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## How Does Multisource Feedback Influence Residency Training? A Case Study

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## Abstract

**Introduction:** Multisource feedback (MSF), also called 360-degree assessment, is one form of assessment used in postgraduate training. However, there is an ongoing discussion on its value, since the factors which influence the impact of MSF and the main impact of MSF are not fully understood. In this study, we investigated both the influencing factors and the impact of MSF on residency training.

**Methods:** We conducted a qualitative case study within the boundaries of the residency training for paediatricians and paediatric surgeons at a University Hospital. We collected data from seven focus group interviews with stakeholders of MSF (residents, raters, supervisors). By performing a reflexive thematic analysis, we extracted the influencing factors and the impact of MSF.

**Results:** We found seven influencing factors: MSF is facilitated by the announcement of a clear goal of MSF, the training of raters on the MSF instrument, a longitudinal approach of observation, timing not too early and not too late during the rotation, narrative comments

as part of the ratings, the residents' self-assessment, and a supervisor from the same department. We found three themes on the impact of MSF: MSF supports the professional development of residents, enhances interprofessional teamwork, and increases the raters' commitment to the training of residents.

**Conclusion:** This study illuminates the influencing factors and impact of MSF on residency training. We offer novel recommendations on the continuity of observation, the timing during rotations, and the role of the supervisor. Moreover, by discussing our results through the lens of identity formation theory, this work advances our conceptual understanding of MSF. We propose identity formation theory as a framework for future research on MSF to leverage the potential of MSF in residency training.

**Keywords:** multisource feedback, 360-degree assessment, identity formation theory, qualitative case study

**Abbreviations:** MSF: multisource feedback

## Introduction

If not executed well, multisource feedback (MSF) can feel like a waste of time. Thus, there is an ongoing discussion on the value of MSF. We know that feedback is a powerful tool to support learning, but surprisingly little is known about the factors that influence the impact of MSF in residency training. To make the best use of MSF, a better understanding of how MSF works is needed.

MSF, also called 360-degree assessment, is a form of assessment that can support postgraduate medical training<sup>1,2</sup>. MSF for physicians is mostly used with a formative purpose, sometimes with a summative purpose<sup>3-6</sup>. Typically, MSF comprises the feedback from several raters given to a trainee via structured questionnaires. Raters may be peers, supervisors, medical or non-medical co-workers, or sometimes patients. Their written feedback is often transferred to the resident by a supervisor in a feedback conversation. There, the resident and supervisor formulate learning goals together<sup>7</sup>.

Outside of medical education, one meta-analysis included longitudinal studies on MSF to quantitatively investigate performance improvement and moderating factors<sup>8</sup>. These authors proposed a theoretical model of eight factors which influence performance improvement, these are: characteristics of the feedback, initial reactions to feedback, personality, feedback orientation, perceived need for change, beliefs about change, goal setting, and taking action.

In the setting of medical education, several reviews have focused on the impact of MSF<sup>3,6,9,10</sup> and the factors which influence the impact<sup>6,9,10</sup>. In summary, it is known that the use of multisource feedback is influenced by facilitating conversations<sup>11-16</sup>, rater credibility<sup>11,17</sup>, scoring by colleagues<sup>14</sup>, narrative comments<sup>13</sup>, and the perceived quality of mentoring<sup>18</sup>.

Still poorly understood is the influence of contextual or cultural factors on MSF <sup>14</sup>, the mentoring relationships <sup>18</sup>, and mentors' roles and responsibilities <sup>19</sup>. We also need to determine MSF's effects and track them over time <sup>3,6,10</sup>.

To address these gaps in the literature on MSF, we pose two research questions:

- (i) What are the factors that influence the impact of MSF on residency training, as perceived by stakeholders in MSF, namely, residents, raters, and supervisors?
- (ii) What is the impact of MSF on residency training, as perceived by stakeholders in MSF, namely, residents, raters, and supervisors?

To explore these questions, we conducted a heuristic qualitative case study based on data collected in focus groups of residents, raters, and supervisors. By integrating all these relevant perspectives and discussing them critically with the literature, we derived recommendations, which might help to leverage the potential of MSF for residency training.

## **Methods**

### **Study Design**

Based on a constructivist worldview, we designed a qualitative case study as described by Merriam et al. <sup>20</sup>. A constructivist worldview sees meaning not as stable, but as negotiated through the interactions among participants and researchers within the specific context, where researchers interpret and influence the findings <sup>21</sup>. Out of several possible qualitative approaches, we chose a heuristic case study to understand the phenomenon and discover new meaning <sup>22</sup>. This approach enabled us to illuminate the contemporary phenomenon of MSF in residency training within the boundaries of a real-world setting <sup>20-23</sup>.

We collected data in focus group discussions <sup>24</sup> and conducted a reflexive thematic analysis <sup>25</sup>. We chose focus groups because participants' discussions can reveal underlying social phenomena when a group of participants is gathered and focuses on a certain phenomenon all of them have experienced <sup>24</sup>. When participants share not only *what* they think but *why*, underlying beliefs come to the surface and are used as a source of data <sup>24</sup>. In order to derive collective meaning and experiences, we used thematic analysis <sup>25,26</sup>. This process uses the researchers' subjectivity as a resource for interpreting the data <sup>25</sup>, in line with our constructivist worldview. Study design and analysis were informed by the literature on influencing factors on MSF and workplace-based assessment in residency training. In the Discussion, we used identity formation theory <sup>27</sup> as the theoretical lens to explain and critically interpret our findings.

### **Context: Case and Phenomenon of Interest**

This study is bound to the residency training for paediatricians and paediatric surgeons at the surgical clinic of the University Children's Hospital Zurich, Switzerland, between 2015 and 2018 (single case study). This clinic aims "to continuously ensure a highly competent and highly motivated next generation of paediatric surgeons by providing the maximum possible support to the most suitable candidates" <sup>28</sup>. The strong commitment to training is embodied in a unique training programme that includes, e.g. individual mentoring and rotations abroad dedicated to attaining specific learning goals. Prior to this study, this clinic had already gained experience with formative assessment using mini-CEX (Mini-Clinical Evaluation Exercise) <sup>2</sup> and DOPS (Direct Observation of Procedural Skills) <sup>2</sup> and, in addition to the national standard, a form of multi-rater assessment. Compared to some international training programs like those accredited by the Accreditation Council for Graduate Medical

Education in the United States or those regulated by the General Medical Council in the UK, MSF is not mandatory in Switzerland. Notably, the study clinic wanted to improve further, aiming for evidence-based methods to best support their residents. So, they were one of the first clinics in Switzerland to implement MSF and still use it.

Every resident receives MSF regularly during residency training. Intervals are once in six months for surgical trainees or twice during the six-month surgical rotation for paediatric trainees. MSF questionnaires are filled in online, usually by 12 raters whom the trainee selects from different groups of co-workers. Raters, residents, and supervisors are informed about the formative purpose of MSF and trained to give feedback via the MSF questionnaire. In a structured feedback conversation between a trained supervisor and the resident, the resident's self-assessment is contrasted to the summarised MSF feedback, and learning goals for the resident are formulated together. Details about the MSF questionnaire have been described earlier <sup>29</sup>.

To the best of our knowledge, only very few residency training programs voluntarily offer MSF, without existing national obligations. We were able to observe this rare situation in which MSF was implemented to support training, without external requirements.

### **Conducting the Focus Groups**

Focus groups included persons who participated in the MSF as residents, raters, or supervisors and were moderated by EH and SHu using a question route. This question route was built by EH, SHu, and AL using a structured method which leads researchers to reflect on their prior knowledge and implicit expectations <sup>30</sup>. To include arising topics, the question

route was iteratively refined after each focus group. For an example of the question route, see the Supplementary Material.

Our sampling strategy within the study aimed for a variety of perspectives. To support open discussions, we held separate focus groups for residents, raters, and supervisors. The residents' groups included residents from paediatrics and paediatric surgery. The raters' groups included nurses from the ward, nurses from the surgical theatre, consultant paediatric surgeons, and consultant anaesthesiologists. The one group of supervisors consisted of consultants from paediatric surgery. These groups of different stakeholders were convened in alternating order for the cross-pollination of ideas between stakeholders, which means from a group of raters to a group of residents, to the group of supervisors and so on. See figure 1. For more data on participants, see the Supplementary Material.

### **Data Processing**

Focus group interviews were held in German and Swiss German, recorded on video to enable better recognition of the different speakers, and then transcribed into German. We anonymised participants, replacing names with codes and removing identifying information from the transcripts.

### **Analysis of Focus Group Data**

Our aim was to investigate MSF as an overall process, including its setting, social boundaries, behaviour of participants, and the resultant learning goals. There are some theoretical frameworks that help explain certain aspects of MSF, however, to be open to all kinds of results, we decided on an inductive approach without focus on a specific theoretical framework.



To identify factors from the participants' experiences, we took a reflexive thematic approach, as described by Braun and Clarke <sup>25,31</sup>, see figure 1. Our analysis was informed by literature on feedback and MSF in medical education, our personal experiences, the reflective notes taken by EH and SHu, and shaped by reflective discussions between focus groups.

Following the proposed steps <sup>31</sup>, after familiarisation with the data, we systematically coded all transcripts in an inductive manner (EH and AT), using the QDA Miner Lite software <sup>32</sup>, sorted the codes and associated data into initial themes (EH, AT, SHu), and visualised their connections in several mind maps (EH, AT, AL, SHu). Then the themes were reviewed at the level of the coded data extracts and the level of the whole dataset (EH and AT). This step included iterative cycles of reflection and re-writing, by reading transcripts or viewing respective parts of the videos again, and through discussions of the study authors.

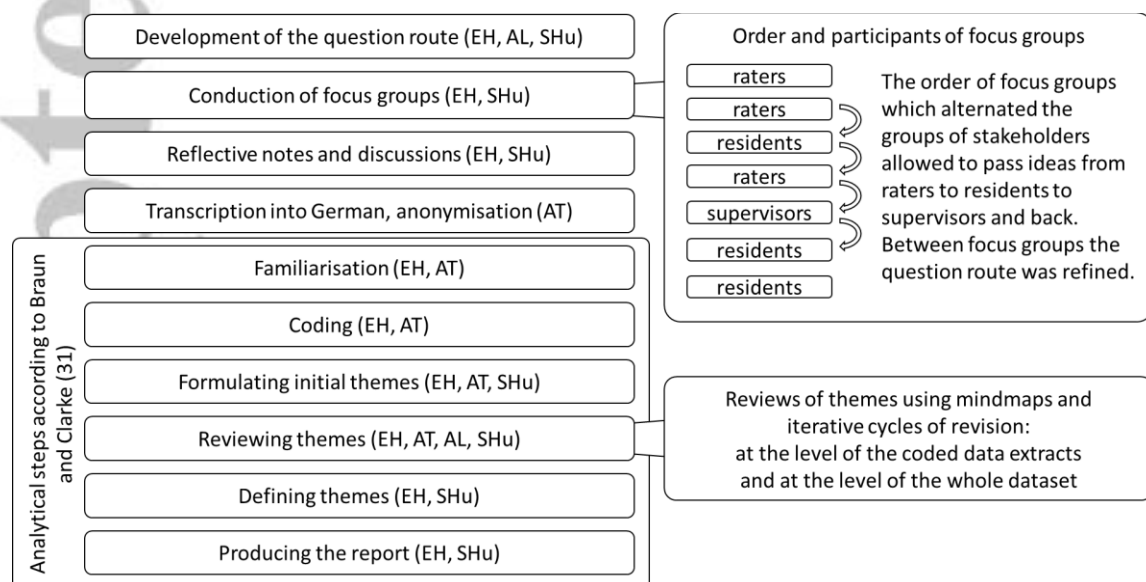


Figure 1: Overview of data collection and analysis.

## Researchers

In constructivist qualitative research and reflexive thematic analysis, the researchers' subjective opinions and experiences influence data generation and interpretations. Our study acknowledges both the emic (within the setting) and the etic (without the setting) perspective of researchers: The emic perspective is offered by US, who stems directly from within the context and is one of the supervisors of MSF. The etic perspective is offered by AT, AL, and SHa. AT studied psychology and had been unfamiliar with medical education. AL is a medical education researcher with a focus on workplace-based assessment. SHa is a clinician engaged in medical education. All three had no prior contact with the study hospital. EH and SHu are physicians by background, mainly engaged in medical education, and they supported the implementation of MSF at the study hospital. Reflexivity was supported by discussing each focus group before and afterwards, including the assumptions of the focus group moderators. EH kept a reflective diary.

We followed O'Brien's standards for reporting qualitative research<sup>33</sup> and the criteria by Cheek et al. for reporting case studies<sup>23</sup>. For more detailed information on our methods, see the Supplementary Material.

## Results

Our analysis of the experiences described in the focus groups reveals ten themes, visualised in Figure 2. Seven themes concern the perceived influencing factors on multisource feedback and three themes concern the perceived impact of multisource feedback. Sample quotes are shown in table 1 and further quotes and context are provided in the Supplementary Material.

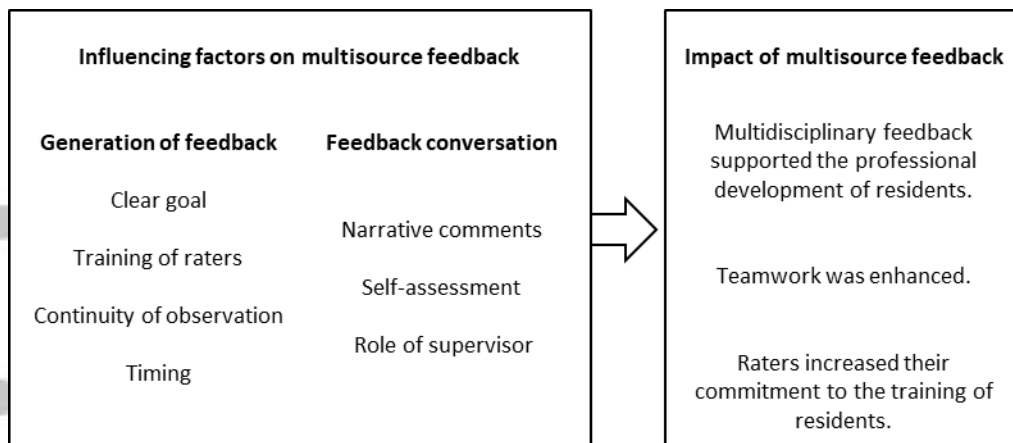


Figure 2: Themes as derived from focus group discussions. Seven themes concern the influencing factors on multisource feedback and three themes concern the impact of multisource feedback.

Table 1: Sample quotes categorised by theme. The broader context and additional quotes are provided in the Supplementary Material.

Theme	Sample quote
Clear goal	(...) that is a serious thing for someone's career. And then, I suddenly felt like: Okay, what's actually happening with that? (rater 1.4)
Training of raters	So there will be no negative effect if you write "unable to comment" everywhere; that isn't negative, is it? (rater 2.8)
Continuity of observation	(...) you watch them a little closer than you normally would (...) So the focus is then different for me, (...) if I know beforehand that there might be someone asking me [for an MSF] in the near future. (rater 2.5)
Timing	(...) one month is incredibly early (...) Three months is okay. It's still early, but it's okay. (supervisor 3)
Narrative comments	But when you give a concrete example (...) that gives you much more feedback, even if it is only a quick snapshot (...) (resident 1.2)
Self-assessment	I think in the feedback conversation, (...) this short addition [the self-assessment] that would certainly remain with you (...) in the long run. (resident 1.5)
Role of supervisor	And it [the feedback conversation] always gets mixed up, (...) it always turns into a bit of a career talk, doesn't it? (supervisor 1)
Impact on the professional development of residents	(...) this is the first time I've really left a feedback conversation and thought "ok, I feel rated fairly now", not only because two consultants told me "oh, you're doing things well or badly", but a whole group did. And I felt for the first time that maybe I can even apply this feedback. (resident 1.2)
Impact on teamwork	But even the anaesthesiologists or nurses have been open to it [giving feedback]. They welcomed it. (...) And that, I think, in turn promotes team spirit. (resident 1.6)
Impact on the commitment of raters	And you can support the resident in this respect. So, for example, if one goal is better communication, then I leave more of the patient interviews to the resident and pay more attention to it and give him the opportunity to improve (...) (rater 2.7)

## Influencing Factors during the Generation of Feedback

We identified four themes connected to generating feedback: a clear goal, the training of raters, continuity of observation, and timing.

A clear goal is fundamental, and whether it is formative or summative has relevant implications. Some residents and raters described being uncertain about whether MSF was intended to be formative or summative and said that their perception of its purpose had shaped their ratings. Residents' motivation to participate and their choice of raters had also been influenced by their perception of its purpose. All supervisors were certain the purpose was formative. All groups concluded that a clear formative goal would allow residents to choose honest raters, and raters would feel free to give accurate and rich feedback. However, residents and raters proposed a possible summative use of MSF for career decisions.

The training of raters is relevant, especially on the possibility to mark "unable to comment" and the scale. Although raters had been trained, they were not sure how to use the option of picking "unable to comment". They also questioned their objectivity about certain items and about the rating scale, which asked them to rate residents based on their expectations of performance for that year of training. Unlike the raters, residents and supervisors did not doubt the objectivity of the raters and felt that the ratings were fair.

The continuity of observation in a longitudinal approach facilitates the ratings. Residents found it important to find raters who had observed them often enough and in an informed and careful manner to give constructive feedback. Similarly, raters stated that after the MSF had been announced, they had tried to follow residents' performance more closely. They suggested that residents should remain with their chosen raters as long as they could work

together to provide opportunities for learning to know the residents' work and behaviour in different situations. They additionally suggested that in case of rotations, residents should inform new raters about their earlier learning goals. Some residents, however, felt learning goals were private and should not be shared with raters.

The timing of MSF should be late enough to gather meaningful feedback, and early enough for residents to work on learning goals. All three stakeholder groups agreed that the right moment in training to conduct an MSF had been difficult to decide. They agreed that depending on the speciality and duration of the rotation, three to six months of training might generate a reasonable number of contacts. Residents pointed out that enough time to work on learning goals was needed and hence MSF should not be too close to the end of rotations.

### **Influencing Factors during the Feedback Conversation**

We identified three themes connected to the feedback conversation: narrative comments, self-assessment, and role of the supervisor.

Narrative comments help residents to understand and accept feedback and can help guide feedback conversations. Residents were grateful to raters who took the time to write comments instead of just ticking boxes. They said that when scale-based ratings were provided with narrative comments, they were much easier to work with and accept. Residents appreciated both, reinforcing and correcting comments. Supervisors explained that they had sometimes let narrative comments guide the feedback conversation.

Self-assessment was perceived as helpful by residents. Residents found self-assessment difficult but appreciated its value. They reported that it helped them prepare for the feedback

conversation. They also claimed that the comparison between their self-assessment and the MSF ratings deepened their insights into their performance.

The role of a supervisor should be fulfilled by persons from the same department. Residents and supervisors discussed whether the feedback conversations could be led by an external person like a physician from another department or a psychologist from outside the hospital. They argued that, on the one hand, an external person might be without role conflicts, but on the other hand, an external person might not understand the feedback as well. Supervisors found that conversations, guided by residents, sometimes tended to move beyond formative feedback, in the direction of career planning. Overall, supervisors and residents agreed that a supervisor from the same department could facilitate the feedback better than an external person.

### **Impact**

We identified three themes on the perceived impact of MSF: MSF supports the professional development of residents, enhances interprofessional teamwork, and increases the raters' commitment to the training of residents.

The professional development of residents was supported by the multidisciplinary perspectives of the raters. Residents explained that the multidisciplinary feedback helped them grow and they appreciated the broad range of raters across different fields and hierarchies. Raters confirmed that they had already observed examples of positive changes, especially in situations they had described in narrative comments.

Stakeholders reported several observations, which led to their perception of enhanced interprofessional teamwork: The raters' understanding of the residents' work grew. Residents

and raters appreciated that the implementation of MSF trained them on giving and receiving feedback in general, which facilitated their communication. This improved communication between raters and residents helped raters to gain a better understanding of residents' working conditions and duties. The better understanding led to enhanced respect for the residents' work and improved interprofessional teamwork.

The commitment of raters to training was increased as they became aware of their supporting role. Residents felt thankful that co-workers were motivated to give feedback in support of their training and realised that co-workers viewed residency training as an important task. Raters said that they had become aware of their active role in training not only during the MSF itself, but also beyond the MSF.

## **Discussion**

To address the ongoing discussion on the value of MSF, we performed a case study which elucidated the influencing factors in MSF and the impact of MSF on residency training. In focus group interviews we collected data from residents, raters, and supervisors of MSF. By performing a thematic analysis and discussing the resulting themes critically with the literature, we derived recommendations.

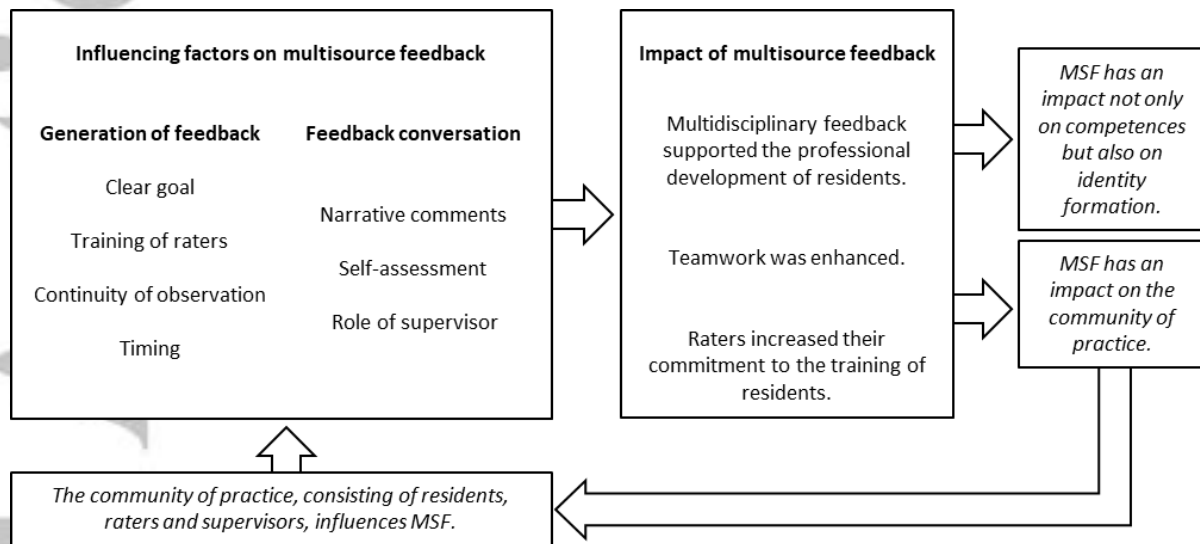
The central insights gained in this study include new aspects relevant to the implementation of MSF and novel theoretical assumptions on how MSF works. In the following, first, we discuss the novel theoretical assumptions. Second, we summarise all recommendations on influencing factors, as derived from the focus group interviews, in table 2, including those not discussed in detail, as they mainly confirm earlier studies. Third, we discuss those recommendations we deemed as adding most to the extant body of literature.



The literature offers theoretical models and frameworks that enhance our understanding of MSF. These are, primarily, general frameworks such as self-regulated learning<sup>34</sup>, social cognitive theories<sup>35</sup>, or theories on communities of practice<sup>36</sup> and, secondly, specific models for MSF. The specific models focus on concrete aspects of MSF and describe the facilitation of MSF<sup>37</sup> the reactions of MSF recipients<sup>38</sup> and, as presented in the Introduction, performance improvements following MSF<sup>8</sup>. Our study took the overall process of MSF into consideration, including its setting and the relevant stakeholders. This way, we discovered a new perspective which might be helpful in the context of residency training: during the analysis of the data we realised that the participants' views on the influencing factors and on the impact of MSF can well be understood through the lens of identity formation theory, as described by Jarvis-Selinger et al.<sup>27</sup>.

Jarvis-Selinger et al.<sup>27</sup> explain that identity formation theory describes the "relation between the development of competency and the formation of identities". Unlike competency-based frameworks, identity formation theory defines the goal of training not only as the expert performance of a sum of competences but also their integration into a more holistic professional identity. Training in this respect concerns the individual level of one's personal development and the collective level of one's socialisation into a community of practice. Development is not only supported by work experience and explicit feedback, but also by the repeated re-interpretation of the self and the alignment to new roles which are attributed by the community of practice. Consequently, development is not only supported by clinical supervisors who give explicit feedback but also by socialising agents, whose (implicit) messages help to shape the expected roles.<sup>27</sup>

Most studies on MSF focus on its impact on performance <sup>3,6,9</sup>. Findings on further impacts beyond competence have rarely been reported <sup>7,19</sup>. Our study newly illustrates the interaction between the implementation of MSF, the community of practice, which in our case includes residents, raters, and supervisors, and the impact of MSF (see Figure 3).



*Figure 3: Mutual interactions between influencing factors on Multisource Feedback (MSF) and impact of MSF (not italicised) as explained with identity formation theory (in italics).*

Using the theories on identity formation, we can understand the impact of MSF better: First, we found that multidisciplinary feedback supported the professional development. Using identity formation theory, we can explain that residents and raters define their roles in the context of their social surroundings and that feedback is needed to shape these roles. Thus, MSF can help to guide residents' professional development. Second, we found that teamwork was enhanced due to the raised communication about the residents' work. Using identity formation theory, we can explain that explicit discussions on expected role behaviour again help to shape the expected roles. Thus, MSF can initiate discussions which indirectly enhance teamwork. Third, we found that raters increased their engagement in

teaching. Using identity formation theory, we can explain that a commitment to training can be understood as part of the raters' role and was strengthened by making it explicit. Thus, MSF reinforces raters' commitment to training.

All recommendations on influencing factors are summarised in Table 2. Following, we discuss the themes concerning influencing factors which add most to the existing body of literature.

*Table 2: Recommendations for the implementation of Multisource Feedback (MSF), derived from the results of the focus group interviews in comparison to the state of the literature.*

Influencing factors as derived from the focus group interviews	State of the literature on influencing factors	Recommendations for the implementation of MSF. Italic text indicates the perspective of identity formation theory.
Clear Goal	The aim of MSF should be made clear to all participants in advance <sup>7,39</sup> .	All participants should be informed about the goals of MSF, as this clarifies the raters' responsibility <i>and makes the raters' role as socialising agents explicit.</i>
Training of Raters	Raters must feel confident in their task <sup>7,40</sup> and trust in raters is needed and appropriate <sup>41</sup> .	Training of raters should include information on "unable to comment" ratings and the scale, including clear reference points <i>and shared discussions on the community's expectations.</i>
Continuity of Observation	Raters must be familiar with the residents' work <sup>17</sup> and a longer period of co-working is helpful <sup>42</sup> .	It may be helpful for residents to remain with the same raters, depending on the learning goals. If the setting or raters change, residents could voluntarily inform the next raters ( <i>community of practice</i> ) about their learning goals. <i>Both supports the role of socialising agents.</i>
Timing	Overeem et al. <sup>18</sup> asked how often feedback	Repeated rotations reduce a resident's chance to work on specific learning goals.

conversations should take place.

We found no studies on the problems of rotations for MSF, although rotations are a typical feature of residency training.

A flexible approach or timeframe for carrying out MSF has advantages and might help decide the ideal timing, but the programme must make sure that time is reserved for feedback.

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Narrative  
Comments

The use of narrative comments is advisable <sup>13,40,42,43</sup>.

Narrative comments strengthen the formative purpose of MSF *and help to define the expectations raters have of residents and make these expectations visible.*

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Self-  
Assessment

Reflection can help residents use feedback <sup>7,14</sup>.

Self-assessment and reflection should be encouraged because it helps residents to prepare for the feedback conversation and take a more active role in their training, *thus supporting the process of re-identification and development.*

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Role of  
Supervisor

Supervisors have a responsible task <sup>14,37,39</sup>.

Feedback should be facilitated by a person familiar with the context, *as context knowledge is needed to assemble the ratings into a broader picture.*

### Continuity of Observation

Raters expressed their efforts to contribute to valid observations and meaningful feedback.

All groups of stakeholders made clear that meaningful rating depends on raters knowing residents well. While this finding has been reported in the literature on formative assessment <sup>42</sup>, it has seldom been discussed with regard to MSF <sup>17</sup>. As far as we know, few studies on MSF have taken the raters' perspective more deeply into account. Our findings show the importance of raters in MSF. It empowers their role as socialising agents when raters get to know residents better over time or when residents voluntarily inform the community of practice about their learning goals. Our findings suggest that the raters' role as socialising agents should be explicitly discussed when implementing MSF and be regarded a valuable

resource. The proposed continuity of observation enables the raters to fulfil their role as socialising agents.

### **Timing**

Residents explained, that they preferred to receive feedback as soon as reasonable to have enough time left for working on goals, but repeated rotations which last only some months could be a hindrance. For the setting of this study, residents and raters considered three to six months a useful observation period. As far as we know, there are no studies on the problem of timing during rotations, although rotations are a typical feature of residency training in many places. Our current impression is that a flexible approach for the moment of carrying out an MSF is needed. It should allow both, a minimum of observation and enough time before the end of a rotation to work on goals. However, as was shown for other forms of workplace-based assessment, a flexible approach can more easily be sacrificed for lack of time<sup>44</sup>. So, the programme has to make sure that time for feedback is reserved. One solution might be to offer a broader timeframe when to conduct the MSF or to set the moment for the MSF depending on the activities during a rotation.

### **Role of Supervisor**

Raters and residents perceived the role of the supervisor in the feedback conversation as very important and they concluded that the feedback could not be facilitated by an external person without a thorough knowledge of the context. Though the literature on MSF also describes delivering the feedback as a task of great responsibility<sup>14,37,39</sup>, it offers no clear guidance, how and by whom this task should be fulfilled. In identity formation theory, it is postulated that beginners need to concentrate on 'doing' and performance, while later in training, the focus

shifts from competence to a more holistic 'identity as a physician'. Assessment should thus be based on more than the sum of competencies. We conclude that while the description of single competencies in the MSF instrument is useful for raters, to assemble those ratings into a picture that can be used to support the resident, experienced supervisors are needed.

### **Strengths and Limitations**

The main strength of the present study is the choice of a setting in which MSF had been implemented explicitly to individually support residents. In addition, we investigated the most relevant perspectives by including residents, raters, and supervisors. Our study leads to new recommendations on the implementation of MSF and, unlike most studies on MSF, proposes a theoretical framework (identity formation theory), which can guide further research on MSF in residency training and its use.

A limitation of the study is that only during the focus group interviews we realised the huge impact of MSF on identity formation. A study which integrates this aspect directly into the research question and question route would probably result in richer and more precise findings concerning this concept. This study did not integrate patients as raters of MSF or as participants of the study, who presumably would have added additional important perspectives. As this study used qualitative methods, we did not measure the proposed factors and outcomes.

Future research should investigate the impact of MSF not only on the competences of single residents but also on social implications and teamwork, to better understand how MSF can influence physicians and their communities of practice.

## **Conclusion**

This study illuminates the influencing factors and impact of MSF on residency training. Our findings add to the body of literature on the implementation of MSF. We derive recommendations on the continuity of observation, the timing during rotations, and the role of the supervisor. Moreover, we provide novel theoretical assumptions on how MSF works. By discussing our results through the lens of identity formation theory, this work advances our conceptual understanding of MSF and might guide further research to leverage the potential of MSF in residency training.

## **Contributions of Authors**

EH, US, SHa, and SHu designed the study. EH and SHu acquired the data. EH, AT, AL, and SHu analysed and interpreted the data. EH and SHu drafted the manuscript. AT, US, AL, and SHa revised it critically for important intellectual content. All authors approved the version to be published and agree to be accountable for all aspects of this study.

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## **Declaration of Conflicts of Interest**

none

## **Ethical Approval**

The local committee of the Association of Swiss Ethics Committees (Kantonale Ethikkommission Zürich) decided from the study protocol that no further approval was necessary. All participants of the study gave informed consent.

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