



Universiteit Utrecht

**Functional Diversity, Participative Safety, Openness to Experience and
Team Innovation**

A Mediated Moderation Study

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Utrecht University

Candidate: Ines de Garcia Pinto (6432301)

Supervisor: Dr. Meltem Ceri-Booms

Second Assessor: Dr. Veerle Brenninkmeijer

Abstract

Team innovation is an increasingly researched topic in psychology and is crucial maintaining organizational success in the global market. Understanding the mechanisms leading to the most successful outcome of innovation at the team-level is therefore an important task for both researchers and practitioners. Organizations are progressively adopting heterogeneous teams and these teams operate positively in distinct contexts. Specifically, when there is a high sense of participative safety between the members of the team. This in turn is facilitated by members' personality trait of openness to experience. In order to test these relations, the current study proposes a team-level mediated moderation effect. Data collected from 38 teams consisting of 147 team members provided no significant results at the team-level data analysis. However, the individual-level analysis produced significant results. Participative safety and openness to experience were significant predictors of team innovation. Furthermore, openness to experience was a further predictor of participative safety. Implications of these results in terms of recruitment process for innovative teams in organizations and suggestions for future research and opportunities will be examined at the end of the paper.

Keywords: team innovation, functionally diverse teams, participative safety, openness to experience

Introduction

Innovation is often characterized by a two-step process that includes creative processes such as employees designing a novel product and its implementation into the global market through marketing strategies (van Knippenberg, 2017). It can also be considered as the modification of the current processes to generate organizational effectiveness and success (Thayer, Petruzzelli, & McClurg, 2018). In the increasingly challenging global market, innovation has become one of the most important requirements for organizations to prosper (Jiménez-Jiménez & Sanz-Valle, 2008). In order to differentiate themselves from their competitors and maintain their success, organizations need to find effective strategies to become highly innovative (Ireland & Webb, 2007). Their economic growth and organizational effectiveness is highly dependent on these innovative processes (Nijstad, Berger-Selman, & De Dreu, 2014; Mahmood & Rufin, 2005; Tellis, Prabhu, & Chandy, 2009). Consequently, understanding the mechanisms that lead to innovation within organizations is an important task both for researchers and for practitioners (Chen, Liu, & Tjosvold, 2005). Innovation is often researched at the team-level, as teams have become the building blocks for organizations (McDermott, 1999). Teams are defined as two or more individuals that group together with a specific goal and purpose oriented by the organization (Huczynski, Buchanan, & Huczynski, 2013). They are considered to be the key to “organizational success” (Martin & Bal, 2006). This is a result of multiple skill sets, expertise and the combination of knowledge of individuals that equips the team with the necessary conditions for innovative processes (Lipman-Blumen & Leavitt, 1999). Innovation is best implemented with the highest quality when interaction of ideas occurs (Csikszentmihalyi, 1996). Working within a team however, implicates a variety of social psychological mechanisms affecting innovative performance (Bain,

Mann, & Pirola-Merlo, 2001). Thus, team processes are fundamental antecedents to creative performance and the level of successful innovative implementation (Lubatkin et al., 2006) It is, therefore, essential to study the mechanisms fostering innovation within teams.

Organizations are increasingly adopting diverse teams, specifically functionally diverse teams, in order to extrapolate the best and most innovative solutions (Kickul & Gundry, 2001). Teams having members with different functional backgrounds can increase the informational pool of ideas which may bring different viewpoints to solutions (Harrison & Klein, 2007) and consequently may become more innovative. In order for this effect to occur, however, team need to be open to new experiences (McCrae & Costa, 1996). In such teams, people will be more willing to share their ideas with each other. Furthermore, they will have a sense of participative safety through which they will discuss issues openly and express their perspective on the task (Carmeli, Brueller, & Dutton, 2009). This, in turn, fosters team innovation. The present study examines these mechanisms mentioned above by claiming that team's participative safety will mediate the relationship between team functional diversity and team innovation. Furthermore, it hypothesizes that the relationship between team functional diversity and team's participative safety is moderated by team's openness to experience.

Literature Review

Functionally Diverse Teams

Functionally diverse teams refer to the differential expertise individuals have within a team context (Bantel & Jackson, 1989). These expertise concerns with a range of skills, insights and alternative outlooks on organizational and task issues (Wanous & Youtz, 1986). These expertise could range in educational background, extra training or

functional differences between team members (Barr, 1998). Highly functional diverse teams are referred to as heterogeneous teams (Hambrick, Cho, & Chen, 1996).

Heterogeneous teams refers to a greater number of functional diversity within the team and homogeneous teams refers to a lower variety of functional diversity members within the team (Hambrick, Cho, & Chen, 1996). Organizations are increasingly embracing heterogeneous teams and therefore, this valuable asset of team functional diversity led research examining whether heterogeneous teams positively or negatively impact the team outcomes (Bradley, Anderson, Baur, & Klotz, 2015). Specifically, the current study defines the desired outcome as successful team innovation.

Research has suggested that functional diversity can have positive effects on innovative performance in specific contexts. As mentioned previously, social psychological mechanisms influence the outlook on the task at hand and team members or leaders (Cohen & Bailey, 1997).

Functional diversity has produced contrast findings in literature (Chi, Huang, & Lin, 2009). This issue has prevailed researchers to have conflicting arguments and points of view on the matter. The two sided argumentation refers to the fact that a team comprised of different areas of expertise can produce more problems, but also a bigger pool of solutions leading to creative and high-quality innovative ideas (Nemeth, 1985). As a result, functionally diverse teams are now considered a “double-edged sword” (Milliken & Martins, 1996). Context affects how successful functional diversity can be within a team setting (Bunderson & Sutcliffe, 2002). Heterogeneous teams can be more positive than homogenous teams as it can promote innovation (Bantel & Jackson, 1989), can find clearer solutions to competitive threats (Hambrick, Cho, & Chen, 1996), have better standing strategies (Bantel, 1993) and are found to be better at implementing innovative strategies (Bunderson & Sutcliffe, 2002).

However, heterogeneous teams can also hinder innovative processes due to differences in insight and can produce undesired effects of task and interpersonal conflict (Knight et al., 1999; Pelled, Eisenhardt, & Xin, 1999; Bunderson & Sutcliffe, 2002), having negative implications on innovative performance (Murray, 1989; Simons, Pelled, & Smith, 1999). The more knowledge added to the team, the more likely members are to have differing perspectives on a task or viewpoint that take the form of positive or negative aspects (Bassett-Jones, 2005). Negative aspects include task or interpersonal conflict (Chi, Huang, & Lin, 2009). Conflict within a team, however, has also been shown to have positive effects including disentangling complicated dilemmas that employees face on a daily basis within the work force (Qian, Cao, & Takeuchi, 2013). This is achieved through the greater pool of solutions and perspectives, allowing a more holistic problem-solving approach at the team-level (Cabralles, Medina, Lavado, & Cabrera, 2008).

This current study will examine the mechanism through which functional diversity can be beneficial for team innovation. The aforementioned positive innovative outcomes could stem from team-level dynamics such as participative safety (Bain, Mann, & Pirola-Merlo, 2001). If team members feel they are able to share their insights without being criticized (Fairchild & Hunter, 2014), more innovative strategies will be discussed, in turn improving problem-solving capabilities (Fairchild & Hunter, 2014). Participative safety at the team-level however, could also be influenced through team members' personality traits (Fairchild & Hunter, 2014). Specifically, individuals with high levels of openness to experience will internally motivate the team members to communicate their ideas and be actively listening to the discussion at hand to devise the highest quality innovation plan (McCrae, 1987). These factors will be further discussed.

Participative Safety

Participative safety is defined as the level of “comfort” experienced by the team members to be able to communicate their viewpoint on the tasks at hand, and be able to express their opinions (even if it goes against group norms) and to give feedback on their evaluation of the task (Anderson & West, 1998). Participative safety has two elements: “participation in decision making” and “intragroup safety.” The former discusses the ability to share and communicate their judgement, and the latter is the degree of support of the team members’ ideas within the team (Fairchild & Hunter, 2013). Participative safety is one of the four constructs in West (1990) theory of “Team Climate.” This psychological construct is heavily based on trust (West, 1990) and team members will be more likely to share their insights if they expect these ideas to be well-received and not dismissed or criticized (Mumford & Gustafson, 1988; West & Anderson, 1996; Bain, Mann, & Pirola-Merlo, 2001). In order for team innovation to occur, all team members are required to contribute their vision and insights to direct the creative inputs into “innovative outputs” by working closely together (Peltokorpi & Hasu, 2014). Therefore, creative processes are encouraged when team members feel comfortable taking risks with new ideas at the team-level (Baer & Frese, 2003). Participative safety has been recognized as a well-established construct and thoroughly researched by past literature to be directly associated with team innovation (Peltokorpi & Hasu, 2014; Bain et al., 2001). In line with the above reasoning, the following hypothesis is formed:

Hypothesis 1: The relationship between functional diversity and team innovation is mediated by participative safety.

The process that leads to high participative safety could be embedded within personality traits of team members' (Hammond, Neff, Farr, Schwall, & Zhao, 2011). Specifically, the paper argues that high levels of openness to experience will in turn increase participative safety within the team (Hammond, Neff, Farr, Schwall, & Zhao, 2011). Therefore, the present study argues that in order for functionally diverse teams to have high levels of participative safety, the team needs to be open to new experiences. This will then in turn lead to success in team innovation. In such teams, team members with high levels of openness to experience will feel more motivated to communicate their ideas and proactively listen to feedback from other team members than team members with low levels of openness to experience (McCrae & Costa, 1996). In the following section, the construct, openness to new experiences will be introduced more in detail.

Openness to New Experience

Openness to new experiences is one of the dimensions for the Big Five Inventory (BFI) and has been defined as internally seeking positive participation in several social and professional events and areas (Zuckerman, 1994). Openness to experience is vital for team innovation as it is indicative of greater problem solving with more creativity for novel ideas (Zhou & Shalley, 2003; Baer & Oldham, 2006), a dimension of team innovation (Thayer et al., 2018). This is due to their understanding and making use of the team members' different perspectives and approaches (Baer & Oldham, 2006). Additionally, personality constructs has been researched to be a key indicator of innovation due to the level of adoption and commitment by the individual member to the production of innovation at the team-level (Marcati, Guido, & Peluso, 2008). Team members will then be as a result more open to new approaches and

solutions creating an environment of collaboration and participation, elements vital to innovative success (Carmeli & Spreitzer, 2009). In parallel, behaviours leading to innovation also include “out of the box thinking,” opening new ways of thinking for ideas for products or services and how to best implement these (Scott & Bruce, 1994; Carmeli & Spreitzer, 2009). The first step to innovation requires generation of novel ideas, and openness to experience facilitates this stimulation of creativity at the individual and team-level (Bledow, Frese, Anderson, Erez, & Farr, 2009). These are characteristics of openness to experience personality trait (McCrae, 1987).

Previous literature has suggested that team members with high levels of openness to experience has desirable effects on team innovation (McCrae & Costa, 1996). This is due to the additional internal motivation to communicate their ideas and proactively listen to feedback from other team members (McCrae & Costa, 1996). As the team innovation process has uncertain characteristics (Blatt, 2009), individuals with high levels of openness to experience will also proactively collaborate in a team setting to reduce these constraining elements of innovation by confronting the issue at hand (Moberg, 2001). Furthermore, openness to experience leads to cognitive flexibility (Burke, Stagl, Salas, Pierce, & Kendall, 2006) in team members, increasing team’s ability to adapt and adjust to the team setting or environment. It also increases the pool of solutions that could be applied to problems that arise during innovative processes (Driskell, Goodwin, Salas, & O’Shea, 2006) by facilitating the inclusion of minority team members (Flynn, 2005) with different perspectives. Based on the above reasoning, the following hypothesis is formed:

Hypothesis 2: The relationship between functional diversity and participative safety is moderated by openness to new experience.

In sum, the current study proposes a mediated moderation model and argues that there will be a mediating effect of participative safety between functional diversity and team innovation and that the relationship between functional diversity and participative safety is moderated by openness to new experiences. Therefore, the third hypothesis which will test the whole model is proposed as follows:

Hypothesis 3: The interaction effect between functional diversity and openness to experience on team innovation is mediated by participative safety.

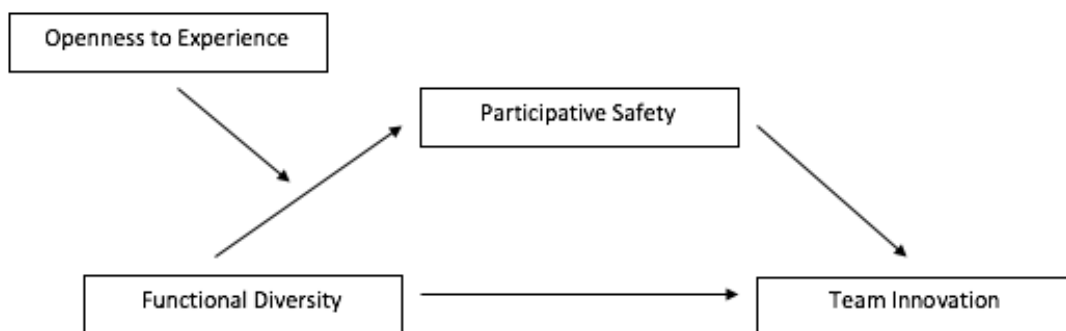


Figure 1. Process Model of the Present Study.

Method

Participants

The total number of teams participating in the study reached 38 of which 147 individuals were members of the recruited teams. From these 147 individual members, 60 were female, and 87 were male and members averaged on the age of 33 years old

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($M= 33,01$, $SD= 9.74$). Individuals participating in this study had to meet the requirements of being full time employed in an organization and working within a team, lead by a team leader. Two questionnaires were handed separately to team leaders and to team members. Teams needed to be functioning in innovative contexts, as such a context is vital in assuring that constant innovation is a requirement at the organization and for the team in order for businesses to evolve. These businesses are assured to manufacture high quality innovative products, designs or services as they have to constantly adapt to the changing environment and embrace new technologies in their business solutions (Sherman & Schultz, 1998). The teams included in the dataset were for example from professional areas such as research and development, product development and marketing. The research team which consisted of 4 master students aimed to reach 40 teams for the study, which is similar to the number of teams several previous studies obtained (Bain, Mann, & Priola-Merlo, 2001; Eisenbeiss, van Knippenberg, & Boerner, 2008; Paulsen, Callan, Ayoko, & Saunders, 2013).

Advertisement of the study was channeled through leaflets, emails and contact details of the organization if they aspired to participate in the research study. Research has suggested that these specific channels are effective at recruiting for research and development (Yancey, Ortega, & Kumanyika, 2006). Researchers made a list of possible organizations they could get a response from. Subsequently, contact between the researcher and the organization was made personally, thus using convenience sampling.

Design

A cross-sectional study was designed and two different questionnaires were handed in: one to the team leaders and one to the team members. The former entailed that team leaders not only had to answer the basic demographic questions, but note

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down the function of each team member, the total number of members in the team and report on team innovation scores. The latter questionnaire were given to team members to rate individual levels of openness to experience and participative safety. All members and leaders from each team were required to sign a consent form prior to the study. The information sheet provides information for the participants to be aware that their data is confidential and if they choose to do so, they could ask to delete their data at a later stage. Since their participation is entirely voluntary, they could withdraw their participation at any point. If the participants agreed to continue the study, their background and demographics were asked in terms of their gender, educational level, age, tenure in company, job tenure, company size and type of industry the employee of the organization is based in.

Procedure

The following scales were delivered in Dutch or English depending on the main language used within the organization. Team leaders submitted the function of each member of the team, and through this, the diversity index was calculated. Functional diversity is measured through a Heterogenous scale devised by Blau (1977) that gives an index of the amount of diversity that exists within the team. This information can be provided by the team leader as to which team member has expertise in what area. Thorough the use of the Blau equation of heterogeneity, it is possible to derive the amount of functional diversity a team has. The equation is: $1 - \sum P_i^2$ and P_i is represented as the “proportion of the total team of each function category” (Somech & Drach-Zahavy, 2011). Considering that the maximum variety value could increase with team size, it was vital to standardize the current scores (Harrison & Klein, 2007) . In order to do so, the “Maximum Blau” was calculated first, and was determined through a simple formula of subtracting 1 from the sum of total members in the team and dividing

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the result by the sum of total members in the team: $(\Sigma - 1) / \Sigma$. The second and final step in standardizing the current scores was to calculate the “Index of Quality Variation” (IQV: Harrison & Klein, 2007; Agresti & Agresti, 1978; Mueller, Schuessler, & Costner, 1970). IQV is a standardized measurement of Blau’s index and is calculated by dividing the initial index by the “Maximum Blau”:

$$IQV = (1 - \sum P_i^2) / [(\Sigma - 1) / \Sigma]$$

The remaining materials comprised for team leaders to complete for the investigation included “Team Innovation Scale” (Litchfield, Karakitapoglu-Aygun, Gumusluoglu, Carter, & Hirst, 2018), a five-item on a five-point Likert scale ($1=Never$; $5=Always$) for the variable “Team Innovation” ($\alpha = .83$). Team leaders were required to evaluate the innovative behaviour of their teams during the last 12 months and sample items include “*Team members often implemented new ideas to improve the quality of our products and services*” and “*This team created new ideas for difficult issues.*” (see Appendix A). Following this, team members then responded for “Participative Safety” that was assessed using the “Team Climate Inventory” (TCI: Anderson & West, 1998; Ouwens, Hulscher, & Wollersheim, 2009) but only selecting eight-items on a five-point Likert scale ($1=strongly disagree$, $5=strongly agree$). Examples of these items include “*We often interact with each other*” and “*Team members often meet each other both formally and informally*” ($\alpha = .89$). This participative safety part of the questionnaire is subdivided into two parts consisting of “team participation” and “safety” (Anderson & West, 1998). The TCI has previously been suggested to have high internal consistency (Duijsens, Goekoop, Spinhoven, & Spermon, 2000) and high validity that is consistent across many researchers (Mathisen, Einarsen, Jorstad, & Bronnick, 2004) (see Appendix B).

Additionally, the moderator variable answered by team members was “Openness to Experience” and was analyzed using the Big Five Inventory (BFI; John & Srivastava, 1999), only selecting the applicable 10 items for this specific personality trait ($\alpha = .50$). This inventory is on a five-point Likert scale ($1 = \textit{strongly disagree}$, $5 = \textit{strongly agree}$). Participants were required to state to what extent they agree with certain statements about themselves. Examples of items include “*Has active imagination*” and “*Is original, comes up with new ideas.*” The BFI has been extensively researched and has been suggested to be one of the most highly valid and reliable measures of the five main personality traits across the board (Fossati, Borroni, Marchione, & Maffei, 2011) (see Appendix C). This questionnaire was distributed through “Qualtrics”, a secure online platform whereby participants can create their own unique identification code in case they want to withdraw their data at a later stage and be able to answer on the domain anonymously.

Results

The purpose of the study was to conduct analyses of the data aggregated at the team-level. Therefore, intraclass correlation coefficients (ICC) was vital in determining reliability of the data points submitted by members through the questionnaire. This was to determine whether data could be aggregated at the team level. After the data collection, calculations of ICC (1) Scores were devised for the following variables:

Openness to Experience and *Participative Safety*.

ICC (1) is an estimation that provides unbiased properties of the group-level data due to number of groups in the data or group size (Bliese & Halverson, 1998). It is also conducted in order to check homogeneity of variance tests (Ludtke & Trautwein, 2007). If this value is above 0.10 (10%), the individual level data variance is interpreted to be

the result of group-level properties that the data has provided (Bliese & Halverson, 1998, p.168).

These scores were calculated using a One-Way ANOVA Analysis test whereby the aforementioned variables were the dependent variable and the group identifier was named as the independent variable. Through this, it was possible to determine the Mean Square Within Subjects and the Mean Square Between Subjects. This data is represented in *Table 1*.

The next step included calculating ICC (2) Scores for the same variables: openness to experience and participative safety. ICC (2) is a very similar analysis to ICC (1) whereby ICC (2) is the group mean reliability coefficient (Bliese & Halverson, 1998). Additionally, k is defined as group size.

The ICC (1) and ICC (2) Scores were thoroughly analysed in order to check whether the data was sufficiently reliable to perform team-level data analysis. The values for both ICC (1) and ICC (2) are in the table below (Table 1. *ICC (1) and ICC (2) Values for Openness to Experience and Participative Safety*) respectively.

Table 1. *ICC (1) and ICC (2) Values for Openness to Experience and Participative Safety.*

Values	Variable	
	Openness to Experience	Participative Safety
MSB	0.176	0.528
MSW	0.206	0.437
Within Percentage	0.539	0.453
k	38	38
ICC (1)	-0.00385	0.00545
ICC (2)	-0.170	0.172
ICC	0.461	0.547

From the table above, it is possible to see negative variance values for *Openness to Experience* and not enough variance for *Participative Safety*. These low values are

deriving from a lower between-group variance than within-group variance. Low values of ICC (2) are also noting that team-level analysis data would not differ from individual level analysis of the same variables (Bliese, 1998, p.369).

The purpose of the study was to conduct the analysis at the team-level, and therefore, it is critical to demonstrate high within group agreement. Since the ICC (1) and ICC (2) values did not demonstrate this exactly, Rwg values will be used as a means to establish reliability. Previous research has suggested that using Rwg's (within-group agreement indices) in these cases is more appropriate than previous reliability indices of ICC (1) and ICC (2) values (LeBreton et al., 2003; James, Demaree, & Wolf, 1984). The implications of these will be further discussed in the *discussion* section.

Table 2.
Rwg Values for Openness to Experience and Participative Safety

Team	Rwg Values	
	Openness to Experience	Participative Safety
Average Rwg	0.848	0.878

The within group agreement for openness to experience was (Rwg= .85) and for participative safety was (Rwg= .88). Therefore, it was possible to aggregate the data at the team-level since the values were greater than the cut-off point of 0.70 (Dunlap, Burke, & Smith-Crowe, 2003).

Mediation Analysis

Before the analyses, outliers and the model assumptions were checked. Data was screened using Mahalanobis distance. The two outliers remained within the parameters to conduct the analyses and the data points were therefore not removed. To test the *Hypothesis 1* that there is a mediation effect of participative safety in the relationship

between functional diversity and team innovation, a hierarchical multiple regression analysis was conducted using Model 4 of PROCESS by Hayes (2013). The first path (Path A) of functional diversity did not produce statistical significant results to predict participative safety, $b=-.31$, $t(34)=-.92$, $p=.36$. Furthermore, the second path (Path B) participative safety also did not yield any significant results of participative safety predicting team innovation, $b=.31$, $t(33)=1.28$, $p=.21$. The direct effect of functional diversity predicting team innovation (Path C') was also statistically non-significant, $b=.11$, $t(33)=.23$, $p=.82$. The mediation was analyzed for the indirect effect of functional diversity on team innovation through participative safety (Path C) and was reported to have a non-significant effect through confidence intervals, $b=-.097$, $SE=.182$, 95% CI [-.571, .146]. It is important to note that team tenure and team size was calculated as the covariate variables within the analyses in order to control for possible external factors.

Table 3.
Mediation results of Participative Safety on the relationship between Functional Diversity and Team Innovation

Path	b	SE	t	p	Confidence Intervals	
A	-.31	.33	-.92	.36	-.985	.369
B	.31	.25	1.28	.21	-.185	.814
C'	.11	.48	.23	.82	-.870	1.095
C	-.097	.18			-.571	.146
Average Team Tenure	-.0083	.0047	-1.8	.084	-.018	.0012
Team Size	-.0033	.021	-.15	.88	-.047	.040

Moderation Analysis

To test the *Hypothesis 2* that there is a moderation effect of openness to experience in the relationship between functional diversity and team innovation, a hierarchical multiple regression analysis was conducted using Model 1 of PROCESS by Hayes (2013). For the first step, functional diversity effect on participative safety was included, $b=.0041$, $t(32)=.01$, $p=.99$, and there was no statistical significance. To avoid problematic high multicollinearity with the interaction, the variables were centered and an interaction term was devised between functional diversity and openness to experience. For the second step, openness to experience effect on participative safety was then conducted, $b=.43$, $t(32)=1.37$, $p=.18$ and there was no statistical significance. The interaction of these two relationships to form the moderation effect was also not significant, $R^2=.031$, $F(1,32)=1.17$, $p=.29$, $b=-1.89$, $t(32)=-1.08$, $p=.29$. For this analysis, team tenure and team size was also calculated as the covariate variables within the analyses.

Table 4.
Moderation Results of the Effect of Openness to Experience to the relationship between Functional Diversity and Participative Safety

Variable	b	SE	t	p	CI (95%)	
Functional Diversity (FD)	.0041	.40	.010	.99	-.808	.816
Openness to Experience (OE)	.43	.32	1.37	.18	-.211	1.078
Interaction (FD x OE)	-1.89	1.75	-1.08	.29	-5.463	1.678
Average Team Tenure	-.00070	.0033	-.20	.84	-.0073	.0060
Team Size	-.012	.015	-.81	.43	-.043	.019

Mediated Moderation Analysis

For the third and final hypothesis, the analyses from Model 7 devised by Hayes (2013) was conducted. The mediated moderation effect was on the grounds that the relationship between functional diversity and team innovation was moderated by team-level openness to new experience and this relationship would be mediated by participative safety. A multiple regression was conducted and was found to not have any significant results associated with the mediated moderation analysis, $b = -.60$, $SE = 1.25$, 95% CI $[-4.394, .5281]$. For this analysis, team tenure and team size was also calculated as the covariate variables within the analyses.

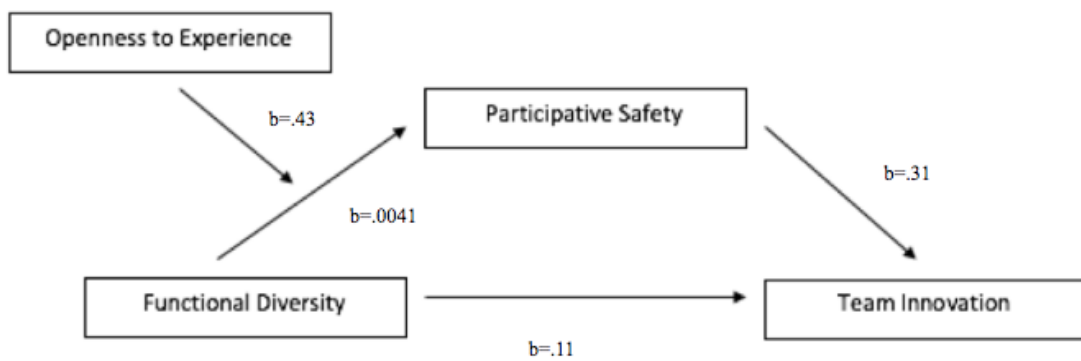


Figure 2. Process Model including Coefficient Values.

Pearson correlations were conducted at the team-level for further analysis of the relationships between the variables of the current study.

Measure	1	2	3	4
1. Functional Diversity	-			
2. Participative Safety	-.21	-		
3. Openness to Experience	-.28	.30	-	
4. Team Innovation	-.043	.25	-.017	-

Supplementary Analyses at Individual Level

Individual level analyses were conducted as additional analyses since ICC (2) scores were too low. Functional diversity could not be included in these analyses as this variable was at the team-level and since all study hypotheses included functional diversity variable, individual analyses were conducted to see the relations between all the other variables. For the team innovation, the assessments of team members were taken into account. A histogram, simple scatterplot and Q-Q plot was analyzed for each of the regressions conducted. These were to check the assumptions of multiple and simple linear regression in terms of homoscedasticity and linearity and they both fulfilled the requirements.

Simple linear regressions were conducted for each relationship. The results indicated that openness to experience was significantly related to team innovation ($\beta = .46$, $p < .05$). Another simple linear regression was calculated to predict team innovation based on participative safety. The results of the simple linear regression indicated that there was a significant relationship between participative safety and team innovation ($\beta = .50$, $p < .001$).

As a result of these analyses, an extra linear regression was conducted to predict participative safety based on openness to experience. The results of this linear regression established that openness to experience and participative safety were also significantly related to each other ($\beta = .284$, $p < .001$, $R^2 = .081$).

In sum, the additional analyses indicate that the mediated moderation variables are linearly related with each other, illustrating their statistical relationship.

Discussion

The analysis process suggested that there were no significant results at the team-level. This includes hypothesis 1 of the mediating effect of participative safety for the relationship between functional diversity and team innovation. Additionally, for hypothesis 2 moderation effect of openness to experience on the relationship between functional diversity and participative safety, there were also no significant results. Finally, hypothesis 3 was also rejected as there were also no significant effects of a mediated moderation whereby the interaction effect between functional diversity and openness to experience on team innovation was not mediated by participative safety. No team-level results yielded significant results. These results were clearly inconsistent with previous literature (Moberg, 2001).

A reason for these insignificant relationships could be the omitted factors in the current study model. Some other external factors or possible mediating or moderating variables could have been involved as previously suggested by research (Houston, Jackson, & Gilliotte, 2017). These external factors pertain to other team climate characteristics proposed by West (1990), such as vision or task orientation. Vision for example can provide members' with a clear goal, addressing all efforts and actions towards one clear mission statement (Peltokorpi & Hasu, 2014). This goal could impact how safely members can communicate with each other (Burningham & West, 1995). Perhaps, if all members understand the mission of their role, individuals will feel further motivated and secure to communicate their ideas and be open to new solutions and approaches (Manzini, 2014). Individuals will also feel their work will not be easily dismissed or criticized as members will feel it is relevant as they understood their task and role appropriately (Fairchild & Hunter, 2014). Leadership qualities are equally important determining motivation to indicate the vision direction, feel high levels of participative

safety or ensuring and reassuring the positive implication of functional diversity (Nijstad, Berger-Selman, & De Dreu, 2014). Leadership qualities have also been suggested to induce successful team innovation and therefore, could have a potential moderating or mediating role in the current study to participative safety specifically (Eisenbeiss, van Knippenberg, & Boerner, 2008).

On the other hand, individual-level results reached some level of statistical significance. Participative safety was a significant predictor of team innovation. This is consistent with current research and incredibly important in the recruitment stage of potential employees (Burch & Anderson, 2004). As acknowledged by Bain, Mann and Pirola-Merlo (2001), participative safety is still very important predicting the success of team innovation as team members will feel they can rely on each other to succeed with no further repercussions. This suggests that more ideas will be overviewed by the team, members will feel the need to share their perspective, and this holistic approach can give way to creativity and greater problem-solving abilities (LoBue, 2002). Participative safety is therefore an important implication when regarding success of innovation at the team level, and therefore should definitely be screened for at the recruitment stage of potential employees (Burch & Anderson, 2004).

Moreover, openness to experience was also a significant predictor of team innovation but non-significant results arised in combination of openness to experience with participative safety. Openness to experience was also shown to have significantly predicted participative safety. Both components are therefore crucial in understanding team innovation and should be further researched under what context these factors can be most beneficial. Research by De Dreu, Nijstad, Bechtoldt, and Baas (2011) support these results as creative originality will stem from openness to experience and extraversion. The authors suggest that openness to experience will designate the

orientation of approach of individuals and this could take place at the team-level of discussing openly about issues at hand, pertaining to participative safety (De Dreu, Nijstad, Bechtoldt, & Baas, 2011).

This suggests for different screening processes occurring at the recruitment stage.

Therefore, personality should be screened first in terms of openness to experience and then placing these individuals in a randomized team to check their participative safety qualities and ensure high innovative behaviour at the team level.

Study Limitations

There are a series of issues pertaining to the present study. This includes the mere fact of having very low and unreliable ICC (2) scores, due to low between-group variance. These negative values originated from the within-group variance that was greater than between-group variance. This lead to the unreliability of using and applying the ICC (2) scores. Therefore, rwg was used as determining reliability and this analysis has been supported by literature to be applied in the case of low ICC (2) values (James, Demaree, & Wolf, 1984; Le Breton et al., 2003). Additionally, a small sample size of 38 teams was reached at the team-level, almost reaching the desirable number of teams. This was after extrapolating the mean from the teams used in research literature (Bain, Mann & Priola-Merlo, 2001; Eisenbeiss, van Knippenberg, & Boerner, 2008; Paulsen, Callan, Ayoko, & Saunders, 2013). This is crucial as small sample sizes usually reduce statistical power of the analyses conducted (Button et al., 2013). Small sample sizes could also lead to higher variability that in turn leads to bias in results (Hertzog, 2008). As a result of this, team tenure and team size was calculated as the covariate variables within the analyses in order to control for possible external factors. However, this does not eliminate the total external factors causing study noise.

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Furthermore, the sample size at the team-level included teams from the same organizations and teams from different organizations. This could produce alternative results for the reason that organizational culture pushes for a level of innovative performance that could be different for other companies (Hogan & Coote, 2014). Moreover, innovation could be defined and understood differently across organizations in terms of their ultimate goal and mission (McDonald, 2007), leading to differing results for team innovative processes. In terms of successfully innovating, support for innovation by the organization is crucial in determining the success of innovation (Hammond, Neff, Farr, Schwall, & Zhao, 2011) and this level of support could be higher or lower in different organizations (Llorens Montes, Moreno, & Fernández, 2004). As a result, this external factor or confounding variable could have study noise and is important to note that needs to be controlled for in future research (MacKinnon & Luecken, 2008). This points a question of internal validity of the present study (Halperin, Pyne, & Martin, 2015). The desirable outcome would be to assess data from different teams in different companies, or different teams from the same company. Likewise, the independent variable functional diversity produced complications throughout the study. Team leaders reported the team members' function as the same but at a higher or lower level of the organizational pyramid due to higher organizational tenure or work experience. This could indicate further training and more advanced expertise, and therefore the analysis included these in a different functional setting (Buyl, Boone, Hendriks, & Matthyssens, 2011). However, this extra training or expertise cannot be guaranteed as the individuals might engage in different responsibilities but have the same functional background.

Lastly, there could be a social desirability bias especially from the team leader's behalf. Although the study was strictly confidential, team leaders' have an extra responsibility

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of making sure that the organization is seen in a good light and having a good image (Elsbach, 2014). As a result, it could have indicated higher team innovation than there is in reality (Fisher, 1993). As a consequence of these limitations, further explanation of future solutions for research are pinpointed in the next section.

Future Directions

After discussing factors leading to limitations surrounding the study, future research should be directed in a variety of ways. The following study is relevant to team leaders in innovative organizations that want to strive for top innovation performance by the members within the team. The variables mentioned in this study, specifically functional diversity, participative safety and openness to experience, can lead to a better understanding of the processes and mechanisms behind successful team innovation and how to best select and recruit members based on these factors.

Firstly, it could be interesting to check the statistical difference between team leaders' ratings and team members' ratings of team innovation. Leadership qualities could also have an influence on team members' production of innovation as well as their ratings towards this task (Deschamps, 2005). Since leaders and members had a different questionnaire, maybe a study could focus on the exact nature of the differences in perspectives on the matter. Team leaders might have a more positive or negative apparent look on the innovative outcome produced by the team than what is the actual reality of the team setting for the team members (Ahearn, Ferris, Hochwarter, Douglas, & Ammeter, 2004). This suggestion could also take place with the other aforementioned variables involved in the current study such as openness to experience and participative safety. Having said this, leadership qualities are likewise important in determining innovation outcomes (Gumusluoglu & Ilsev, 2009). Team leaders might have

motivational qualities leading to a more positive perspective on their team or vice versa, creating a discrepancy between the perceived team innovation versus the reality (Rosing, Frese, & Bausch, 2011). Therefore, future studies should be directed at team leaders' qualities and team members' ratings of participative safety for example. Secondly, other personality characteristics apart from openness to experience have been shown to produce team innovation. These are namely extraversion (Kristof-Brown, Barrick, & Kay Stevens, 2005) and conscientiousness (Reiter-Palmon, Wigert, & de Vreede, 2012). As a result, the congregation of these three personality characteristics could be vital in determining characteristics of team leaders leading to the best performance outcome for team innovation specifically. Although there are specific characteristics in personality, personality as a whole entails a much more holistic approach and a combination of temperaments could be a more realistic approach to human behaviour, teams and creativity (Kurtzberg & Amabile, 2001). Another solution would be to aggregate and check for the variance within the team of each members' personality, if a large inter-group personality variance are hindering team processes or if it helping the team attracting a bigger pool of solutions through different perspectives and ways of working (Sumer & Knight, 2001).

Practical Implications

The results from the current study provide essential groundwork in recruitment process in organizations, specifically, in highly innovative contexts. Screening potential employees for their personality trait of openness to experience is an influential first step. Individuals with high levels of openness to experience have been suggested to provide creative and novel ideas (McCrae, 1987). Research has also suggested that individuals with high levels of openness to experience have an extra motivation of communicating

their ideas internally and externally, imperative for successful team innovation (McCrae & Sutin, 2009). This is further emphasized in the current study whereby openness to experience predicted team-level dynamics of participative safety and most importantly, team innovation. Individual traits will exacerbate the effect of participative safety within the team setting, a major predictor of team innovation (Burningham & West, 1995). The next logical step would be to investigate these characteristics in a team-setting to observe how individuals work closely together. Potential employees should be placed in a situation or task that requires teamwork and dynamics in order to produce creative solutions. These tasks can study human behaviour in a more realistic setting, and in this case team innovation could be produced in real time. This task could include the “Tower of Hanoi” (Cagan, 2007) that is a problem solving puzzle that can be conducted at the team level, showing how quickly members and leaders can work well together to produce the outcome. This task involves a high level of creativity and synergetic team dynamics in order to be solved. Observational data could aid in understanding the mechanisms that are involved in reaching the solution. The most interconnected team should be the hired individuals for the organization as these would work well under pressure, have high problem solving abilities, have high participative safety as ideas were pushed through and have a clear understanding of the goals imposed by the organization (Anderson, 1993).

In conclusion, future studies should focus on preceding variables leading to team innovation in a more realistic context and assessing differences between the team members and team leaders. Practical applications of the results from the present study include screening the personality characteristics of specifically openness to experience for individuals at the recruitment stage. Specifically, in organizations working mainly producing innovative products or services at the team-level. After this initial

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recruitment stage, aggregating these individuals with high levels of openness to experience to work together in random teams for a common creativity goal, is crucial in determining individuals with the most participative safety. This will ultimately lead to successful team innovation according to results from the current study.

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Appendix A

Team Innovation Scale (Litchfield, Karakitapoglu-Aygun, Gumusluoglu, Carter, & Hirst, 2018)

1 = Never, 5 = Always

1. Team members often implemented new ideas to improve the quality of our products and services
2. This team gave a lot of consideration to new and alternative methods and procedures for doing their work
3. Team members often produced new services, methods, or procedures
4. This was an innovative team
5. This team created new ideas for difficult issues

Appendix B

Participative Safety (Dutch Version) (Ouwens, Hulscher, & Wollersheim, 2009)

1 = Strongly Disagree, 5 = Strongly Agree

1. We gaan vaak met elkaar om
2. We hebben regelmatig contact met elkaar
3. Als team houden we contact met elkaar
4. Teamleden treffen elkaar vaak zowel formeel als informeel
5. Teamleden doen hun best om informatie binnen het hele team te delen
6. Teamleden houden elkaar op de hoogte van werkgerelateerde zaken
7. In het team delen we gewoonlijk informatie met elkaar, in plaats van dat we deze voor onszelf houden
8. We beïnvloeden elkaar allemaal

Appendix C

Openness to New Experience Scale from Big Five Inventory (BFI; John & Srivastava, 1999)

1= Strongly Disagree, 5= Strongly Agree

1. Is original, comes up with new ideas
2. Is curious about many different things
3. Is ingenious, a deep thinker
4. Has an active imagination
5. Is inventive
6. Values artistic, aesthetic experiences
7. Prefers work that is routine
8. Likes to reflect, play with ideas
9. Has few artistic interests
10. Is sophisticated in art, music or literature