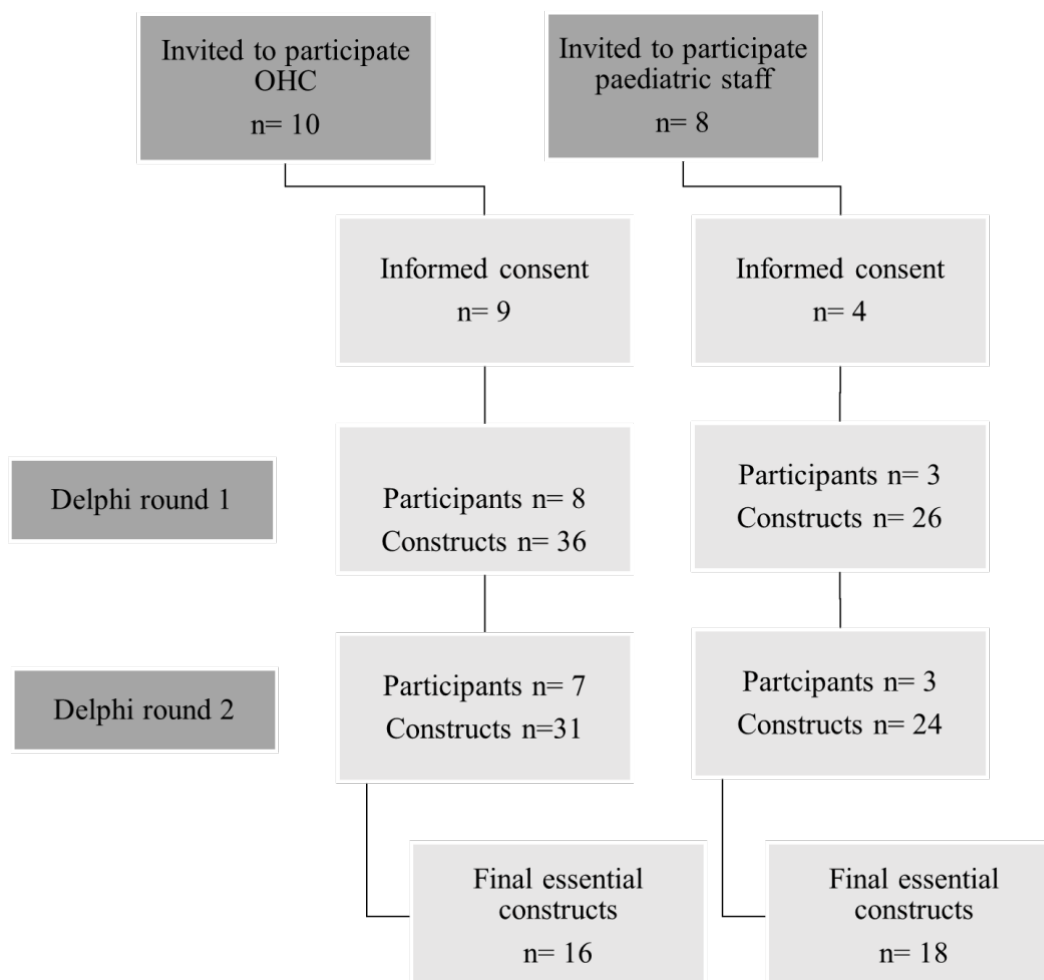


Figure 1. Flow chart participants and constructs in questionnaire.

In the first round, 31 of the 36 constructs, and in the second round 16 of the 31 constructs, were scored as *essential* ($\geq 67\%$) to implement an OHC at a well-baby clinic (Figure 1) by the OHCs. Constructs that were not essential were mainly related to intervention characteristics, the characteristics of the individuals and the inner setting.

In the first round, 24 of the 26, and in the second round, 18 of the 24 constructs, were scored as *essential* ($\geq 67\%$) by paediatric staff (Figure 1). Constructs that were not deemed essential mainly related to the individuals executing or facilitating the intervention (i.e., *characteristics of the individuals*). The construct scores in each Delphi round are presented in Table 2. No additional explanations of answers were given by participants.

In domain 1 (Intervention characteristics) agreement was reached regarding *relative advantage* between OHC and paediatric staff. Both groups identified the importance of the intervention's impact on the oral health of children. Paediatric staff emphasized the need for clear development and proven effectiveness of the intervention, in contrast to the OHCs, to whom these items were not essential. The OHCs felt the execution of the intervention was essential (i.e., *adaptability, complexity and design quality and packaging*). This indicates that the intervention must be adaptable to the needs of the well-baby clinic in question. Furthermore, it is essential that the intervention is not too complex to execute and must be bundled and presented in a pleasant way.

Agreement was reached on all domain 2 (Outer setting) constructs. Both parties considered it essential that the different organizations, such as youth healthcare and dental practices, were connected and networked with each other about the execution and progress of the TOHI. They indicated that there should be strategies for distributing the intervention, including through policies, partnerships and guidelines. Both parties emphasized the importance of understanding the needs of the parents and their children, and then meeting those needs. The presence of *peer pressure* to implement TOHI was not considered essential.

In domain 3 (Inner setting) paediatric staff stressed the importance of realizing the need to change the current oral health practices in children to implement the TOHI. In addition, the TOHI must be in alignment with the norms and values of the youth healthcare organization. OHCs emphasized the need for prioritization and compatibility with the vision of the dental practice to deploy an OHC at a well-baby clinic. The OHCs aimed to be a valued partner in the implementation, with the opportunity to experiment within the TOHI. They wanted clear goals that should be evaluated. Both OHCs and paediatric staff considered enough resources, such as time, physical space and materials as essential. They felt there should be easy access to information and knowledge about the execution and facilitation of the intervention and how to integrate it into existing work tasks. The OHCs did not find considering the organizational structure (e.g., size and social architecture) and neither paediatric staff nor OHCs found the form of communication used within an organization to be essential. Nor were constructs such as *incentives* and *leadership engagement* considered essential.

After prioritizing the constructs during round two, none of domain 4, the *characteristics of the individuals* involved with the intervention, such as self-efficacy, knowledge and beliefs about the intervention, were considered as essential in the implementation of an OHC.

For Domain 5 (Process) both parties emphasized the need for a manual on how to carry out or facilitate the TOHI. In addition, they wanted a *formally appointed internal implementation lead* within each organization, responsible for the implementation and to transfer their enthusiasm to the rest of the team. Both groups felt regular meetings for sharing progress and experiences were important. Paediatric staff also expressed the need for an *external change agent*; someone outside the organization to influence implementation according to plan.

Discussion

In this study, OHC and paediatric staff members identified constructs from the Consolidated Framework for Implementation Research as essential for the implementation of OHCs at well-baby clinics. Factors within the domains *outer setting* (i.e., broad context factors, outside the organizations involved); *inner setting* (i.e., within the involved organizations or setting); and *process* were deemed essential by both OHCs and paediatric staff during implementation of the TOHI.

The expert panel emphasized the importance of the integration of TOHI into existing work tasks. This aligns with the findings of King et al. (2020), which indicates the importance of the compatibility of a new intervention with existing workflows and systems for successful implementation. Durlak and DuPre (2008) indicated that interventions that are adaptable and compatible are more likely to be incorporated into organizations' procedure, emphasizing shared decision making. Successful implementation required including staff and stakeholders in planning from the outset. Shared decision-making empowers individuals to exercise control over local services and recognizes the importance of matching intervention delivery to local needs, preferences and cultural norms (Durlak & DuPre, 2008). Our results highlight the importance of regular meetings to share progress updates. These meetings could facilitate shared decision-making during the adaptation and implementation of the TOHI.

King et al. (2020), stressed the need to ensure that an intervention aligns with the organizational culture, echoed by the paediatric staff in our study. This might be a challenge for OHCs, given that they come from private oral health practices and need to adapt to a new organization. Furthermore, a systematic review (Li et al., 2018) found that organizations that are receptive to innovation and have a learning culture are more likely to achieve successful implementation of new interventions. Therefore, we might need to assess the organizational culture of participating well-baby clinics to specify the strategies needed to ensure involvement.

According to Warner et al. (2021), establishing relationships between different organizations involved in intervention implementation is crucial. Fostering informal relationships and partnerships between organizations increased familiarity and trust within and between organizations. Teamwork and collaboration are highly relevant

Table 2. Outcomes of the constructs in the Delphi rounds.

<i>CFIR construct</i>	<i>Oral Health Coach (OHC)</i>		<i>Paediatric staff</i>	
	<i>Round 1</i> <i>N = 8 (%)</i>	<i>Round 2</i> <i>N = 7 (%)</i>	<i>Round 1</i> <i>N = 3 (%)</i>	<i>Round 2</i> <i>N = 3 (%)</i>
1. Intervention characteristics				
Intervention source	55	NA	100	67
Evidence strength and quality	88	63	100	100
Relative advantage	100	76	100	100
Adaptability	100	75	NA	NA
Trialability	77	13	66	34
Complexity	100	88	NA	NA
Design quality and packaging	100	100	NA	NA
Cost	100	51	NA	NA
2. Outer setting				
Patient needs and resources	88	88	100	100
Cosmopolitanism	100	76	100	100
Peer pressure	55	NA	66	33
External policy and incentives	100	88	100	100
3. Inner setting				
Structural characteristics	77	63	NA	NA
Networks and communications	77	13	100	13
Culture	77	62	100	100
Implementation climate				
• Tension for change	55	NA	100	100
• Compatibility	100	75	100	100
• Relative priority	100	88	100	33
• Organizational incentives and rewards	100	63	NA	NA
• Goals and feedback	88	50	100	67
• Learning climate	88	76	NA	NA
Readiness for implementation				
• Leadership engagement	44	NA	67	33
• Available resources	100	75	100	100
• Access to knowledge and information	100	100	67	100
4. Characteristics of individuals				
Knowledge and beliefs about the intervention	100	25	NA	NA
Self-efficacy	100	62	NA	NA
Individual stage of change	88	50	NA	NA
Individual identification with organization	88	25	33	NA
Other personal attributes	100	63	100	33
5. Process				
Planning	100	88	100	100
Engaging				
• Opinion leaders	55	NA	33	NA
• Formally appointed internal implementation leaders	100	100	100	100
• Champions	100	88	67	67
• External change agents	100	63	100	100
Executing	88	50	100	100
Reflecting and evaluating	100	75	100	67

Bold = essential construct

Green = essential for both paediatric staff and OHCs

Yellow = essential for OHCs

Blue = essential for paediatric staff

(Li *et al.*, 2018) in new interventions that require participation from multidisciplinary teams. These partnerships become essential when interventions rely on client referrals from different organizations. Previous research has indicated that healthcare provider-based referrals increase participation (Nhim *et al.*, 2019). Within TOHI, the paediatric staff must refer parents to the OHCs. This study highlights the importance of connection and networking between organizations to implement the TOHI. Strategies are required to disseminate the intervention, including policies and guidelines to the inner and outer settings.

Li *et al.* (2018) regard leadership as important in successful implementation. Again, our participants echoed this view, associating an active and engaged leader who seeks and provides feedback to staff with better implementation. *Formally appointed implementation leaders, champions* could also enthuse the rest of the team.

In contrast to the literature, the *characteristics of the individuals* were not regarded as essential for the implementation of TOHI, especially for the OHCs. Van Oers *et al.* (2021) stressed the relevance of these individual characteristics: ‘Clinicians that do not feel skilled or enthusiastic about the innovation in a sustained way, are resistant to use the intervention’. Durlak and DuPre (2008) state that the chances of a successful implementation depend on providers who recognize a specific need for the intervention; who believe the innovation will produce the desired effects; and who have the requisite skills and knowledge. It is not clear why OHCs in this study did not consider their individual roles and characteristics as essential. One possible explanation is a lack of reflection regarding their skills and knowledge, given that the role of OHC is relatively new in both oral and youth healthcare settings. A comprehensive profile of an OHC has not yet been established, resulting in potential ambiguity regarding individual perceptions of their roles, knowledge and skills. However, participating OHCs all volunteered to help with the study. They were highly motivated, recognizing the need for the intervention and convinced of the potential effect of the intervention. They may therefore have estimated these factors as obvious.

This study has some limitations. In trying to increase paediatric staff participation by reducing questionnaire length, we eliminated items on constructs that were not relevant in previous studies. Therefore, some constructs of the CFIR may not have been sufficiently assessed. (E.g., characteristics of the individuals). Previous interviews within TOHI and the national survey of paediatric staff (van Spreuwel *et al.*, 2021) showed that they have positive attitudes and basic knowledge of child oral health but pay insufficient attention to oral health promotion at well-baby clinics. However, given their important role in implementing the TOHI and in referring children and parents to the OHC, comprehensive assessment of these constructs could have added value. Second, patient involvement is not a primary focus in CFIR. Including parents in this study may have brought new insights. Participants considered the construct of *patient needs and resources* as essential. In order to assess the extent to which an organization knows and prioritizes patient needs, it is necessary to determine those needs. ‘Researchers “don’t know what they don’t know” until they involve patients’ (Staley, 2015) and involving patients in research

can lead to greater enrolment and relevance to patients, which can enhance implementation (Domecq *et al.*, 2014). Finally, in the first round, a 10-point Likert scale could have encouraged participants to opt for the endpoints of the scale, resulting in assigning more constructs as important. A 5-point scale was used in the second round to establish clearer distinction between constructs that were essential and those of lesser significance, which led to increases or decreases of some constructs. However, this adjustment made it clearer which constructs were truly important.

Despite these limitations, this study included OHCs and paediatric staff who took part in the clinical trial of the TOHI. Consequently, their input was grounded in experiences during the execution of the intervention, so giving insight into factors essential for successful implementation. The Consolidated Framework for Implementation Research focuses not only on the constructs that influence implementation but also on *why* implementation succeeds or fails in different contexts (King *et al.*, 2020). When relevant constructs are known, CFIR can help to choose and adapt implementation strategies to reduce barriers and promote facilitators.

In conclusion, this capacity and needs assessment found that basic conditions are needed, such as available resources and information on how to execute the intervention, and how to integrate it into existing work tasks. An internal implementation leader within each organization and the regular meetings for progress and experience sharing were regarded as essential. Alignment and partnership between OHCs and paediatric staff were emphasized. Strategies are needed to address all identified needs during implementation to increase the adoption, implementation and maintenance of the TOHI. The TOHI is a healthcare innovation that requires close collaboration between private and public sectors organizations. As such, this study provides valuable insights into factors important in implementing an oral health intervention in a public health setting.

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