

DIVERSITY, TEAM MECHANISMS, AND PERFORMANCE: A META-ANALYTICAL TEST OF AN OPPOSING PATH MODEL

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ABSTRACT

Organizations become increasingly diverse and especially the diversity of work teams has gained a strong interest in science and public discussions. Although various studies and meta-analyses have investigated the impact of team diversity on performance, they mostly find weak or non-significant relationships. We propose and test whether the inconclusive empirical results originate in the simultaneous effects of two counteracting team mechanisms. Using a sample of 218 studies, we examine via meta-analytical structural equation modelling (MASEM) whether the effects of three bio-demographic diversity dimensions (i.e., gender, age, ethnicity) and three task-related diversity dimensions (i.e., functional, educational, experiential diversity) on subjective and objective performance are simultaneously mediated via social categorization and information elaboration. In doing so, we consider positive and negative effects of diversity at the same time. Contrary to our hypothesis, we found a weak negative relationship between ethnic diversity and information elaboration. None of the other diversity dimensions had a significant effect on either of the mediators and, thus, on performance. Subsequent bivariate meta-analysis in addition to moderator analyses failed to provide evidence about context specific relationships between diversity and its presumed consequences.

Keywords: team diversity, social categorization, information elaboration, performance, meta-analysis, structural equation modeling

JEL Classification: M14, L25

1 INTRODUCTION

Most of the work in organizations today is completed in teams (Costa, 2003; Kozlowski & Ilgen, 2006; Tröster, Mehra, & Knippenberg, 2014). Plausibly, team composition is thought to have a powerful influence on team processes and outcomes (Campion, Papper, & Medsker, 1996; Triana, Miller, & Trzebiatowski, 2013; van Knippenberg et al., 2004). As a result of globalization and of substantial demographic, cultural, and legal changes, the workforce of organizations becomes increasingly diverse (Christian et al., 2006). These economic and social changes have led to a growing interest for the influence of team diversity on team processes and performance among managers, researchers, and politicians (Eagly, 2016; Kearney & Gebert, 2009; Lee & Farh, 2004).

The question whether diversity is beneficial or detrimental for team performance remains unanswered (Jackson et al., 2003; Mannix & Neale, 2005; van Knippenberg & Schippers, 2007). While some studies find a negative relationship between diversity and performance (e.g., Cady & Valentine, 1999; Rogelberg & Rumery, 1996), others find a non-significant (e.g., Stewart & Johnson, 2009), or positive relationship (e.g., Lee & Farh, 2004). Also, several meta-analyses (Bell, Villado, Lukasik, Belau, & Briggs, 2011; Horwitz & Horwitz, 2007; Joshi & Roh, 2009; Webber & Donahue, 2001) revealed mostly weak or non-significant effects, thus either questioning the relevance of diversity for performance (Schneid, Isidor, Steinmetz, & Kabst, 2016; Webber & Donahue, 2001) or prompting scholars to refrain from considering main effects while focusing on moderators and contexts (Joshi & Roh, 2009; van Knippenberg et al., 2004).

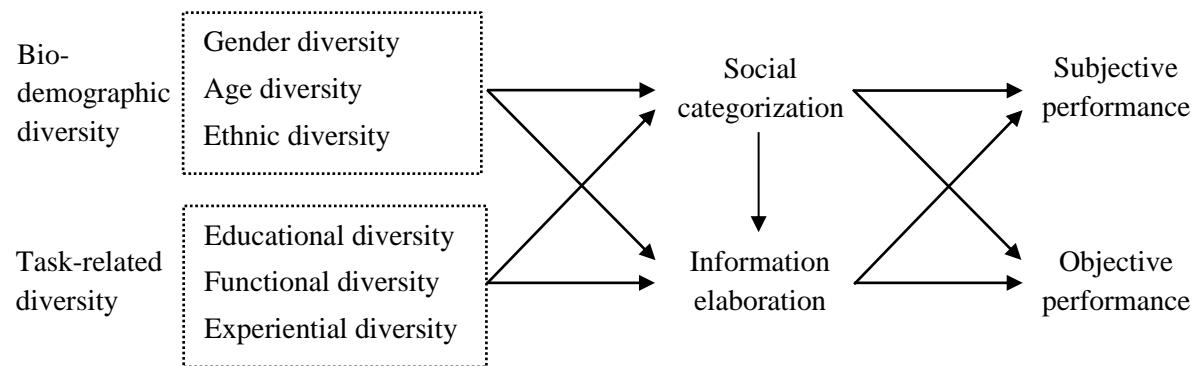
Past researchers generally drew on either the social categorization perspective or the information-processing approach when hypothesizing about the effects of diversity on performance (van Knippenberg & Schippers, 2007). The social categorization perspective (Tajfel, 1969; Turner, Hogg, Oakes, Reicher, & Wetherell, 1991) suggests negative effects of diversity in readily detectable attributes (e.g., sex, age, ethnicity) by facilitating intergroup bias and disrupting collective teamwork (Brewer & Kramer, 1985). In contrast, the information-processing approach (Mannix & Neale, 2005; Williams & O'Reilly, 1998) suggests a positive effect of diversity in more job-related attributes (e.g., functional and educational backgrounds) (van Knippenberg et al., 2004). Job-related diversity provides a team with an increased variety of resources (e.g., experience, skills, knowledge) and leads to a beneficial elaboration of task-relevant information.

The ambiguous results of past studies indicate that all diversity dimensions have the potential to simultaneously exert both positive and negative effects on team performance (van Knippenberg & Schippers, 2007). Therefore, researchers have started to consider social categorization and information elaboration simultaneously instead of analyzing the respective core mechanism separately. To cite an example, van Knippenberg and colleagues (2004) integrated both perspectives in the theoretically derived categorization-elaboration model (CEM), hence proposing a more comprehensive approach for the diversity-performance relationship. By constructing this MASEM, we test the comprehensive theory's validity. As the indirect effect of social categorization is regarded as negative and the indirect effect of information elaboration is expected to be positive, the total effect should be smaller or even non-existing due to both effects cancelling each other out.

In the present study, we conduct a meta-analytical integration of the available research on relevant diversity dimensions (i.e., gender, age, ethnic, functional, educational, and experiential diversity) to test the opposing path model. Figure 1 depicts how we integrate the six diversity dimensions and the two mediators into one comprehensive model and analyze the indirect effects on both objective performance (e.g., financial and accounting measure) as well as subjective performance (e.g., supervisor rating of team performance). To make full use of the meta-analytical approach, we support our study with various bivariate meta-analyses aggregating all correlations between diversity, social categorization, information elaboration, and performance. Finally, we test selected context factors (i.e., collaboration period and team type) as moderators.

Our study offers two major contributions to extant research. First, by conducting a MASEM with integrated mediators, we not only test for the possibility of the opposing path model as a possible explanation for prior non-significant relationships but also implicitly investigate the theories as viable frameworks for diversity research (i.e., social categorization perspective and the information-processing approach). Second, our study has important practical implications as it may serve as a foundation for attempts to intentionally strive for diverse work communities for the sake of an assumed gain in performance outcome.

Figure 1: Theoretical Model



2 THEORETICAL FRAMEWORK

Team diversity reflects the difference between team members with regard to any objective or subjective attribute within a team (van Knippenberg & Schippers, 2007; Williams & O'Reilly, 1998). Most notably, the literature differs between two forms of diversity: bio-demographic diversity (such as gender, age, and ethnic diversity) and task-related diversity (such as educational or functional background diversity) (Horwitz & Horwitz, 2007; Joshi & Roh, 2009).

To predict the effects of diversity on team performance, scholars have commonly relied on the social identity theory (Tajfel, 1969; Turner et al., 1991), the similarity-attraction-paradigm (Byrne, Clore, & Worchel, 1966), and the information-processing approach (Hoffman, 1959; Mannix & Neale, 2005; Triandis, Hall, & Ewen, 1965; Williams & O'Reilly, 1998). Drawing on the social categorization perspective and the similarity-attraction paradigm, researchers argue that team diversity is associated with negative team outcomes. In particular, these perspectives suggest that team diversity disrupts collective teamwork because it enhances subgroup development within teams (van Knippenberg et al., 2004; Williams & O'Reilly, 1998). In contrast, scholars drawing on the information-processing approach highlight the "*value in diversity*" hypothesis (Mannix & Neale, 2005) and expect positive consequences of team diversity due to the greater variety of team resources (e.g., experiences, skills, knowledge, and perspectives) (Qin, O'Meara, & McEachern, 2009; Williams & O'Reilly, 1998). To simultaneously account for the positive and negative effects of diversity, both theoretical perspectives have been re-conceptualized and integrated in the categorization-elaboration model (CEM) (van Knippenberg et al., 2004).

According to our conceptual model (see figure 1), both bio-demographic and task-related attributes may trigger information elaboration (Mannix & Neale, 2005; Williams & O'Reilly, 1998) and social categorization processes (Tajfel, 1969) and can therefore yield either positive or negative effects on team performance (van Knippenberg & Schippers, 2007).

2.1 Team Diversity and Information Elaboration

The positive effects of diversity in teams result from the beneficial elaboration of task-relevant information. Both diversity forms analyzed in this paper (i.e., bio-demographic and

task-related) have the potential to positively influence information elaboration (Kearney et al., 2009). Regarding bio-demographic diversity (e.g., gender, age, ethnicity) past research found that behavioral differences (e.g., between men and women) complement each other in decision making situations (Myaskovsky, Unikel, & Dew, 2005; Wegge et al., 2008; Wood, 1987). For instance, the assertive and task-oriented characteristics of men form an optimal complement to the friendly and process-oriented behavior of women (Wegge et al., 2008) and might therefore lead to more harmonious and efficient communication. Age-diverse team members have diverging organizational, work, and life experiences (Kunze, Boehm, & Bruch, 2011), which might lead to more intense discussions and, thus, to more creative results (De Dreu, 2006). Finally, ethnically diverse teams have been found to be more creative and bring novel ideas to the discussion table (McLeod et al., 1996; Watson, Johnson, & Zgourides, 2002). Hence, we hypothesize:

Hypothesis 1a: Gender diversity in teams is positively associated with the elaboration of task-relevant information.

Hypothesis 1b: Age diversity in teams is positively associated with the elaboration of task-relevant information.

Hypothesis 1c: Ethnic diversity in teams is positively associated with the elaboration of task-relevant information.

We further predict that task-related diversity, such as functional, educational, or experiential diversity, also has a positive influence on information elaboration. Task-related diverse teams have access to a larger variety of non-redundant resources in form of distinct experiences, skills, and knowledge (Bantel & Jackson, 1989). Different experiences, skills, and knowledge are usually associated with diverging opinions and viewpoints requiring diverse teams to discuss conflicting opinions more rigorously and process information more thoroughly (van Knippenberg et al., 2004). In their study, Simons and colleagues (1999) demonstrated that all three task-related diversity dimensions (educational, functional, and experiential diversity) are positively related to an increase in discussion. Therefore, we hypothesize:

Hypothesis 1d: Educational diversity in teams is positively associated with the elaboration of task-relevant information.

Hypothesis 1e: Functional diversity in teams is positively associated with the elaboration of task-relevant information.

Hypothesis 1f: Experiential diversity in teams is positively associated with the elaboration of task-relevant information.

The enhanced discussion and task-related conflicts triggered by diversity can lead to improved team performance. The dissemination of diverging perspectives prevents teams from a groupthink trap (Certo et al., 2006), enables an effective elaboration of tasks and leads to more creative as well as innovative results (Bantel & Jackson, 1989; De Dreu, 2006). Past research confirmed the positive influence of task conflict on performance. Dooley and Fryxell (1999) found that opposing opinions enhance decision quality among strategic decision-making teams in U.S. hospitals. Furthermore, Drach-Zahavy and Somech (2001) found a strong and positive relationship between team interaction processes and innovation. Since subjective performance ratings of minority groups were found to be biased (van Dijk et al., 2012), we see the need to differ between the influence of information elaboration on subjective and on objective performance. Hence, we hypothesize:

Hypothesis 2a: The elaboration of task-relevant information is positively associated with subjective performance.

Hypothesis 2b: The elaboration of task-relevant information is positively associated with objective performance.

2.2 Team Diversity and Social Categorization

The detrimental effects of diversity are a result of intergroup biases. Intergroup biases usually evolve from social categorization (Tajfel & Turner, 1979; Turner et al., 1991; Wegge et al., 2008). According to the social categorization perspective (Turner et al., 1991; van Knippenberg et al., 2004), individuals classify themselves and others into subgroups. Whereas team members similar to the individual are categorized as in-group members, dissimilar team members are categorized as out-group members (Turner et al., 1991; van Knippenberg et al., 2004). Any salient diversity dimension can initiate social categorization processes (Cunningham, 2007; Harrison, Price, Gavin, & Florey, 2002; Phillips & Loyd, 2006).

Prior research predominantly focused on bio-demographic diversity when arguing for social categorization processes since age, ethnicity, and gender are the most salient dimensions (Richard et al., 2013; Westphal & Zajac, 1995). Gender diversity is highly visible within teams (Richard et al., 2013) and can therefore trigger stereotyping and facilitate intergroup biases (Randel, 2002). Members of the same age cohort grow up in similar social, political, and economic conditions and are therefore likely to share similar beliefs and values (Schneid et al., 2016). They tend to form an in-group (Balkundi, Kilduff, Barsness, & Michael, 2007) and, ultimately, develop prejudices against out-group members (Bayazit & Mannix, 2003). Not only age diversity but also ethnic diversity was found to trigger relational frictions (Mannix & Neale, 2005). Leslie (2017) showed that subgroup formation was especially pronounced in presence of status differences between ethnic subgroups. Therefore, we hypothesize:

Hypothesis 3a: Gender diversity in teams is positively associated with social categorization.

Hypothesis 3b: Age diversity in teams is positively associated with social categorization.

Hypothesis 3c: Ethnic diversity in teams is positively associated with social categorization.

Task-related diversity (i.e., functional, educational, or experiential diversity) might also initiate social categorization processes (van Knippenberg et al., 2004). Particularly when experiential diversity (such as organizational or industry tenure) is translated into status differences among team members, individuals might divide their team into subgroups (Harrison & Klein, 2007; Pelled, Eisenhardt, & Xin, 2006). Furthermore, Smith and colleagues (1994) found that both functional and experiential diversity were negatively correlated with social integration. Schoenecker et al. (1997) found that educationally diverse teams did not enjoy teamwork as much as homogeneous teams in a university context. Hence, we hypothesize:

Hypothesis 3d: Functional diversity in teams is positively associated with social categorization.

Hypothesis 3e: Educational diversity in teams is positively associated with social categorization.

Hypothesis 3f: Experiential diversity in teams is positively associated with social categorization.

It is not social categorization per se that evokes the negative reactions, but rather intergroup biases between subgroups that may follow from social categorization (van Knippenberg et al., 2004). Intergroup bias hampers team member interaction, cooperation, and communication and leads to detrimental behavior as well as suboptimal team outcomes (Brewer & Kramer, 1985; Turner et al., 1991). However, social categorization engenders intergroup biases only if there are subjective reasons (e.g., prejudices, negative stereotypes) to respond negatively to members of another subgroup (e.g., Bantel & Jackson, 1989; Zenger & Lawrence, 1989). Bio-demographic diversity, in particular, was found to facilitate intergroup biases (Randel, 2002; Schneid, Isidor, Li, et al., 2014). To cite an example, in case of a conflicting team environment, women are reluctant to share their knowledge with members of another subgroup (Lubatkin et al., 2006) and, thus, hamper superior information elaboration processes. Hence, we hypothesize as follows:

Hypothesis 4: Social categorization is negatively associated with the elaboration of task-relevant information.

We also argue that social categorization has a direct and negative influence on team performance, as social categorization not only hampers information elaboration processes but also other important team processes. Although past research did not explicitly study the direct relationship between social categorization and team performance, several studies provide preliminary support for the existence of a direct link. For example, a meta-analysis of 46 empirical studies (Gully, Devine, & Whitney, 1995) found that lacking group cohesiveness (which is a direct outcome of social categorization (van Knippenberg et al., 2004)) is negatively related to team performance. Furthermore, fragmented teams are associated with less efficient group routines and have a higher need for coordination (De Dreu & Weingart, 2003; Jehn & Chatman, 2000). This leads to less efficient team outcomes than socially integrated and cohesive teams. Therefore, we argue in favor of a direct link between social categorization and team performance. Again we follow van Dijk et al.'s (2012) recommendation by considering both subjective and objective team performance:

Hypothesis 5a: Social categorization is negatively associated with subjective performance.

Hypothesis 5b: Social categorization is negatively associated with objective performance.

2.3 Moderating Effects

We also account for two moderating effects that potentially influence the strength and direction of effects. First, since team compositions differ regarding their degree and kind of diversity, the team type (i.e., top management team, student team, new venture team, or work team) might moderate the diversity - performance relationship (Webber & Donahue, 2001). Among other things, the team type determines how often a group meets, what kind of tasks a team is working on and what kind of team member resources are needed. Therefore, diversity dimensions might interact differently with information elaboration and social categorization (Tekleab & Quigley, 2014). Second, we included the collaboration period of a team since the effect of diversity is argued to decrease over time (Harrison et al., 2002). Familiar team members spend less time for coordination and focus more effectively on the task at hand (Harrison et al., 2002).

3 METHODS

3.1 Approach

We used a meta-analytical structural equation model (MASEM) to test our hypotheses. In contrast to traditional bivariate meta-analyses, a MASEM relies on a multivariate meta-analytical correlation matrix of all model variables. The subsequent structural equation model reflects the assumed causal structure (i.e., a full mediation structure in our case). The fit of the model evaluates in how far the implication of the model is consistent with the data.

3.2 Sample

To identify relevant studies, we used multiple search techniques. We conducted a computerized literature search in several databases (e.g., PsychInfo, Business Source Complete, and Web of Science) with different combinations of keywords such as *diversity*, *heterogeneity*, *homogeneity*, *similarity*, *dissimilarity*, *distance*, *differences*, *teams*, *group*, *mixed teams*, *top management teams*, *demographic*, *bio-demographic*, *age*, *gender*, *sex*, *male/female*, *ethnic*, *race*, *task*, *task-related*, *education*, *educational*, *function*, *functional diversity*, *tenure*, *organizational tenure*, *process*, *social categorization*, *social integration*, *cohesion*, *commitment*, *identification*, *elaboration*, *communication*, *cooperation*, *interaction*, *knowledge sharing*, *information exchange*, *outcome*, *performance*, *task performance*, *effectiveness*, *efficiency*, *creativity*, and *innovation*. We also checked the reference lists from previous reviews and meta-analyses and carried out an issue-by-issue search of several journals (e.g., *Academy of Management Journal*, *Organization Science*, *Applied Psychology*, *Group and Organizational Management*, *Small Group Research*, *International Journal of Conflict Management*, *International Journal of Intercultural Relations*, *Journal of Applied Psychology*, *Journal of Management*, *Journal of Organizational Behavior*). Finally, to find possible unpublished studies, we used Google Scholar and contacted leading authors in the field of diversity research to receive possible desk drawer studies. Our initial search resulted in 675 studies about team diversity.

Next, we evaluated each of these studies according to the following inclusion criteria: We included only studies, which had (a) a clear focus on diversity in teams, were (b) non-experimental, (c) relied on quantitative data, (d) focused on measures of objective instead of perceived diversity (Hentschel, Shemla, Wegge, & Kearney, 2013) and (e) which reported specific, non-aggregated forms of diversity. Consequently, studies using diversity

measures based on “faultlines” were excluded¹. Furthermore, (f) we included only studies which had their focus on the team level as opposed to the individual team member level. These teams had to (g) meet face-to-face, thus excluding virtual teams, (h) and did not exceed a size of 25 members. By limiting the team size, we assured including only teams in which members cooperate frequently and belong to the same social entity (Schneid, Isidor, Li, et al., 2014; van Dijk et al., 2012). Based on the inclusion criteria, the final sample consisted of $k = 218$ studies with an overall sample size of $N = 37,192$ teams. The sample consisted of 200 articles published between 1984 and 2016 as well as 18 unpublished studies².

3.3 Measures

Diversity. Following past research, we differentiated between bio-demographic diversity (age, gender, and ethnic diversity) and task-related diversity (educational, functional, and experiential diversity) (Horwitz & Horwitz, 2007; Joshi & Roh, 2009). We aggregated industry experience and organizational tenure to the construct of experiential diversity since both specific dimensions are based on experience-based knowledge. With regard to the rest of the variables, we conformed to the conceptualizations and measurement approaches applied in primary studies: Authors had mainly measured the diversity of categorical attributes (such as gender, ethnicity, functional, or educational background) either with the Blau index (Blau, 1977), Teachman’s entropy measure (Teachman, 1980), or, in case of gender and ethnic diversity, also with the percentage of the minority group present. Diversity measures of continuous variables such as age or years of experience had been calculated with the help of Allison’s (1978) coefficient of variation or with the standard deviation (Harrison & Sin, 2006).

Information elaboration. The primary studies included in this meta-analysis have used a variety of proxies for the process of information elaboration (e.g., communication, information exchange, and knowledge-sharing). The majority of studies directly assessed information elaboration among team members (Kearney & Gebert, 2009) or via the supervisor (Bunderson & Sutcliffe, 2002). Whereas most studies stressed the aspect of

¹ The faultline concept is a multidimensional combination of different correlating diversity attributes using a different operationalization of diversity and is therefore an incomparable technique to the included studies (Lau & Murnighan, 1998; van Knippenberg & Schipper, 2007).

² Table 5 (appendix) gives an overview of the studies included in the MASEM. Furthermore, the table shows the year of publication, the journal which published the study, the number of teams and the variables analyzed.

communication quality (Barrick, Bradley, Kristof-Brown, & Colbert, 2007; Earley & Mosakowski, 2000; Kearney et al., 2009), others also focused on the frequency and amount of communication (Cummings, 2004).

Social categorization. Only few primary studies explicitly analyzed social categorization. Therefore, we used several proxies (i.e., team cohesion, team commitment, collective team identification, reversed operationalization respectively). These proxies mirror the degree of social fragmentation within a team which is a direct outcome of social categorization (van Knippenberg et al., 2004). Social categorization was mainly measured directly from team members (Kearney & Gebert, 2009; van der Vegt & Bunderson, 2005). Although a variety of operationalizations was used, primary studies most frequently used the 5-item measure of cohesiveness developed by Seashore (1954).

Performance. We distinguish between objective and subjective performance. Previous research has shown that subjective performance ratings are potentially influenced by stereotyping and prejudices and might therefore diverge from objective measures (van Dijk et al., 2012). We considered measures on both the organizational and the team level as relevant output measures. Studies analyzing top management or entrepreneurial teams measured performance on the organizational level via accounting measures (e.g., ROA, ROE), financial market measures (e.g., stock price), or a mix thereof (i.e., Tobin's q). Few studies also consider a number of subjective performance measures on the organizational level such as the CEO's opinion on the current firm performance (Richard, Devinney, Yip, & Johnson, 2009). The performance of organizational teams below the top management level as well as the performance of student teams were mainly measured on the team level. Team performance incorporates all measures describing the quantity or quality of team outputs as well as the efficiency of task performance (Cohen & Bailey, 1997).

Moderators. We considered two moderators. First, we distinguished between four *team types*. We adapted Cohen and Bailey's (1997) typology of teams by differentiating between top management teams and work teams. Since entrepreneurial teams present a special form of organizational teams (Huovinen & Pasanen, 2010), we considered them separately as we did for student teams. Second, we distinguished between a short and a long *collaboration period*. We categorized the studies based on the length of time a team existed (Joshi & Roh, 2009). In doing so, we considered a collaboration period of 15 or more weeks as long-term collaboration (Harrison et al., 2002; Schneid, Isidor, Steinmetz, Kabst, & Weber, 2014).

Either the studies explicitly indicated the collaboration period or we coded the study based on the study mean³.

³ We also coded and tested *task complexity* as a potential moderator to explore the heterogeneity in effect sizes. However, due to the small number of studies focusing on low task complexity, the number of studies per subcategory was only sufficient ($k \geq 3$) for two effect sizes. Task complexity did not significantly moderate either of these two relationships.

4 META-ANALYTICAL PROCEDURE

The MASEM approach consisted of two steps. In step one, we estimated a meta-analytical correlation matrix containing all correlations among the model variables. In this regard, we relied on recent approaches to combine three-level random effects meta-analysis (Cheung, 2014, 2015b; Steinmetz, Knappstein, Ajzen, Schmidt, & Kabst, 2016) with traditional MASEM (Brown & Peterson, 1993; Harrison, Newman, & Roth, 2016; Viswesvaran & Ones, 1995). The approach enables dealing with the occurrence of studies reporting more than one effect size. Regarding the present meta-analysis, this was the case when studies reported correlations between diversity and several types of information elaboration, social categorization, or performance measures. Applying the three-level approach avoided creating averages (and the consequential loss of information) and enabled to estimate the within-study heterogeneity (Cheung, 2014). As a consequence, the overall variance of the observed effect sizes is divided into sampling error, true heterogeneity within studies (τ^2_{within}), and true heterogeneity between studies (τ^2_{between}).

Recently, Wilson, Polanin, and Lipsey (2016) proposed a method to combine the three-level random effects approach with the MASEM approach. Following Wilson and colleagues, we ran a three-level random effects model in which a single vector of all correlations extracted from the studies was regressed on a set of dummy variables that reflected the different cells of the model correlation matrix. Because we excluded the intercept from the regression model, the estimated B's were the weighted cell means (i.e., the weighted average correlations). In addition to the average correlations, step 1 calculated the asymptotic covariances of the correlations which reflected the variances due to the studies' varying sample sizes. In the second step, the matrix of these correlations served as input for the MASEM, together with the asymptotic covariance matrix as weighting matrix. The weighting resulted in appropriate standard errors of the diverse model parameters. The N for the overall model was the sum of the primary studies (Cheung, 2014, 2015a; Cheung & Chan, 2005; Wilson et al., 2016). The model was estimated with the weighted least squares estimator. All procedures were conducted with the metafor package (Viechtbauer, 2010) and metaSEM package (Cheung, 2015b) in the open source software R.

As Figure 1 shows, our MASEM tested the mediating role of information elaboration and social categorization on performance. Furthermore, we assumed no direct effects of the diversity variables onto the outcomes. The model suggests that relationships between

diversity and team performance are solely mediated by social categorization and information elaboration processes. In addition, we estimated an effect of social categorization on information elaboration to reflect the expectation that social categorization processes diminish knowledge exchange. As evaluation criteria, we relied mainly on the chi-square test statistic which tests in how far the model is able to reproduce the empirical correlations. Statistically, this is achieved by a null hypothesis test assuming equality of the implied correlations and empirical correlations. In addition, we report fit indices that reflect the degree of the deviations between the model implied correlations and the empirical correlations. These were the root mean square error of approximation (RMSEA) and comparative fit index (CFI).

To create a solid base for further moderator analysis, we conducted a series of bivariate three-level random effects models and estimated two heterogeneity measures. First, we calculated the Q-test, that is, an overall test showing whether the observed variance of the respective correlation exceed the degree expected by sampling error. To achieve a picture of the degree of true heterogeneity, we calculated the square root of the estimated true heterogeneity (i.e., τ). This measure reflects the estimated standard deviation of a relationship and can be interpreted in a straightforward manner. Due to the three-level model, we were able to distinguish between the within-study heterogeneity (τ_w) and the between-study heterogeneity (τ_B) (Cheung, 2014). Following recommendations by Aguinis (2011), we relied on the τ -value rather than the Q-test as a basis for deciding whether to conduct a moderator analysis for a specific correlation. We decided to regard τ_w - or τ_B -values larger than 0.10 as a reasonable basis to investigate possible moderators.

All moderators tested, were categorical moderators. We excluded the intercept, leading to regression coefficients that reflect the weighted average correlations within the categories of the moderator. These averages are almost identical to those of separate subgroup analysis but avoid reducing power and efficiency inherent in the subgroup division.

4.1 Correlation Matrix

Table 1 depicts the meta-analytically derived correlation matrix containing bivariate correlations between all variables. Furthermore, the table depicts for each correlation the number of studies (k), the number of correlations analyzed (m), as well as the sample sizes (N).

Table 1: Meta-Analytical Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Gender div.									
(2) Age diversity	.08**								
k(m)	57 (57)								
N	8,648								
(3) Ethnic div.	.12**	.14**							
k(m)	42 (48)	27 (28)							
N	5,446	4,764							
(4) Educational div.	.10**	.12**	.06						
k(m)	35 (36)	37 (40)	14 (16)						
N	6,235	8,813	3,097						
(5) Functional div.	.12**	.08**	.20**	.19**					
k(m)	27 (31)	30 (35)	9 (9)	29 (33)					
N	3,398	4,258	1,476	4,644					
(6) Experiential div.	.05	.19**	.08	.06	.10**				
k(m)	27 (29)	36 (38)	12 (13)	25 (29)	33 (41)				
N	5,325	6,636	1,570	4,934	3,802				
(7) Categorization	-.01	.05	.06	-.04	-.02	.01			
k(m)	19 (20)	16 (18)	11 (12)	13 (13)	15 (16)	7 (7)			
N	1,047	994	637	802	937	461			
(8) Information elab.	-.02	.02	-.08	-.01	.04	.04	.58**		
k(m)	13 (14)	12 (13)	7 (8)	10 (10)	11 (11)	10 (11)	16 (17)		
N	983	750	389	682	882	748	1,051		
(9) Subj. performance	.02	-.03	-.06	.05	.07**	.00	.27**	.34**	
k(m)	49 (61)	39 (48)	27 (33)	26 (36)	37 (56)	22 (37)	27 (39)	19 (31)	
N	4,370	2,873	1,661	2,679	3,979	1,914	2,043	1,335	
(10) Obj. performance	.01	.01	.04	.03	.04*	-.02	.30**	.27**	.18**
k(m)	36 (53)	30 (51)	22 (28)	26 (49)	38 (66)	28 (65)	17 (21)	10 (10)	10 (18)
N	9,544	12,134	5,811	5,944	5,437	4,480	1,235	701	1,041

Notes. * p < .05; ** p < .01; k = number of studies; m = number of correlations; N = sample size

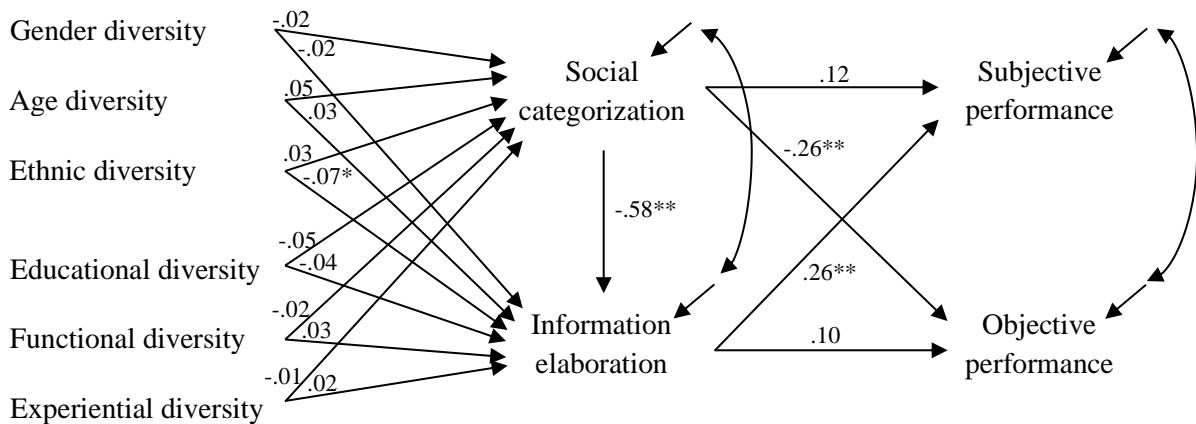
Neither of the bio-demographic diversity dimensions (gender, age, ethnic diversity) nor task-related diversity dimensions (functional, educational, experiential diversity) showed a significant relationship with any of the mediating team mechanisms (information elaboration or social categorization). In contrast, there was a substantial negative effect of social categorization on information elaboration ($r = -.58$; $p < .01$) and on both subjective ($r = -.27$; $p < .01$) and on objective performance ($r = -.30$; $p < .01$). Information elaboration was related to both subjective ($r = .34$; $p < .01$) and objective performance ($r = .27$; $p < .01$). Finally, the correlation between subjective and objective performance was moderate ($r = .18$; $p < .01$)

4.2 Test of the Hypotheses

Figure 2 shows the results of the MASEM. The model fitted cleanly ($\chi^2(12) = 13.44$, $p = .33$, RMSEA = .00, CFI=1.0) indicating no direct effects of the six diversity variables on team performance.

There was a small but significant effect of ethnic diversity on information elaboration ($r = -.07$; $p < .05$). However, the effect was negative and therefore contrary to our hypothesis. Therefore, we had to reject Hypothesis 1c. None of the remaining bio-demographic diversity dimensions (gender and age) or task-related diversity dimensions (functional, educational, experiential diversity) showed any significant relationship with information elaboration. Therefore, we also rejected hypotheses 1a, b, d – f. Information elaboration did show the predicted positive effect on subjective performance ($r = .26$, $p < .01$), thus confirming Hypothesis 2a, but had no significant effect on objective team performance. Hypothesis 2b had to be rejected. Also, hypotheses 3 a – f) had to be rejected. Neither of the bio-demographic nor of the task-related dimensions had a significant influence on social categorization. As hypothesized, social categorization was substantially negatively associated with information elaboration ($r = -.58$, $p < .01$) suggesting harmful effects of social categorization processes on creative team processes such as communication and knowledge exchange. Thus, our study confirmed Hypothesis 4 and corroborated the well-researched negative effect of social categorization on information elaboration. Finally, social categorization was not significantly related to subjective performance, but had a significant direct negative effect on objective performance ($r = -.26$, $p < .01$). We therefore had to reject Hypothesis 5a, hypothesis 5b was confirmed.

Figure 2: Results of the Meta-Analytical Path Model



Notes. * $p < .05$; ** $p < .01$

To find a possible explanation for the either insignificant or counterintuitive correlations between the six diversity dimensions and the two core mechanisms respectively, we took a closer look at the bivariate relationships. Table 2 depicts the bivariate correlation coefficient r , the 95% confidence interval, and the results of the heterogeneity analyses (Q test and τ -estimates). The I^2 -values indicate the percentage of true heterogeneity explained by the τ_w - and τ_B -estimates. Furthermore, we tested for publication bias.

4.3 Bivariate Meta-Analyses and Moderator Effects

As table 2 shows, no diversity dimension was significantly correlated with the mediators. The heterogeneity (τ_w and τ_B) is minimal for each correlation. Only three correlations exceed the previously defined limit of $\tau_B > .10$ qualifying them for subsequent moderator analyses. However, since the effect of ethnic diversity on information elaboration was only calculated on the basis of $k = 7$ studies, it had to be omitted from further analysis. Hence, only the relationship between functional diversity and categorization as well as experiential diversity and information elaboration was analyzed further.

Table 3 shows the results of the moderator analyses for the influence of collaboration period and team type. Collaboration period could not be tested for the relationship between experiential diversity and information sharing since the number of studies per subcategory was not sufficient ($k < 3$). None of the supposed moderators had an effect on the relationship of functional diversity on social categorization or experiential diversity on information elaboration.

Table 2: Bivariate Relationships: Diversity and Team Mechanisms

	K	m	N	r	95% CI	Q(df)	τ_w (I^2_w)	τ_B (I^2_B)	Publication bias	Moderator analysis
<i>Gender diversity</i>										
Categorization	19	20	1,047	.00	-.06	.06	14.08 (19)	.00 (.00)	.00 (.00)	No
Information elab.	13	14	983	-.01	-.09	.07	20.27 (13)	.00 (.00)	.08 (.36)	No
<i>Age diversity</i>										
Categorization	16	18	994	.05	-.03	.12	24.47 (17)	.00 (.00)	.01 (.32)	No
Information elab.	12	13	750	.01	-.06	.08	9.00 (12)	.00 (.00)	.00 (.00)	No
<i>Ethnic diversity</i>										
Categorization	11	12	637	.06	-.02	.13	8.46 (11)	.00 (.00)	.00 (.00)	No
Information elab.	7	8	389	-.07	-.21	.07	16.13 (7)	.00 (.00)	.14 (.53)	No
<i>Educational diversity</i>										
Categorization	13	13	802	-.03	-.10	.05	14.75 (12)	.03 (.05)	.03 (.05)	No
Information elab.	10	10	682	.00	-.08	.07	8.49 (9)	.00 (.00)	.00 (.00)	No
<i>Functional diversity</i>										
Categorization	15	16	937	.00	-.10	.09	33.05 (15)**	.00 (.00)	.13 (.52)	No
Information elab.	11	11	882	.05	-.08	.18	41.61 (10)**	.02 (.37)	.02 (.37)	No
<i>Experiential diversity</i>										
Categorization	7	7	461	-.01	-.10	.08	4.39 (6)	.00 (.00)	.00 (.00)	No
Information elab.	10	11	748	.04	-.06	.14	21.22 (10)	.00 (.00)	.12 (.51)	No

Notes. k = number of studies, m = number of effect sizes; τ_w = square root of the within-study heterogeneity (average true variation around the study mean), τ_B = square root of the between-study heterogeneity (average true variation of study overall effect sizes around the overall mean); I^2_w = percentage of true heterogeneity of observed heterogeneity due to within-studies true differences; I^2_B = percentage of true heterogeneity of observed heterogeneity due to between-studies differences; ^amoderator analysis not possible due to low k/m or insufficient variance in the moderator

Table 3: Test of Categorical Moderators: Diversity - Mediators

Moderator	k	m	N	r	95% CI	Q _{Res} (df)	R ² _W	R ² _B
Functional diversity & categorization								
<i>Collaboration period</i>								
Short-term	3	3	126	.02	-.22	.25		
Long-term	12	13	811	.00	-.11	.09		
<i>Team type</i>								
Top management teams	3	3	151	-.00	-.21	.20		
Student teams	3	3	126	.02	-.21	.25		
Work teams	7	8	497	-.03	-.16	.10		
Entrepreneurial teams ^a	2	2	163	.	.	.		
Experiential diversity & information elaboration								
<i>Team type</i>								
Top management teams	4	3	232	-.06	-.20	.07		
Student teams ^a	1	1	55	.	.	.		
Work teams	5	7	461	.04	-.04	.13		
Entrepreneurial teams ^a	0	0	0	.	.	.		

Notes. *p < .05, **p < .01; k = number of studies, m = number of effect sizes; R²_W = within-study variance explained by the moderator; R²_B = between-study variance explained by the moderator. ^amoderator analysis not possible due to low k/m or insufficient variance in the moderator

In addition, we conducted bivariate meta-analyses of the overall relationship between the diversity dimensions and performance as it constitutes an indication of the overall heterogeneity underlying our MASEM. Table 4 shows the bivariate relationships between the six diversity dimensions and subjective as well as objective performance respectively. There was a significant albeit small correlation between ethnic diversity and objective performance (r = .05; p < .01). Furthermore, educational diversity exerted a significant effect on both subjective (r = .06; p < .05) and objective performance (r = .03; p < .05). The same was true for functional diversity, which had a significant effect on subjective (r = .07; p < .05) and objective performance (r = .06; p < .05). Furthermore, the elevated τ_B -values ($\tau_B > .10$) of gender, age, educational, experiential diversity and subjective performance respectively indicate the possible presence of moderators⁴.

⁴ Neither collaboration period nor team type significantly moderated the diversity-performance relationship. Table 6 (appendix) shows the results of the moderator analysis.

Table 4: Bivariate Relationships: Diversity and Performance

	k	m	N	r	95% CI	Q(df)	$\tau_w (I^2_w)$	$\tau_B (I^2_B)$	Publication bias	Moderator analysis
<i>Gender diversity</i>										
Subjective performance	49	61	4,370	.01	-.04	.05	118.06 (60)**	.00 (.00)	.12 (.54)	No Yes
Objective performance	35	53	9,544	.02	-.01	.05	106.98 (52)**	.06 (.53)	.00 (.00)	No No
<i>Age diversity</i>										
Subjective performance	39	48	2,873	-.03	-.08	.02	77.38 (47)**	.00 (.00)	.10 (.41)	No Yes
Objective performance	30	51	12,134	.02	-.01	.04	100.83 (50)**	.05 (.46)	.00 (.00)	No No
<i>Ethnic diversity</i>										
Subjective performance	26	33	1,661	-.06	-.14	.03	151.33 (32)**	.15 (.67)	.00 (.00)	No Yes
Objective performance	21	28	5,811	.05**	.02	.09	47.89 (27)**	.00 (.00)	.05 (.41)	No No
<i>Educational diversity</i>										
Subjective performance	26	36	2,679	.06*	.01	.12	64.28 (35)**	.00 (.00)	.11 (.52)	Yes Yes
Objective performance	26	49	5,944	.03*	.00	.05	63.05 (48)**	.03 (.16)	.00 (.00)	No No
<i>Functional diversity</i>										
Subjective performance	37	56	3,979	.07*	.01	.13	228.47 (55)**	.02 (.50)	.01 (.25)	No No
Objective performance	38	66	5,437	.06*	.01	.10	174.34 (65)**	.06 (.22)	.09 (.49)	No No
<i>Experiential diversity</i>										
Subjective performance	22	37	1,914	-.01	-.08	.05	58.18 (36)*	.00 (.00)	.11 (.49)	No Yes
Objective performance	28	65	4,480	-.02	-.06	.02	107.39 (64)**	.01 (.01)	.07 (.45)	No No

Notes. * $p < .05$, ** $p < .01$; k = number of studies, m = number of effect sizes; τ_w = square root of the within-study heterogeneity (average true variation around the study mean), τ_B = square root of the between-study heterogeneity (average true variation of study overall effect sizes around the overall mean); I^2_w = percentage of true heterogeneity of observed heterogeneity due to within-studies differences; I^2_B = percentage of true heterogeneity of observed heterogeneity due to between-studies differences

5 DISCUSSION

5.1 Theoretical Implications

The goal of this study is to empirically investigate the diversity – performance relationship by analyzing the two underlying team mechanisms of social categorization and of information elaboration simultaneously. By integrating the well-researched diversity – performance relationship in one encompassing model, we gain a more comprehensive understanding of the processes and effects within the “*black box*” of diversity (Pelled, Eisenhardt, & Xin, 1999). Using meta-analytic structural equation modeling on a sample of 218 studies, our analysis shows important implications for future research.

First, we wanted to investigate whether the small or insignificant results of earlier studies can be traced back to the fact that neither social categorization nor information elaboration is a valid mediator and, thus, that diversity does not have an effect whatsoever or whether both team mechanisms are valid but cancel each other out. We prove that the small and contradictory results of past research do not originate in both team mechanisms canceling each other out. However, there is no blanket claim for the roles of information elaboration and social categorization across all diversity dimensions.

To start with, in case of ethnic diversity, information elaboration poses a valid mediator. Our results confirm the small and negative effect of ethnic diversity on performance found in past meta-analyses (Bell et al., 2011) and also corroborates the argument of van Dijk and colleagues (2012) that the negative effect of ethnic diversity is limited to subjective performance measures. This underlines past research’s claim that ethnic diversity is the most critical (Ely, Padavic, & Thomas, 2012) and most salient diversity dimension (Richard et al., 2013). In our model, ethnic diversity decreases the subjective perception of performance by reducing the quality or quantity of communication within teams. Therefore, the reduction in performance is not caused by social categorization within teams.

Second, in case of functional diversity, social categorization might pose a valid mediator as well as information elaboration might pose a valid mediator for experiential diversity. However, both functional and experiential diversity per se do not seem to trigger team mechanisms. In fact, the elevated variances indicate the presence of moderators. In our analysis, neither collaboration period nor team type moderated the relationship between functional diversity and categorization nor did team type moderate the relationship between

experiential diversity and information elaboration. As a consequence, more research is needed to identify further factors that trigger either information elaboration or social categorization within functionally or experientially diverse teams. To cite but a few examples, Kearney et al. (2009) found that a team's need for cognition helps diverse teams to overcome social categorization and drives team members to engage in information elaboration. Cheung et al. (2016) found affect-based trust to be a moderator between functional diversity and information elaboration. These studies focus on team inherent factors as opposed to the team external boundary conditions, that are most commonly focused on in team research and are therefore also considered in this meta-analysis.

When it comes to gender, age, and educational diversity, neither information elaboration nor social categorization poses a valid mediator. Past research discusses whether the insignificant results stem from variations in the conceptualization of "diversity" across studies, making it difficult to aggregate results (Bunderson & van der Vegt, 2018). However, our study differentiates between the true variance within (τ_w) and between studies (τ_B). Considering the τ_w -values close to zero between diversity dimensions and team mechanisms, our study shows that the heterogeneity does not originate from aggregating different operationalizations. There are other possible explanations for the non-significant effect of these three diversity dimensions on either of the team core mechanisms. First, the insignificant relationship might originate from the focus on objectively measured diversity, that is the actual composition of team characteristics (Ormiston, 2015). One alternative view to objectively measured diversity is perceived diversity which finds growing interest in the diversity research community. Perceived diversity was found unrelated to objective diversity (Hentschel et al., 2013). Individuals' perception of and reaction to diversity differs and, thus, might lead to differing team mechanisms (Shemla et al., 2014). Hentschel and colleagues (2013) found objectively measured age, gender, and educational diversity to be unrelated to team identification. However, the authors confirmed that perceived age, gender, and educational diversity did influence team identification negatively. Recent research found proof that perceived diversity is a mediator between objective diversity and information elaboration (Shemla & Wegge, 2018). This further underlines the argument that team and team member inherent factors are key to analyze the effect of diversity on team mechanisms.

Second, the absent effect might be attributed to the aspect of time (Harrison et al., 2002). Superficial diversity dimensions such as gender, age, and educational diversity are easy to

detect by team members and tend to lose their influence on group processes over time (Harrison et al., 2002). However, an alternative (and less popular) interpretation of the relationship between gender, age, and educational diversity and team mechanisms is that these diversity categories have no effect on team mechanisms whatsoever. The Q as well as the τ - statistics show that there is no heterogeneity within or between studies. Especially when it comes to gender and age diversity, these results corroborate past findings. Balkundi and colleagues (2007) find that demographic attributes do not play an important role within teams that interact on a daily basis. Also several meta-analysis confirm that - all studies taken together - gender diversity (Eagly, 2016) and age diversity (Schneid et al., 2016) do not have an effect on team core processes and thus on performance.

In a nutshell, we prove that the small and contradictory results of past research do not originate in both team mechanisms canceling each other out. What is more, it stands to question whether the roles of information elaboration and social categorization in diversity research are valid for every kind of diversity. The two team mechanisms need to be the focus of further studies and extended by including other processes or emergent states. This argument is supported by the bivariate analysis between the six diversity dimensions and the two performance variables. The significant correlation between ethnic diversity and objective performance as well as the significant correlation of educational and of functional diversity with both objective and subjective performance respectively⁵, indicate that these diversity variables might influence performance through other mechanisms and team processes. The current processes might have a too narrow scope to describe the underlying core processes. Therefore, expanding and empirically testing existing theoretical models would help to further open the “*black box*” between diversity and team mechanisms. To cite but a few examples, beside information elaboration and social categorization earlier studies also find conflict (de Wit, Greer, & Jehn, 2012) and external communication (Keller, 2001) to be important team mechanisms.

Another noticeable result of the bivariate analysis between the six diversity dimensions and the two performance variables are the elevated τ_B -values of gender, age, educational and experiential diversity in combination with subjective performance. This corroborates earlier research by van Dijk and colleagues (2012) that subjectively measured performance might

⁵ Due to the positively tested publication bias, the relationship between educational diversity and subjective performance has to be interpreted with caution.

be distorted by rater biases and can thus lead to an underestimation of demographic and an overestimation of job-related diversity. Therefore, our study further supports the claim for objectively measured performance.

When it comes to the relationship between team mechanisms and performance, information elaboration only enhances subjective team performance but is not significantly related to objective performance. Team members and / or leaders tend to rate the performance better in case a team engages frequently in high qualitative information exchange. However, this subjective perception is not mirrored in objective performance measures. This result questions whether the commonly argued “*value in diversity*” arises from information elaboration in the first place.

In contrast, social categorization plays a critical role when team performance is concerned. Social categorization not only influences subjective performance indirectly through a substantial reduction in information elaboration, but also exerts a negative direct effect on objective performance measures. By finding proof for the direct and negative effect of social categorization on objective performance, we expand theory since it was not considered explicitly by previous studies. The theoretical reasoning for the importance of this effect can be inferred from the social categorization perspective itself. Traditionally argued within the diversity research literature, intergroup bias has a negative effect on team processes like communication, cooperation, and interaction (e.g., Bantel & Jackson, 1989; Zenger & Lawrence, 1989), and leads to more friction and relationship conflict (Jehn, 1999; Jehn et al., 1997; Pelled & Xin, 1997; Pelled, Xin, & Weiss, 2001). Therefore, social categorization does not only disturb the elaboration of task-relevant information but also task accomplishment directly as it hampers the opportunities for coordination and decreases the synergetic effects of teamwork. This effect, in turn, influences performance negatively (De Dreu & Weingart, 2003; Jehn & Chatman, 2000).

Although the effects of diversity on team mechanisms are either small or insignificant, our results confirm and further expand past comprehensive models like the CEM. More comprehensive models considering both social categorization and information elaboration simultaneously such as the CEM or the present study are a good starting point for identifying fruitful avenues for further research. In addition, the combination of these comprehensive research models with the concept of perceived diversity might be key in discovering the reasons of diverging results in the past.

5.2 Practical Implications

Currently, diversity is an intensively discussed issue in organizations and society. Most practitioners emphasize the “*value-in-diversity*” hypothesis and, therefore, strive to increase team diversity. In doing so, they want to boost creativity and produce a more profound understanding of markets (Kochan et al., 2003; Mannix & Neale, 2005). Even politicians ask to raise the degree of diversity in organizations in order to remain competitive (Eagly, 2016). However, our results confirm that there is no positive or negative blanket statement when it comes to diversity (Eagly, 2016). Particularly, the intensive discussion about the influence of age and gender diversity on team performance might be overestimated. Managers and organizations should not be as concerned about team performance when hiring team members differing in age or gender. Instead, managers should pay more attention to the attributes of diversity, such as ethnic, functional or experiential diversity, which potentially influence team collaboration.

To foster both subjective and objective team performance, managers should be particularly aware of social categorization, as it seems to exert a negative influence on both the elaboration of task-relevant information and directly on teams’ task accomplishment. Thus, managers should try to minimize the potential for social categorization. Especially, when highly ethnically and functionally diverse team members work together, team leaders should try to reinforce group spirit and foster team cohesion. Increased team cohesion ensures that team members are willing to support the team, stimulates collective teamwork, and enhances teamwork effectiveness.

5.3 Limitations and Future Research

Our study has the following limitations: First, the validity of the estimated path coefficients linking diversity, team mechanisms, and performance requires the correctness of the specified causal model and the absence of omitted common causes (e.g., that leadership style and conflict management reduce social categorization and increase the elaboration of task-relevant information). Hence, future research should incorporate variables that help reduce alternative causal structures (cf. Antonakis, Bendahan, Jacquart, & Lalivé, 2010).

Second, a common problem of meta-analyses is that only relationships based on a sufficient number of primary studies can be analyzed (van Dijk et al., 2012). Therefore, we were only able to analyze a reduced number of moderators and to distinguish between subjective and

objective performance measures. Future research might also distinguish between more fine-grained performance types (accounting or financial measures, innovation, creativity, or team viability). More fine-grained distinctions between diversity variables and performance measures help determine whether diversity attributes influence some types of performance more than others. Furthermore, as not sufficient studies considered the social categorization or the information elaboration process explicitly, we had to use operationalizations as proxies for these core processes (e.g., knowledge sharing as proxy for information elaboration and team cohesion as proxy for social categorization). This approach might be considered slightly rough. However, it is the first empirical analysis of the comprehensive diversity-performance relationship and is therefore supposed to provide a solid base for future, more fine-grained analyses. As the “*black box*” of diversity (Pelled et al., 1999) is yet to be uncovered, greater efforts should be invested to close the gap between the diversity-performance relationship. Therefore, we encourage future research to focus on possible team processes and emergent states mediating diversity effects on team performance. A valuable target for future research could be to start with comprehensive models (such as the CEM) and add further mediating and moderating variables to the model to integrate further possibly important processes.

Third, we add up different diversity operationalizations across studies such as Blau index (Blau, 1977), Teachman’s entropy measure (Teachman, 1980), or, in case of gender and ethnic diversity, also the percentage of the minority group present. However, some author’s find the applicability especially of the minority / majority approach controversial at best (Budescu & Budescu, 2012). Not only the methods of measuring are unequivocal but there have also been discrepancies in the theoretical conceptualizations across the vast extent of research studies, making it difficult to compare empirical results across studies (Bunderson & van der Vegt, 2018). Still, in our study only the correlation between ethnic diversity and subjective performance showed an elevated τ_w -value ($\tau_w = 0.17$), thus indicating a mixing of diverging operationalizations. However, we accepted these inaccuracies in favor of a larger dataset.

Fourth, social categorization and the elaboration of task-relevant information may be affected by other attributes such as status (Jackson et al., 2003), religion, or the socio-economic background. In particular vertical differences between team members might have an effect on team mechanisms (Bunderson & van der Vegt, 2018; Leslie, 2017). There are

also further diversity attributes that have not yet been investigated in sufficient numbers and which were therefore not included in this study.

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7 APPENDIX

Table 5: Overview Over Studies and Variables Included in the MASEM

Author	Year	Journal	No. of teams	Diversity dimension	Team mechanism	Performance measure
Abebe	2010	LODJ	1	education function		objective
Acan	2007	MT	36	education function gender	categorization	
Afolabi, Osayawe	2005	TPM	54		categorization	objective information
Amason et al.	2006	JBV	174	age education function		objective
Ancona, Caldwell	1992	Organ. Sci	45	function experience		subjective
Anderson et al.	2002	AOS	18	function	categorization	objective
Andrejski et al.	2014	JOM	115	ethnicity gender		objective
Aubé, Rousseau	2005	GD	97	education experience age gender		
Auh, Menguc	2005	IMM	242	age education function experience gender		subjective
Balkundi et al.	2007	JOB	23	age ethnicity gender		subjective
Balkundi et al.	2009	SGR	19	age ethnicity		subjective
Bantel, Jackson	1989	SMJ	199	age education function experience		subjective
Bär et al	2011	WP	2260	age education experience gender		
Barrick et al.	2007	AMJ	51	age education gender	categorization information	objective subjective

Barrick et al.	1998	JAP	94	categorization	subjective information
Barry, Stewart	1997	JAP	61	categorization	subjective information
Barsade et al.	2000	ASQ	62	function	categorization objective
Bayazit, Mannix	2003	SGR	28	age ethnicity gender	subjective
Boeker	1997	AMJ	67	experience	objective
Boerner et al.	2011	TPM	59	age education	objective
				experience	
Bohren, Strom	2010	JBFA	229	age	objective
Boling	2012	D	210	age function experience	
Boone, Hendriks	2009	MS	33	function	objective
Boulouta	2013	JBE	126	gender	objective
Bunderson, Sutcliffe	2002	AMJ	45	age function experience	information objective
Buyl et al.	2011	JMS	33	function	information objective
Cady, Valentine	1999	SGR	50	age ethnicity function gender	objective subjective
Cai et al.	2013	SRES	527	function	objective subjective
Camelo et al.	2010	IJM	97	function experience	objective
Camelo-Ordaz et al.	2005	JMD	100	function experience	information
Campion, Medsker	1993	PP	80	function	information subjective
Cannella et al.	2008	AMJ	207	age education function experience gender	objective
Cantner et al.	2011	AMAM	337	age function experience gender	objective
Carless, de Paola	2000	SGR	59	categorization information	subjective
Carpenter	2002	SMJ	225	education function experience	objective

Carpenter, Frederikson	2001	AMJ	207	education function experience	objective
Carson et al.	2007	AMJ	59	ethnicity gender	subjective
Chang	2009	D	26	age education gender	categorization
Chattopadhyay	2010	AMJ	34	gender function	
Chen et al.	2010	SMJ	104	education	objective
Cheng et al.	2012	JOB	67	gender	subjective
Chi et al.	2009	GOM	67	education experience	subjective
Choi et al.	2003	JOB	169	age ethnicity education gender	
Chowdhury	2005	JBV	79	age function gender	categorization subjective
Cole et al.	2011	LQ	108	gender	subjective
Coopman	2001	JBC	7		categorization subjective information
Cordero et al.	1996	JETM	.	ethnicity gender	objective subjective
Cruz, Nordqvist	2012	SBE	882	gender	subjective
Cummings	2004	MS	182	age function experience gender	information subjective
Curseu et al.	2010	JASP	72	function gender	subjective
Cursue et al.	2010	OS	76	ethnicity gender	categorization
Cursue, Schrijver	2010	GD	174	ethnicity gender	subjective
Dahlin et al.	2005	AMJ	19	ethnicity education	
Darmadi	2011	COC	169	ethnicity gender	objective
de Saá-Pérez et al.	2017	R&D	149	education function gender	objective
Dooley et al.	2000	JOM	68	function experience	objective

Drach-Zahavy, Somech	2001	GD	48	function	information	subjective
Drach-Zahavy, Somech	2002	JEA	48	age education function experience gender	information	subjective
Earley, Mosakowski	2000	AMJ	24	ethnicity	information	subjective
Eby, Dobbins	1997	JOB	148		information	objective
Eisenhardt, Schoonhoven	1990	ASQ	92	experience		subjective objective
Elron	1997	LQ	121		categorization	subjective
Ely	2004	JOB	486	age experience gender		objective
Ely et al.	2012	OS	496	ethnicity		objective
Engel et al.	2010	JPP	60	gender ethnicity		subjective objective
Ensley et al.	2002	JBV	70		categorization	objective
Ensley, Hmielecki	2005	RP	256		categorization	objective
Faems, Subramanian	2013	RP	938	age ethnicity education function gender		objective
Fay et al.*	2006	JOOP	66	function		subjective
Fay et al.*	2006	JOOP	95	function		subjective
Ferrier, Lyon	2004	MDE	70	education function experience		objective
Foo	2011	SBE	73	age ethnicity function experience		subjective
Foo et al.	2005	JBV	51	age education gender		subjective
Foo et al.	2006	SMJ	154	education		objective
Ford, Seers	2006	LQ	51	age gender experience	categorization information	
Franca, Lourenco	2010	RAM	231	age gender education		
Fry, Slocum	1984	AMJ	61	function		subjective

Gebert et al.	2011	TPM	47	age gender experience	
Gellert, Kuipers	2008	CDI	150	age	objective
Gil	2009	D	300	education function experience	objective
Godthelp, Glunk	2003	EMJ	50	age experience	
Goins, Mannix	1999	PIQ	66	age ethnicity gender	subjective
Goll et al.	2008	MD	164	function	objective
Gong	2006	MIR	370	ethnicity	objective
Greening, Johnson	1996	JMS	136	age function experience	objective
Greer et al.	2012	JAP	100	age ethnicity education function gender	objective
Gul et al.	2008	D	901	gender	objective
Gupta et al.	2010	JLOS	28	function categorization gender	objective
Hafsi, Turgut	2013	JBE	95	age ethnicity experience gender	objective
Hagendorff et al.	2010	CG	204	age function	
Hambrick et al.	1996	ASQ	32	education function experience	objective
Han, Harms	2010	JOB	36	ethnicity	subjective
Harden	2009	D	60	ethnicity education function experience gender	subjective
Harrison et al.	1998	AMJ	71	age ethnicity gender categorization	
Harrison et al.	2002	AMJ	144	age ethnicity gender	subjective
Haslam et al.	2010	BMJ	92	gender	objective

He et al.	2007	JMIS	51	function gender education	subjective
Hellerstedt	2009	D	1212	age ethnicity education	objective
Henttonnen et al.	2010	TPM	76	age education gender	subjective
Hobman, Bordia	2006	GPIR	27	age ethnicity function gender	categorization
Hoch et al.	2010	JPP	26	age	subjective
Howell, Shea	2006	GOM	41	function	subjective
Hsu et al.	2016	PAccR	3317	gender	objective
Hyatt, Ruddy	1997	PP	100	categorization information	objective subjective
Jackson et al.	1991	JAP	93	age education experience function	
Jackson, Joshi	2004	JOB	365	ethnicity gender experience	objective
Jehn et al.	1999	ASQ	92	categorization	objective subjective
Jehn, Mannix	2001	AMJ	51	categorization	subjective
Jehn et al.	2010	AMJ	51	gender	objective subjective
Kearney et al.	2009	AMJ	83	age ethnicity education	categorization information
Kearney, Gebert	2009	JAP	62	age ethnicity education experience gender	categorization information
Keck	1997	Organ. Sci	18	function experience	objective
Keck, Tushman	1993	AMJ	104	function experience	
Keller	2001	AMJ	93	function experience	categorization information
Keller	2006	JAP	52	experience	subjective objective

Kianto	2011	IJLIC	20	age education gender experience	subjective
Kirkman et al.	2004	GOM	98	age ethnicity experience gender	subjective
Klein et al.	2001	JAP	65	age education experience gender	categorization
Klein et al.	2011	OBHDP	79	age	subjective
Knight et al.	1999	SMJ	76	education function experience age	
Lee, Farh	2004	AP	45	gender	categorization subjective
Li, Hambrick	2005	AMJ	71	gender	information subjective
Liang et al.	2012	IJPM	62		information subjective
Liechtenstein et al.	1997	JABS	105	age function experience gender	
Lin, Peng	2010	MOR	62	age education experience gender	categorization objective
Lin, Shih	2008	JOM	201	education gender	subjective
Liu et al.	2012	JBR	185	function	objective
Loeters	2011	MT	36	age education function gender	subjective
Lovelace et al.	2001	AMJ	43	function	subjective
MacCurtain et al.	2010	CIM	39	function age experience	information objective
Mahadeo et al.	2012	JBE	42	age education gender	objective
Marimuthu, Kolandaivasamy	2008	JISR	100	gender	objective
Martins et al.*	2003	GOM	110	gender ethnicity	
Martins et al.*	2003	GOM	30	gender	

ethnicity					
Mason	2006	SGR	24	age gender	information
Mayo, Pastor	2005	WP	71	age ethnicity education experience gender	subjective
Mayo et al.	1996	LQ	68	age ethnicity gender experience	subjective
Michel, Hambrick	1992	AMJ	134	function experience	objective
Miller, Triana	2009	JMS	326	ethnicity gender	objective
Mitchell et al.	2015	HRM	75	function	subjective
Mohammed, Angell	2004	JOB	45	ethnicity gender	subjective
Mohammed, Nadkarni	2011	AMJ	71	age gender	subjective
Moon	2013	JASP	73	ethnicity	subjective
Murray	1989	SMJ	84	function	objective
Neubert	1999	SGR	21	categorization	subjective
Nielsen, Huse	2010	CG	201	gender	information
Oetzel	2001	SGR	36	age ethnicity gender	information subjective
Olson et al.	2006	JBM	66	age function gender	objective
Opstrup, Villadsen	2015	PAR	91	gender	objective
O'Reilly et al.	1989	ASQ	20	age	categorization
Orlitzky, Benjamin	2003	AMLE		gender	subjective
Ozer	2010	JBR	151	gender age	
Peeters et al.	2008	SGR	26		subjective objective
Pelled et al.	1999	ASQ	45	age ethnicity function experience gender	subjective
Polzer et al.	2002	ASQ	71	function	categorization subjective
Puck et al.	2006	JOTSC	16		information subjective
Qian et al.	2013	SMJ	122	function	subjective

Quintana-Garcia	2011	WP	229	function	objective
Radlach, Schlemmbach	2008	MT	48	ethnicity gender	objective
Rau	2005	SGR	111	function experience	objective
Raver, Gelfand	2005	AMJ	35	ethnicity	categorization
Reagans, Zuckerman	2001	Organ. Sci	224	experience	objective
Rentsch, Klimoski	2001	JOB	41	age education gender	subjective
Richard et al.	2004	AMJ	150	ethnicity gender	objective
Richard et al	2006	IJHRM	79	ethnicity gender	objective
Richard, Shelor	2002	IJHRM	4774	age	objective
Ries et al.	2010	ZAO	157	age	categorization
Riordan, McFalane Shore	1997	JAP	98		categorization
Rodriguez	1998	SGR	11	age	subjective
Rodríguez- Domínguez et al.	2012	EJLE	96	gender	objective
Rousseau, Aubé	2010	GOM	97	age education gender	subjective
Sargent, Sue-Chan	2001	SGR	42	ethnicity	categorization
Schippers, den Hartog	2003	JOB	54	age education gender	subjective
Schoenecker et al.*	1997	RHE	78	age ethnicity education gender	categorization
Schoenecker et al.*	1997	RHE	51	age ethnicity education gender	information
Scott	1997	JETM	42	function	categorization
Sethi	2000	JM	141	function	information
Sethi et al.	2001	JMR	141	function	categorization
Shaw et al.	2011	JAP	87	education	subjective
Shemla*	2010	D	33	age gender	subjective
Shemla*	2010	D	61	age gender	subjective
Shin et al.	2012	AMJ	68	gender experience	subjective

Shin, Zhou	2007	JAP	75	age education gender	subjective
Simons et al.	1999	AMJ	57	age education function experience	objective
Simsek et al.	2005	AMJ	402	education function	subjective
Smith et al.	1994	ASQ	53	education function	categorization objective
Somech	2006	JOM	136	age education function experience gender	subjective
Somech, Drach - Zahavy	2007	JOB	73	education function experience gender	categorization information
Somech, Drach- Zahavy	2011	JOM	96	education function gender	subjective
Srivastava et al.	2006	AMJ	102	education	information objective
Stewart, Barrick	2000	AMJ	45		information subjective
Tanikawa et al.	2017	IJOA	744	age experience	objective
Tibben	2010	MT	126	age ethnicity education function gender	objective
Tihanyi et al.	2000	JOM	126	age education function	
Townsend, Scott	2001	IR	122		categorization objective
Triana et al.	2013	Organ. Sci	462	age ethnicity gender	objective
Tröster et al.	2014	OBHDP	92	age ethnicity experience gender	subjective
Tsai et al.	2014	APJM	128	education function	subjective

Tung, Chang	2011	JCHR	79	education	categorization	subjective information
Tütén	2009	MT	74	age experience gender		subjective
Tyran, Gibson	2008	GOM	57	gender ethnicity		
van der Linden	2011	MT	27	age function experience gender		subjective
van der Vegt et al.	2005	AMJ	57	gender age ethnicity function	categorization	subjective
v. Knippenberg et al.	2010	HR	42	function gender		objective
Vissa, Chacar	2009	SMJ	84	function	categorization	objective
Vodosek	2007	IJCM	73	ethnicity education gender		subjective
Wagner et al.	1984	ASQ	31	age		objective
Watson et al.	2002	IJIR	165		categorization	subjective
Wei et al.	2005	ABM	111	age education function experience		objective
Wellalage, Locke	2013	AJBE	88	gender		objective
Wiersema, Bird	1993	AMJ	40	age experience		objective
Wolfe, Box	1986	DBSEE	19		categorization	objective
Wong	2004	Organ. Sci	73	function	categorization	subjective
Yeh, Chou	2005	SBP	88	function		subjective
Zampetakis, Moustakis	2011	SGR	51	age experience gender		
Zellmer-Bruhn et al.	2008	OBHDP	55	ethnicity education experience gender	categorization information	
Zhang et al.	2011	CG	1182	age education		objective
Zhou et al.	2015	IEMJ	144	education function		subjective

Notes. * A superscript asterisk (*) indicates studies that analyzed two separate samples in one research paper and are therefore listed twice

AMJ = *Academy of Management Journal*; ABM = *Asian Business & Management*; AJBE = *Asian Journal of Business*

Ethics; AMAM = Academy of Management Annual Meeting; AMLE = Academy of Management Learning & Education; AOS = Accounting, *Organizations and Society*; AP = *Applied Psychology*; APJM = *Asia Pacific Journal of Management*; ASQ = *Administrative Science Quarterly*; BMJ = *British Journal of Management*; CDI = *Career Development International*; CG = *Corporate Governance*; CIM = *Creativity and Innovation Management*; COC = *Corporate Ownership and Control*; D = *Dissertation*; DBSEE = *Development between team cohesion dimensions and business game performance*; EJLE = *European Journal of Law and Economics*; EMJ = *European Management Journal*; GD = *Group Dynamics: Theory, Research and Practice*; GOM = *Group & Organization Management*; GPIR = *Group Processes & Intergroup Relations*; HR = *Human Relations*; HRM = *Human Resource Management*; IEMJ = *International Entrepreneurship and Management Journal*; IJCM = *International Journal of Conflict Management*; IJHRM = *International Journal of Human Resource Management*; IIJIR = *International Journal of Intercultural Relations*; IJLIC = *International Journal of Learning and Intellectual Capital*; IJM = *International Journal of Manpower*; IJOA = *International Journal of Organizational Analysis*; IJPM = *International Journal of Project Management*; IMM = *Industrial Marketing Management*; IR = *Industrial Relations*; JABS = *Journal of Applied Behavioral Science*; JAP = *Journal of Applied Psychology*; JASP = *Journal of Applied Social Psychology*; JBC = *Journal of Business Communication*; JBE = *Journal of Business Ethics*; JBFA = *Journal of Business Finance & Accounting*; JBM = *Journal of Business and Management*; JBR = *Journal of Business Research*; JBV = *Journal of Business Venturing*; JCHR = *Journal of Chinese Human Resources*; JEA = *Journal of Educational Administration*; JETM = *Journal of Engineering and Technology Management*; JISR = *Journal of International Social Research*; JLOS = *Journal of Leadership & Organizational Studies*; JM = *Journal of Marketing*; JMD = *Journal of Management Development*; JMIS = *Journal of Management Information Systems*; JMR = *Journal of Marketing Research*; JMS = *Journal of Management Studies*; JOB = *Journal of Organizational Behavior*; JOM = *Journal of Management*; JOOP = *Journal of Occupational and Organizational Psychology*; JOTSC = *Journal of Organisational Transformation and Social Change*; JPP = *Journal of Personnel Psychology*; LODJ = *Leadership & Organization Development Journal*; LQ = *Leadership Quarterly*; MD = *Management Decision*; MDE = *Managerial and Decision Economics*; MIR = *Management International Review*; MOR = *Management and Organization Review*; MS = *Management Science*; MT = *Master Thesis*; OBHD = *Organizational Behavior and Human Decision Processes*; Organ. Sci = *Organization Science*; OS = *Organization Studies*; PAccR = *Pacific Accounting Review*; PAR = *Public Administration Review*; PIQ = *Performance Improvement Quarterly*; PP = *Personnel Psychology*; R&D = *R&D Management*; RAM = *Revista de Administacao*; RHE = *Research in Higher Education*; RP = *Research Policy*; SBE = *Small Business Economics*; SBP = *Social Behavior and Personality*; SGR = *Small Group Research*; SMJ = *Strategic Management Journal*; SRES = *Systems Research and Behavioral Science*; TPM = *Team Performance Management*; WP = *Working Paper*; ZAO = *German Journal of Work and Organizational Psychology*

Table 6: Test of Categorical Moderators: Diversity - Performance

Moderator	k	m	N	r	95% CI	Q _{Res} (df)	R ² _W	R ² _B
Gender div. & subj. perf.								
<i>Collaboration period</i>								
Short-term	12	15	773	.06	-.03	.16	114.19 (57)**	.00
Long-term	35	44	3,473	-.02	-.07	.04		
<i>Team type</i>								
Top management teams	6	7	1,518	-.01	-.12	.11	114.96 (56)**	.00
Student teams	13	16	832	.04	-.05	.13		
Work teams	26	33	1,718	-.01	-.08	.05		
Entrepreneurial teams ^a	2	2	130					
Age div. & subj. perf.								
<i>Collaboration period</i>								
Short-term	6	7	377	-.03	-.17	.10	76.60 (45)**	.00
Long-term	32	40	2,445	-.02	-.07	.03		
<i>Team type</i>								
Top management teams	4	5	563	-.05	-.17	.08	72.28 (41)**	.00
Student teams	6	7	377	-.04	-.17	.09		
Work teams	25	32	1,651	-.01	-.07	.05		
Entrepreneurial teams	3	3	203	-.13	-.31	.04		
Ethnic div. & subj. perf.								
<i>Collaboration period</i>								
Short-term	9	12	718	-.07	-.20	.07	122.65 (28)**	.00
Long-term	15	18	828	-.08	-.20	.03		
<i>Team type</i>								
Top management teams ^a	0	0	0	.	.	.	127.44 (28)**	.00
Student teams	13	16	879	-.02	-.14	.10		
Work teams	11	14	636	-.09	-.22	.04		
Entrepreneurial teams ^a	1	1	73	.	.	.		
Educational div. & subj. perf.								
<i>Collaboration period</i>								
Short-term ^a	1	1	128	.	.	.		
Long-term	23	34	2,427	.	.	.		
<i>Team type</i>								
Top management teams	6	7	1,171	.10	-.02	.20	61.91 (32)**	.00
Student teams ^a	0	0	0	.	.	.		
Work teams	17	24	1,240	.06	-.01	.13		
Entrepreneurial teams ^a	2	4	195	.	.	.		
Experiential div. & subj. perf.								
<i>Collaboration period</i>								
Short-term ^a	1	1	92	.	.	.		
Long-term	21	36	1,822	.	.	.		
<i>Team type</i>								
Top management teams	4	5	563	-.07	-.17	.04	43.22 (33)	.00
Student teams ^a	1	1	92	.	.	.		
Work teams	15	29	1,094	.04	-.02	.10		
Entrepreneurial teams ^a	2	2	165	.	.	.		

Notes. *p < .05, **p < .01; k = number of studies, m = number of effect sizes; R²_W = within-study variance explained by the moderator; R²_B = between-study variance explained by the moderator. ^amoderator analysis not possible due to low k/m