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Reinders, Jan; Krijnen, Wilhelmus; Goldschmidt, Aline; van Offenbeek, Marjolein; Stegenga, Boudewijn; van der Schans, Cees P.

*Published in:*  
European Journal of Work and Organizational Psychology

*DOI:*  
[10.1080/1359432X.2018.1458712](https://doi.org/10.1080/1359432X.2018.1458712)

**IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.**

*Document Version*  
Publisher's PDF, also known as Version of record

*Publication date:*  
2018

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

Reinders, J., Krijnen, W., Goldschmidt, A., van Offenbeek, M., Stegenga, B., & van der Schans, C. P. (2018). Changing dominance in mixed profession groups: Putting theory into practice. *European Journal of Work and Organizational Psychology*, 27(3), 375-386. <https://doi.org/10.1080/1359432X.2018.1458712>

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## Changing dominance in mixed profession groups: putting theory into practice

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To cite this article: Jan J. Reinders, Wim P. Krijnen, Aline M. Goldschmidt, Marjolein A. G. van Offenbeek, Boudewijn Stegenga & Cees P. van der Schans (2018) Changing dominance in mixed profession groups: putting theory into practice, *European Journal of Work and Organizational Psychology*, 27:3, 375-386, DOI: [10.1080/1359432X.2018.1458712](https://doi.org/10.1080/1359432X.2018.1458712)

To link to this article: <https://doi.org/10.1080/1359432X.2018.1458712>



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## Changing dominance in mixed profession groups: putting theory into practice

Jan J. Reinders <sup>a,b</sup>, Wim P. Krijnen<sup>a</sup>, Aline M. Goldschmidt<sup>b</sup>, Marjolein A. G. van Offenbeek <sup>c</sup>, Boudewijn Stegenga<sup>d</sup> and Cees P. van der Schans<sup>a,e,f</sup>

<sup>a</sup>Research Healthy Ageing Allied Health Care and Nursing, Hanze University of Applied Sciences Groningen, Groningen, The Netherlands;

<sup>b</sup>Department of Community and Individual Oral Health Care, University of Groningen, University Medical Center Groningen, Center for Dentistry and Oral Hygiene, Groningen, The Netherlands; <sup>c</sup>Department of Innovation Management & Strategy, Research on Healthcare Organization and Innovation, University of Groningen, Groningen, The Netherlands; <sup>d</sup>Department of Oral and Maxillofacial Surgery, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands; <sup>e</sup>Department of Rehabilitation Medicine, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands; <sup>f</sup>Health Psychology Research, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands

### ABSTRACT

An extended professional identity theory is proposed to enhance interprofessional collaboration. The purpose of this study is to investigate whether comparative feedback on interprofessional interaction can decrease the degree of profession-based dominance and general dominance in mixed profession groups. This observational study comprised a randomized double-blind pretest-posttest control group design with 19 mixed profession groups (10 intervention and nine control groups, each with three dental and three dental hygiene students). All groups received reflective feedback during two consecutive two hour team development meetings. Intervention groups also received comparative feedback. Profession-based dominance concerned the sum of three observation items (conversational turn-taking, dominance and contributing ideas) with a three-point scale:  $-1$  = dental dominance,  $0$  = no dominance,  $+1$  = dental hygiene dominance. Polychoric correlations confirmed positive associations with the latent trait and an unidimensional underlying structure. Observation items were internally consistent ( $\alpha > .70$ ). General dominance concerned the sum of absolute values of observation items with a minimum value of zero (no dominance) and the maximum value of three (strong dominance). A two-way factorial ANOVA was performed. The results revealed a significant interaction effect with regard to general dominance,  $F(1,17) = 6.630$ ,  $p = 0.020$  and large effect size (partial eta squared = 0.28). Comparative feedback on interprofessional interaction decreases general dominance in mixed profession groups.

### ARTICLE HISTORY

Received 5 May 2017  
Accepted 23 March 2018

### KEYWORDS

Communication; observation; interprofessional collaboration; team development; teamwork; group formation

Changing demographics (e.g., Baumgartner, Schimmel, & Müller, 2015; Thistlethwaite, 2012; WHO, 2012), increasing the complexity of work (e.g., Hood, 2012; Koné Pefoyo et al., 2015; Vettore, Meira, Rebelo, Rebelo Vieira, & Machuca, 2016) and fragmentation through increasing specialization (e.g., Agha, Frandsen, & Rebitzer, 2017; Teece & Abdulrahman, 2011; Tsoukas & Vladimirou, 2001) are three important reasons that increase the necessity to integrate services. The challenge of integrating services of different disciplines and organizations is prominent in health care (Hood, 2012; Xyrichis, Reeves, & Zwarenstein, 2017), social work (e.g., Archibald & Estreet, 2017; Bolin, 2016) and information technology (e.g., Bryan Jean, Sinkovics, & Kim, 2014; Gal, Blegind Jensen, & Lyytinen, 2014). Integrated services are the outcome of interprofessional collaboration (Headrick, Wilcock, & Batalden, 1998). However, such collaboration can be limited by social psychological processes during which ingroup members favour each other while simultaneously enhancing outgroup derogation which leads to intergroup competition (Tajfel & Turner, 1979; Liao, O'Brien, Jimmieson, & Restubog, 2015; McNeil, Rebecca,

Mitchell & Parker, 2013). Between professions, these ingroup-outgroup behaviours become visible in the degree of profession-based dominance (e.g., Morison, Marley, Stevenson, & Milner, 2008; Palaganas, Epps, & Raemer, 2014; Ross, Turner, & Ibbetson, 2009). To overcome this type of intergroup behaviour between members of different professions, intergroup contact is applied as a common educational intervention to enhance positive attitudes between different professional groups (e.g., Hayashi et al., 2012; Hertweck et al., 2012; Matziou et al., 2014; Robben et al., 2012). However, only intergroup contact between members from different professions (such as multiprofessional education; MPE) is not enough to produce attitude changes (Carpenter & Dickinson, 2016). According to Allport (1954), four conditions are required besides mere intergroup contact: support of authorities (institutional support), working towards common goals, cooperation and equal status within the contact situation are also necessary. Four additional conditions were identified by other researchers: positive expectations, successful joint work, similarities versus differences and the perception that

**CONTACT** Jan J. Reinders  [jj.reinders@umcg.nl](mailto:jj.reinders@umcg.nl)

Jan J Reinders (PhD Candidate), Wim P. Krijnen (Professor), Aline M. Goldschmidt (Lecturer), Marjolein A.G. van Offenbeek (Associate Professor), Boudewijn Stegenga (Associate Professor), Cees P van der Schans (Professor)

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outgroup members are typical representatives of their group (Hewstone & Brown, 1986).

During interprofessional education (IPE), students from different professions learn about each other by working together on assignments that enhance interprofessional collaboration (Reeves et al., 2016). Several studies report that this collaborative work in mixed profession groups can positively influence interprofessional attitudes, knowledge and skills. A recent study reports that professional identification within a mixed profession group can have a negative effect on interprofessional attitudes of one professional subgroup while having a positive effect on attitudes of another (Sollami, Caricati, & Mancini, 2017). The exclusive nature of professional identity can prevent the inclusion of other professionals when working together (Whittington, 2003). In addition, several other authors are also convinced that professional identity plays a key role in limiting or enhancing interprofessional collaboration (e.g., Baker, Egan-Lee, Martimianakis, & Reeves, 2011; Carpenter & Dickinson, 2016; Hammick, Freeth, Copperman, & Goodsman, 2009; Khalili, Orchard, Spence Laschinger, & Farah, 2013). A professional identity is a social identity that consists of three aspects: belonging, commitment and beliefs (Barbour & Lammers, 2015; Liao et al., 2015). Just changing the beliefs such as attitudes towards other professions and interprofessional teamwork might not be sufficient. Changing attitudes does not have to change a sense of belonging and commitment to an interprofessional team. Even more so, commitment and attitude are two distinct phenomena (Meyer & Herscovitch, 2001). Commitment can influence behaviour even in the absence of extrinsic motivation or positive attitudes. Based on these arguments, changing attitudes towards interprofessional education and collaboration will not be a sufficient predictor of interprofessional communication even though this is a common approach for enhancing interprofessional collaboration (e.g., Hayashi et al., 2012; Hertweck et al., 2012; Matziou et al., 2014; Robben et al., 2012).

Interprofessional communication becomes apparent in non-hierarchical behaviours and implies reciprocity between different professions (D'Amour, Ferrada-Videla, San Martin Rodriguez, & Beaulieu, 2005; Headrick et al., 1998). Profession-based dominance can limit the collaboration between members of different professions (Edmondson, 2003) as non-hierarchical groups are more productive in the sense that individuals have a higher identification with their enterprise, feel more committed and consequently work more efficiently and productively (Godard & Delaney, 2000; Huselid, 1995; Ichniowski, Shaw, & Prensushi, 1997; Wenga & Carlsson, 2015). Hierarchy is a rank order of individuals or groups on a valued social dimension (Magee & Galinsky, 2008) and is common to all social groups including professions (Brown, 1991). The degree of profession-based dominance is represented by the relative dominance between professions (Cheng, Tracy, Foulsham, Kingstone, & Henrich, 2013; Cheng, Tracy, & Henrich, 2010) and is visible in several observable behaviours. It is also visible in asymmetry during conversational turn-taking (Bateson, 1972; Corser, 1998; West, 1979), i.e., dominant individuals tend to talk more often than those that are less dominant. Non-hierarchical behaviour concerns a behavioural pattern characterized by similar behaviour of interacting

individuals (Bateson, 1972). According to the interaction theory (Gallagher, 2008, 2005), our understanding of others is based on our interactions and perceptions. It is also inherent to socialization (Clausen, 1968). The claim-affirmation model of Holmes (2001) describes the process of professional socialization in which individuals claim or disclaim their professional attributes and affirm or disaffirm other people's professional attributes. This process reflects the relationship between the members of different professions and is visible in profession-based dominance. Non-hierarchical communication between group members becomes apparent in the willingness to share (Guzzo, 1995; Yukelson, Weinberg, & Jackson, 1984) and is especially functional when group tasks require a broad range of ideas and perspectives (Anderson & Brown, 2010). Intergroup comparison can enhance intragroup collaboration (Böhm & Rockenbach, 2013) because it enhances social identification. This identification is associated with perceived intragroup similarity through psychological distinctiveness from another group (Tajfel & Turner, 1979). Such intragroup similarity is associated with greater group cohesion. Commitment increases within a group and is a direct determinant of behaviours that benefit ingroup members (Bergami & Bagozzi, 2000). When members of different professions identify with an interprofessional group, they are also likely to display ingroup behaviours accordingly. If so, professional subgroups in a mixed profession group are likely to show less profession-based dominance. In addition, mixed profession groups in which interprofessional identification is not facilitated will probably show more profession-based dominance or maintain the same degree of it during mixed profession group formation. This group formation concerns the assembly of a collection of people into a unity or group (Campbell, 1958). In order to facilitate interprofessional identification, the professional identity should be "extended" to include interprofessional belonging, commitment and beliefs. The self-categorization theory describes under which circumstances an individual will perceive collections of people as a group and themselves as a group member (Turner, 1999, 1987). This theory makes a distinction between different levels of abstraction and inclusiveness with regard to personal and social identity. In other words, a professional can also be a member of a larger group like an interprofessional group. The salience of a social category like the interprofessional group depends on a non-conscious process of accentuation. This means that differences between mixed profession groups can be emphasized along with similarities within these social categories. Consistent accentuation can result in depersonalization which concerns a process of self-stereotyping. Individuals will perceive themselves as interchangeable examples of a social category. This way, unique individuals will be inclined to act upon and base their interpretations on the norms, goals and needs of the salient ingroup. The self is redefined in terms of group membership. The context in which a social identity or self-categorization is formed also depends on comparative and normative perceptions. Also, past experiences will influence the readiness to use a particular social category.

The self-categorization theory provides clues for social identity formation through self-categorization. Because of

this, it is likely that professionals can identify with an inter-professional group. However, this theory does not provide practical suggestions for how to change specific behaviours and enhance interprofessional collaboration. It also does not take into account that long-term interprofessional socialization is likely to influence a social category of a lower abstraction level: professional identity formation. It is inherent to interprofessional collaboration that any profession should be added value to the interprofessional group. This makes a distinct professional identity also inherent to interprofessional identification and, eventually, interprofessionalism will become a characteristic of professional identity. The self-categorization theory does not describe how to practically enhance accentuation. It describes the process but not how specific (interprofessional) behaviour can be facilitated. So far, no single theory has provided practical clues of how to facilitate interprofessional identification and, ultimately, interprofessional behaviour. For this reason, an extended professional identity theory is proposed as a practical intervention theory that is a special adaptation of self-categorization theory.

### ***Towards an extended professional identity theory***

Comparative group feedback as a team process during professionals' education is a promising strategy for influencing perceptions on interprofessional task distribution (Reinders, Krijnen, Stegenga, & van der Schans, 2017). In addition, intergroup comparison enhances intragroup cooperation (Böhm & Rockenbach, 2013), and competition between groups can divert internal competition between subgroups (Munkes & Diehl, 2003). Furthermore, social identity formation requires psychological distinctiveness or accentuation of differences and similarities. This distinctiveness is only possible when using a comparable reference group (Turner & Reynolds, 2010). Therefore, when facilitating competition through comparative group feedback between mixed profession groups, it is likely that professional subgroup members will identify with their mixed profession group. If interprofessional identification is enhanced, it is also likely that the members of the professional subgroups will exhibit a decreased profession-based dominance. On the other hand, reflective group feedback without intergroup comparison is likely to not unify the members of a mixed profession group but will plausibly reinforce the initial relationship between its professional subgroups.

### ***Basic assumptions of the extended professional identity theory***

Based on earlier research and the rationale described earlier, the proposed extended professional identity theory has 10 basic assumptions.

1. Social belonging is a common human need that predicts group commitment and group loyalty. People can feel committed to any social group under the right circumstances and have the tendency and desire to belong to a social group (Beal, Cohen, Burke, & McLendon, 2003).

2. A group is a social psychological construct and thus a psychological reality. The perception that a collection of individuals is a psychological unity or group, also known as

entitativity (Campbell, 1958), will depend on three aspects: common fate, similarity and proximity. This is why new groups can be composed and accepted as a social psychological reality. Groups can also include smaller groups because people can have widening circles of group membership (Turner, 1987).

3. Social differentiation is essential for creating a strong professional identity. A social identity such as a professional identity is constructed by individuals through differentiation between groups as a result of intergroup comparison (Barnes, Carpenter, & Dickinson, 2000; Forgas & Williams, 2014). This differentiation enables self-definition as a group member because individuals have a need for psychological distinctiveness.

4. Interprofessionalism cannot exist without distinct professional identities. When a professional identity has an interprofessional orientation, the uniqueness of an individual's own field of expertise becomes emphasized because interprofessional collaboration concerns connecting distinct fields of expertise. Thus, the uniqueness of a professional identity in an interprofessional team is related to the added value of the interprofessional team. When professional uniqueness decreases, so will the added value to the team. Team diversity is only utilized when there is interprofessional commitment. The relationship between team diversity and team effectiveness is moderated by team identity (Mitchell, Parker, & Giles, 2011).

5. According to the team development model of Tuckman (1999, 1965), internal conflict or competition in a team is a risk after a team is formed. Introducing a comparable outgroup will shift the risk of internal competition to external competition. This way, interprofessional conflict or competition within a mixed profession group can be avoided and will not decrease group cohesion (Munkes & Diehl, 2003).

6. Intergroup contact between members of different professions will enhance interprofessional tolerance under the right conditions (Allport, 1954; Hewstone & Brown, 1986) but not change interprofessional positions or profession-based dominance. Attributions of professional characteristics can deviate from true group characteristics (Baker et al., 2011). Therefore, intergroup contact can enhance interprofessional tolerance by discrediting occupational stereotypes. However, it will not enhance interprofessional commitment because there is no sense of belonging to an interprofessional team that does not psychologically exist.

7. The nature of intergroup comparison dimensions will indirectly guide behaviour through professional identity. A professional identity is a mental representation of professional behaviour and, therefore, also interprofessional behaviour. This identity subsequently guides professional and interprofessional behaviour (Owens, Robinson, & Smith-Lovin, 2010). When reciprocal behaviours (such as equal conversational turn-taking) between members of different professions are a comparison dimension or performance indicator, beliefs regarding interprofessional relationships will be altered by observational learning (Bandura, 1988) and social comparison (Festinger, 1954). This way, when such beliefs are developed in a work related context, they will become internalized and initiate interprofessional behaviours.



8. A professional identity with an interprofessional orientation is context dependent. A social identity is triggered by the context that is relevant to that identity (Finn, Garner, & Sawdon, 2010; Ginsburg, Regehr, & Lingard, 2003; Lingard, Garwood, Szauter, & Stern, 2001). Interprofessional behaviour does not always have to be necessary but is appropriate in dynamic situations and complex patient categories (Donofrio, Spohrer, & Zadeh, 2009).

9. Intergroup comparison simultaneously enhances ingroup cohesion and outgroup separation. It is associated with intragroup cooperation (Böhm & Rockenbach, 2013), and outgroup derogation is accompanied by ingroup favouritism (Hewstone, Rubin, & Willis, 2002).

10. The group cohesion in a mixed profession group can increase through time without developing an interprofessional team culture. According to the team development model of Tuckman (1999, 1965), group cohesion will develop after a group has evolved beyond the storming phase during which internal group conflict is at risk. However, this model describes the development of any team and not just an interprofessional team. Team cohesion is distinct from team culture.

Based on these 10 basic assumptions, an extended professional identity is formed when comparative feedback on interprofessional performance between comparable mixed profession groups is facilitated in a professional context (Figure 1). The extended professional identity theory states that interprofessional collaboration can be enhanced by facilitating intergroup comparison on interprofessional reciprocity

between mixed profession groups. In order to do so, comparative feedback between mixed profession groups and regarding professional subgroup interaction should decrease dominance between professional subgroups.

The purpose of this study is to investigate whether comparative feedback on interprofessional interaction is more effective for decreasing the degree of profession-based dominance and general dominance in mixed profession groups compared to only reflective feedback.

## Methods

We conducted a randomized double-blind pretest-posttest control group design with *mixed profession groups*. Each *mixed profession group* consisted of six students (three dental and three dental hygiene students) who performed assignments related to team development and interprofessional care.

## Participants

Eligible participants were dental students of the University of Groningen and dental hygiene students of the Hanze University of Applied Sciences, Groningen, The Netherlands who were at the midpoint of their undergraduate training. None of the students had previous experience with interprofessional collaboration or clinical practice: they had only received a single-discipline education and were not yet involved in patient care.

## Study design

We randomly (alphabetically) assigned 114 dental and dental hygiene students to 19 *mixed profession groups*, each simulating an oral care practice. Subsequently, the groups were randomly assigned to either an intervention condition or a control condition (Figure 2). Each *mixed profession group* received eight team development assignments (e.g., mission statement, business establishment, interior design, practice website, work schedules, protocols) and four virtual patient assignments for shared care planning. The assignment results were entered into a group portfolio after each group meeting. The experiment took four hours divided over two consecutive group meetings of two hours each.

Psychologists and psychology master students were trained as observers to score specific communicative behaviours between dental and dental hygiene students (ratio of conversational turn-taking, relative dominance and relative contribution of ideas) during two consecutive group meetings each lasting 15 minutes. Each *mixed profession group* consisted of two subgroups: a subgroup of three dental and a subgroup of three dental hygiene students. Interprofessional communication between the subgroups of dental and dental hygiene students in each *mixed profession group* was observed for the purpose of measurement and group-based feedback as well as experimental intervention (intergroup comparison by comparative feedback). Observed dominance between dental and dental hygiene students was recoded and reframed as “interprofessional interaction” before it was communicated as group-based feedback to each group. Both groups received

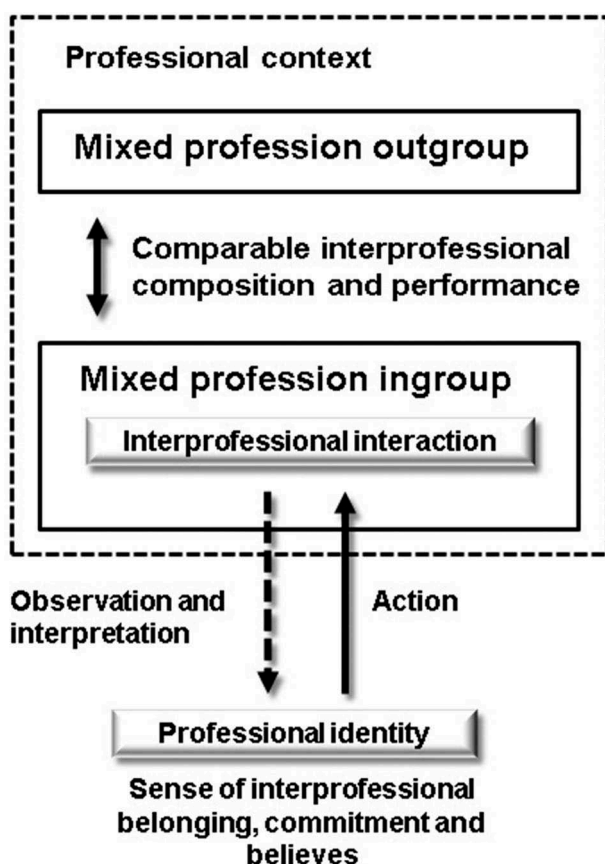


Figure 1. Towards an “extended professional identity theory”.

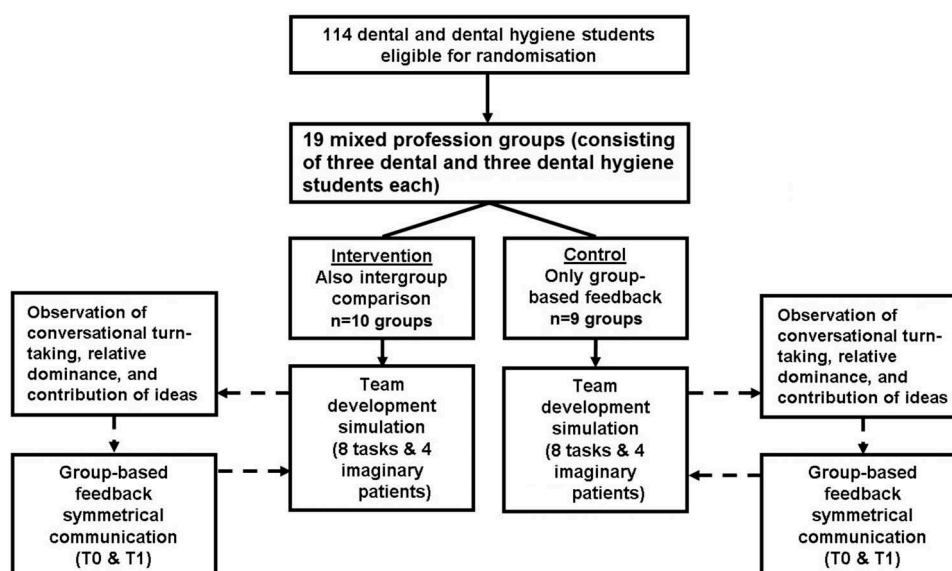


Figure 2. Study design.

feedback on the degree of relative dominance between professions within their (mixed) group after each session. Only the intervention groups received feedback concerning relative dominance in the other mixed groups. This was distributed through the group portfolio.

### Ethical considerations

We informed all of the participants about the study, and they could withdraw at any given time. We guaranteed full anonymity to all participants. The Institutional Review Board of the Hanze University of Applied Sciences approved this study.

### Measurement of profession-based dominance and general dominance

Profession-based dominance was defined as the relative dominance of members of one profession over members of another profession (based on Lindemann, 2007). This was measured with three observation items (i.e., conversational turn-taking, relative dominance and relative contributing ideas). General dominance was the degree of dominance within a mixed profession group without considering the dominance of one profession over the other.

#### Observation item 1. Ratio of conversational turn-taking

The ratio of conversational turn-taking was measured by the observers on a group-level between the subgroups of dental and dental hygiene students for 15 minutes at a time. Each initiated verbal response by a dental or dental hygiene student was counted during each collective group meeting (West, 1979). A non-participating observer (psychologist of psychology master student) began each observation by identifying participants (dental or dental hygiene students) within a *mixed profession group*. In order to clearly register the responses of dental and dental hygiene students during the group meeting, the profession and physical position of each

student was determined beforehand. Each initiated verbal response of at least three words was counted as a turn. The ratio was calculated by dividing the average turns of dental hygiene students by the average turns of dental students. The value '0' (= no dominance) was assigned when the ratio of conversational turn-taking was between 45% and 55%. The profession-based dominance was based on dental domination ( $-1$  = dental dominance) when the ratio of conversational turn-taking was more than 55% and dental hygiene domination ( $+1$  = dental dominance) when it was less than 45% of the time during a team meeting. These turn-taking intervals corresponded with the group-based feedback standard on this communicative behaviour during the simulation. This observation item had a three-point scale:  $-1$  = dental dominance,  $0$  = no dominance,  $+1$  = dental hygiene dominance.

#### Observation item 2. Relative dominance

Relative dominance was measured by observers on a group-level between the subgroups of dental and dental hygiene students for 15 minutes at a time. During the observer training, several indicators of dominance were discussed: interruption, questioning, topic control, formulation and amount of talk (e.g., Adelswärd et al., 1987; Duff, 1986; Kollock, Blumstein, & Schwartz, 1985; Linell, 1990; Roger & Schumacher, 1983; Ten Have, 1991). Observers evaluated this relative dominance between dental and dental hygiene students within a *mixed profession group* using an ordinal scale (to score the perceived image related to dominance):  $-1$  = dental dominance,  $0$  = no dominance,  $+1$  = dental hygiene dominance.

#### Observation item 3. Relative contribution of ideas

The relative contribution of ideas was measured by observers on a group-level between the subgroups of dental and dental hygiene students for 15 minutes at a time. The relative contribution of ideas is also considered an indication of dominance in the groups (James, 2006). It was defined as the verbal response of a person in bringing about a result by providing a meaningful thought, conception, or notion (Stichler, 1995). Verbal responses

that were an expression of agreement, understanding, or listening were not considered as the contribution of an idea. Observers evaluated this relative contribution of ideas between dental and dental hygiene students within a *mixed profession group* using an ordinal scale (to score the perceived image related to the contribution of ideas): -1 = dental dominance, 0 = no dominance, +1 = dental hygiene dominance.

### Psychometric properties

Profession-based dominance and general dominance were each applied as an index based on psychometric properties when factorability was sufficient. A non-parametric kernel smoothing IRT (Mazza, Punzo, & McGuire, 2014; Ramsay, 2000) was applied to determine whether all three observation items represent the same latent variable. For purposes of comparison Cronbach's alpha was calculated to estimate internal consistency. The internal consistency is considered sufficient when it is higher than .70 (Nunnally, 1978; Nunnally & Bernstein, 1994).

Profession-based dominance represented the relative dominance of one profession over the other. Therefore, it was calculated as the sum of the three observation item scores. Profession-based dominance had a minimum value of -3 and a maximum value of +3 since each observation item had a minimum value of -1 and a maximum value of +1.

General dominance represented the degree of dominance within a mixed profession group independent of the profession of either party. Therefore, it was calculated as the sum of absolute values of observation items since each observation item had a minimum value of -1 and a maximum value of +1. Thus, general dominance has a minimum value of 0 (no dominance) and a maximum value of 3 (strong dominance).

### Data analyses

A two-way factorial ANOVA was applied to analyse main effects (time or experimental condition) and interaction effects between time and experimental condition. This analysis was performed to separately investigate both profession-based dominance and general dominance.

To determine the effect size, the partial eta squared was used. A partial eta squared of 0.01 is considered small, 0.06 as medium and 0.14 as large (Cohen, 1988; Field, 2005). Before performing each two-way factorial ANOVA analysis, potential pretest differences of both profession-based dominance and general dominance were tested by an ANOVA. For all of the analyses, we applied a significance level of .05.

## Results

### Descriptive statistics

The group of students that were eligible for randomization consisted of 114 dental and dental hygiene students. The gender distribution did not differ between experimental conditions (Table 1); the majority was female (63.3%,  $n = 31$ ; 95.7%,  $n = 44$ ). Dental students were older than dental hygiene students in both the intervention and control

conditions (mean = 22.7 years,  $SD = 1.8$  years versus mean = 21.1 years,  $SD = 1.8$  years;  $p < .001$ ).

### Psychometric properties

Since Cronbach's alpha seems to be a gross estimate of associations between ordinal observation items (with three levels), a polychoric correlation was used (Table 2). With this rating scale with a small number of response options can be tested (Mazza et al., 2014; Ramsay, 2000). The polychoric correlations were sufficient (between .50 and .94).

All the psychometric properties of our measurement were sufficient or more than sufficient (Table 2). The three ordinal items were analysed by non-parametric kernel smoothing IRT (Mazza et al., 2014; Ramsay, 2000), revealing polychoric item trait correlations of .61, .62, .90, respectively (pretest) and .50, .72, .94 respectively (posttest). This provides evidence for strong positive association of the items with the latent trait and a unidimensional underlying structure. For purposes of comparison we also calculated Cronbach's alpha which was .73 (pretest) and .71 (posttest), respectively, before and after the intervention.

### The effect on profession-based dominance

An analysis of pretest differences on profession-based dominance revealed no significant differences between experimental conditions ( $F(1,17) = .000$ ,  $p = .988$ ). Therefore, a two-way factorial ANOVA analysis could be performed without having to use baseline scores as a covariate.

Table 3 shows the means, standard errors and lower and upper bounds (95% confidence interval) at the T0 and T1 measurement moments of the intervention and control condition. The *mixed profession groups* in the intervention and control conditions display a similar profession-based dominance.

Figure 3 illustrates that a trend towards a changed profession-based dominance of dental students was visible but not significant. Table 3 shows that there is no interaction effect between experimental condition and time,  $F(1, 17) = 3.441$ ,  $p = .081$ . The partial eta squared of this non-significant interaction effect was large since it was 0.17 (Cohen, 1988; Field, 2005).

Table 1. Descriptive statistics of intervention and control conditions ( $n=96$ ).

Demographic variables	Experimental conditions		$p$ -Value Chi square test
	Intervention ( $n = 52$ )	Control ( $n = 44$ )	
Gender			
- Male	25% ( $n = 13$ )	16.3% ( $n = 7$ )	.299
- Female	75% ( $n = 39$ )	83.7% ( $n = 36$ )	
			Independent t-test
Years of age	22.2 ( $SD = 2.0$ )	21.5 ( $SD = 1.7$ )	.082

Table 2. Polychoric correlations and Cronbach's alpha's of observation items.

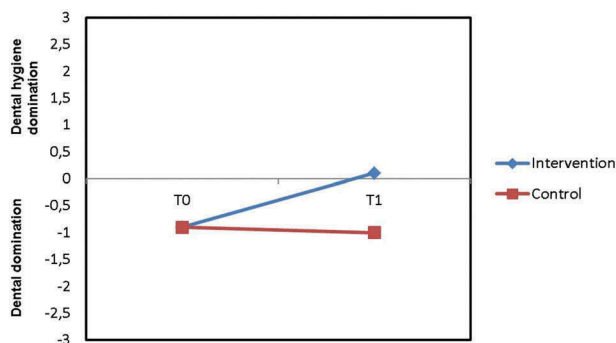
Measurement	Observation item	Polychoric correlation	Cronbach's alpha
T0	Conversational turn-taking	.61	.73
	Impression of dominance	.90	
	Contribution of ideas	.62	
T1	Conversational turn-taking	.94	.71
	Impression of dominance	.72	
	Contribution of ideas	.50	



**Table 3.** Means and standard errors of profession-based dominance of dental and dental hygiene students in mixed profession groups during the experiment (n=19 groups).

	Experimental conditions								Two-way factorial ANOVA p-Value	
	Intervention				Control					
	Std.	Lower	Upper	Std.	Lower	Upper				
Time	Mean	Error	Bound	Bound	Mean	Error	Bound	Bound	Time	.156
T0	-0.90	0.52	-2.00	0.20	-0.89	0.55	-2.04	0.27	Cond.	.415
T1	0.10	0.47	-0.88	1.08	-1.00	0.49	-2.04	0.04	Time*Cond.	.081

Time = Professional position at T0 and T1; Cond. = Experimental condition (intervention versus control); Time\*Cond. = interaction between Time and Experimental condition.  
95% Confidence Interval.



**Figure 3.** Profession-based dominance of dental and dental hygiene students in mixed profession groups before and after the experiment.

The experimental condition (intervention versus control) as a between-subjects factor did not reveal a main effect  $F(1,17) = 0.700, p = .415$ . No main effect was found on time (profession-based dominance before and after the experiment),  $F(1,17) = 2.202, p = .156$ .

**The effect on general dominance**

An analysis of pretest differences on general dominance revealed no significant differences between experimental conditions ( $F(1,17) = .015, p = .904$ ). Therefore, a two-way factorial ANOVA analysis could be performed without having to use baseline scores as a covariate.

Table 4 shows the means, standard errors and lower and upper bounds (95% confidence interval) at the T0 and T1 measurement moments of the intervention and control condition. The mixed profession groups in the intervention and control conditions seem to display a similar magnitude of interprofessional hierarchy in both conditions ( $M = 1.50, SE = 0.31$  and  $M = 1.56, SE = 0.33$ , respectively).

**Table 4.** Means and standard errors of general dominance between dental and dental hygiene students in mixed profession groups during the experiment (n=19 groups).

	Experimental condition						Two-way factorial ANOVA p-Value			
	Intervention			Control						
	Std.	Lower	Upper	Std.	Lower	Upper				
Time	Mean	Error	Bound	Bound	Mean	Error	Bound	Bound	Time	.304
T0	1.50	0.31	0.84	2.16	1.56	0.33	0.86	2.25	Cond.	.110
T1	0.70	0.28	0.12	1.28	1.89	0.29	1.27	2.50	Time*Cond.	.020

Time = Interprofessional hierarchy at T0 and T1; Cond. = Experimental condition (intervention versus control); Time\*Cond. = interaction between Time and Experimental condition.  
95% Confidence Interval.

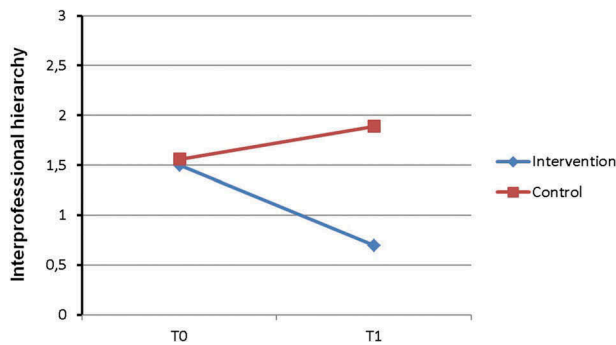
Figure 4 shows a downward trend of general dominance in the intervention condition and an upward trend of general dominance in the control condition. Table 4 indicates that an interaction effect was determined between experimental condition and time,  $F(1, 17) = 6.630, p = .020$ . The partial eta squared of the interaction effect was large since it was 0.28 (Cohen, 1988; Field, 2005).

The experimental condition (intervention versus control) as a between-subjects factor did not reveal a main effect  $F(1,17) = 2.846, p = .110$ , see Table 4 and Figure 3. No main effect was found for time (general dominance before and after the experiment),  $F(1,17) = 1.124, p = .304$ .

**Discussion**

Comparative feedback on interprofessional interaction in mixed profession groups changes the dominance between different professions. Furthermore, the conventional approach of intergroup contact with reflective but without comparative feedback does not decrease dominance. The results were inconclusive with regard to profession-based dominance. It could not be proven whether one profession was generally more dominant than the other. However, an effect of the intervention on profession-based dominance when considering the magnitude of effect sizes was found.

Intergroup comparison of interprofessional interaction reduces general dominance regardless of profession in mixed profession groups. Thus, dental and dental hygiene students tend to communicate more equally following an intervention based on group identification through comparative feedback on interprofessional interaction. Therefore, these results provide indirect evidence that the proposed extended professional theory seems to be suitable for changing dominance between members of different professions.



**Figure 4.** General dominance of dental and dental hygiene students in mixed profession groups before and after the experiment.

Unfortunately, our design does not provide hard evidence that professional group membership is the driver behind group dominance. However, several studies do report that one of the professions involved in this study are generally more dominant compared to the other profession involved (e.g., Morison et al., 2008; Palaganas et al., 2014; Ross et al., 2009). Apart from that, profession-based dominance is not the most desired result but, instead, the ability to decrease dominance in a mixed profession group. Dominance limits interprofessional collaboration independent of profession (D'Amour et al., 2005; Headrick et al., 1998).

It is possible that the dominance measured in this study is driven by one or a few individuals' dominance rather than an entire professional subgroup dominating the other in a mixed profession group. However, based on external evidence, it is more likely that the dental students will display more dominance compared to dental hygiene students (Morison et al., 2008; Ross et al., 2009). Furthermore, even if one individual is more dominant than all of the other group members will affect group dynamics and, ultimately, the communication style within the mixed profession group. This will subsequently negatively affect the socialization of all of those who are involved.

A limitation of our study is the small sample size of the intervention. This small sample can result in a low statistical power. Therefore, the ability of the statistical test to detect an interaction effect between time and experimental condition becomes less likely even when this specific effect actually exists. However, despite this small sample size, we found a significant effect of our intervention. In addition, independent of sample size, we have found a large effect size.

Researchers should base their inferences on several factors such as the quality of measurements, study design and the external evidence for studied phenomenon. With regard to our study, we used a wide range of external evidence. In addition, we provided a comprehensive theoretical framework to design our intervention and to predict its outcomes. We also used a reliable measurement to analyse the effect of the experimental intervention. Furthermore, we developed a strong study design which is seldom used when investigating the effectiveness of interprofessional education (Reeves et al., 2016). Our design has at least five strong design features. In our study, we expected that the profession-based dominance of dental students would change when we facilitated *mixed profession group* identification. This expectation was based on several studies with many different

human subjects. There is no reason to suspect that dental and dental hygiene students would not display similar social behaviours like any other human beings. The only difference is that we applied this external evidence to produce a specific effect between members of different professions. We wanted to change profession-based dominance and reduce dominance between members of different professions in general.

The decreased general dominance corresponds with the theory that intergroup comparison is likely to affect interprofessional identification. Intergroup comparison through comparative feedback is a group process that results in intergroup differentiation on a certain evaluative dimension (Ashfort & Kreiner, 1999). The Social Identity Theory (Tajfel & Turner, 1979) suggests that similar groups should have increased motivation to distinguish themselves from the others. Perceived ingroup similarity, inherent to social identification, increases because of outgroup distinctiveness. When applied to *mixed profession groups*, the perceived similarity between the members of a *mixed profession group* is likely to increase. If so, then *mixed profession group* identification might influence the formation of an interprofessional identity. Several authors suggest that its formation will enhance interprofessional collaboration (e.g., Baker et al., 2011; Carpenter & Dickinson, 2016; Hammick et al., 2009; Khalili et al., 2013). However, even though interprofessional identity formation might have been facilitated during our intervention, only the influence of comparative feedback on interprofessional interaction was measured in our study. It is an indirect indication that interprofessional identification occurred.

In our study, all of the groups were equal in composition and had a similar objective. Therefore, it is likely to assume that their motivation to differentiate between groups was increased when feedback enabled intergroup comparison. Intergroup differentiation is associated with identity formation of which the identity content depends on the content of the evaluative dimension (Ashfort & Kreiner, 1999; Hogg, van Knippenberg & Rast III, 2012; Kelly, 1993). In order to guide the nature of their intergroup differentiation, we controlled the nature of the comparison outcome. The intervention groups compared themselves with other *mixed profession groups* using interprofessional interaction (non-hierarchical interaction between members of different professions; D'Amour et al., 2005) as comparative feedback. Even though interprofessional identification was not measured, the results of the current experiment do correspond with this presumed social psychological mechanism. For this, another indication was found in an experiment regarding a *mixed profession group* formation intervention and perceived interprofessional task distribution (Reinders et al., 2017). In that study, the combination of group-based feedback, intergroup comparison and intergroup competition between *mixed profession groups* was facilitated. After that intervention, half of all predefined professional tasks became more shared (less dentist-centric) between dental and dental hygiene students. The perceptions of dental students especially became less dentist-centric. The tendency to share with members of one's own group becomes more likely when people are committed to their group (Guzzo, 1995; Yukelson et al., 1984). Group commitment is associated with psychological group formation (Beal et al., 2003). However, the changed interprofessional communication

within the intervention condition does not necessarily have to imply that an interprofessional identity is developed during the group development process. It might just have facilitated a temporary group identity and not have influenced the professional identity formation of the participants. However, a longitudinal application of the intervention might consolidate the group identity as an interprofessional identity and become an integrated part of the professional identity. When comparing this to behavioural change in general, routines are more sustainable when they are consistently displayed over a longer period. For instance, researchers have found proof that, when changed behaviour is consistent for at least six months, it becomes more likely that it becomes a sustainable change (Prochaska, DiClemente, & Norcross, 1992). This sustainable change of professional identity is referred to as “internalization” (Yu & Wright, 2015). Further research must clarify whether this approach is sustainable and affects professional identity formation.

An alternative explanation of the findings of this study and a former study (Reinders et al., 2017) is the contact hypothesis (or intergroup contact theory) of Allport (1954). The premise of his theory states that interpersonal contact can reduce prejudice between groups. By facilitating communication and joint work between members of different groups, such as students in a *mixed profession group*, a mutual understanding of different viewpoints can be enhanced. However, the contact between students in the control condition did not reduce dominance within the mixed profession groups. Non-hierarchical interaction concerns a behaviour pattern formed from the similar behaviour of interacting individuals (Bateson, 1972). Social similarity is inherent to the perception of the ingroup as one entity (Campbell, 1958) and inherent to a shared social identity (Gaertner, Rust, Dovidio, Bachman, & Anastasio, 1994). Therefore, it is more likely that a shared social identity was developed in the intervention groups and that this shared identity concerns interprofessionality because of the content of the comparative feedback. Further research must substantiate that interprofessional identification can be enhanced by psychological *mixed profession group* formation with intergroup comparison based on interprofessional behaviour.

The dental students were older in both of the experimental conditions. Age-related status in peer collaboration may play a role in how partners interact (Glachen & Light, 1982). Therefore, the general dominance at the beginning of the experiment might have been caused by these age-differences. In small children, such age-differences have a significant impact because of differences in age-related mental development (Feldman & Ruble, 1988). These types of age-related developmental differences do not apply to adults and, to a lesser degree, adolescents. Therefore, it is unlikely that a mean age-difference of 1.6 years has a significant impact. However, the age difference could signify an extra year of professional education and training (e.g., 2nd year students and 3rd year students). Therefore, the professional subgroup dominance may be associated with greater knowledge and expertise rather than membership in a professional group. However, none of the students had experience with interprofessional collaboration or with clinical practice. Since clinical practice was the focus of the team development sessions, it is unlikely

that differences in experience can account for the outcomes of this study. In addition, age differences and differences in the levels of knowledge and expertise between the professions cannot explain the behavioural differences that were found between the control and intervention conditions.

A limitation of our study is that it was conducted in an educational setting as part of the IPE programme. In such a context, it is more difficult to exert control over experimental conditions since students might have influenced each other between their *mixed profession group* meetings. However, the occupations involved in this study also work together after graduation and task shifting has resulted in interprofessional tensions and competition between them (e.g., Adams, 2004; Knevel, Gussy, Farmer, & Karimi, 2017; Northcott et al., 2013; Ross & Turner, 2015). Therefore, the context of this experiment does approximate the vocational context and makes it more likely that an intervention is required in order to decrease dominance in mixed profession groups. Furthermore, the strengths of this study were its group randomization and double-blind design. This way, the cause and effect relationship in this study can be interpreted with more confidence compared to other designs. First, because of the double-blind design, both the subjects and the observers did not know which group was selected for which experimental condition. Second, the size of each group was the same. Third, dental and dental hygiene students were equally represented in each *mixed profession group*. Fourth, students were randomly assigned to a *mixed profession group*. Fifth, all experimental procedures, assignments, tasks and assessments were standardized by protocols. Besides the quality of our measurements and our study design, the intervention derived from our intervention theory was based on comprehensive external evidence.

The results of this study might be reproducible in a work context. In order to do this, the interaction between professionals must be measured in at least two mixed teams. Then, these teams must be able to compare their own interaction with the interprofessional interaction in other teams. It is possible that comparative feedback on other interprofessional behaviours and performance can also produce similar results. However, this must be confirmed by additional studies.

Many other (external) influences can affect collective behaviour in the work context and are less easy to control. The influence of legal issues and liabilities (Colvin et al., 2013) or incentives in remuneration systems (Brocklehurst et al., 2016) are examples of factors that are likely to influence collaboration between dentists and dental hygienists.

## Conclusions and future study

Comparative feedback to facilitate group processes and change dominance in a mixed profession group seems a viable and promising strategy. Even though the results of this study were inconclusive with regard to decreasing profession-based dominance, evidence was found that general dominance in a mixed profession group can be decreased.

Regardless of the study's limitations and the small sample size, indirect evidence was found that interprofessional identification seems to be facilitated as assumed by the proposed

extended professional identity theory. However, additional research must provide direct proof. Apart from that, the intervention based on our intervention theory did enhance inter-professional behaviour. Whether it would produce similar results in the work context is unknown and should be investigated. Future studies might examine whether this approach produces sustainable effects.

## Disclosure statement

No potential conflict of interest was reported by the authors.

## ORCID

Jan J. Reinders  <http://orcid.org/0000-0001-6880-0440>

Marjolein A. G. van Offenbeek  <http://orcid.org/0000-0002-5474-895X>

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