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Dr. J. Gevers & Dr. S. Rispens

The Effect of Psychological Safety on Task Conflict and Team Performance

Group Assignment

Group 13

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Authors:
Boonstra, V.H.N. (Victor) - 0939895
Dros, A. (Arwen) - 1013996
Halilović, E. (Edin) - 1262572
Schmidt, M.J.A. (Mykel) - 0912900
Subakov, D. (Darija) - 1592726

Abstract

This study aims to test whether the effect of psychological safety on general team performance is curvilinear, and whether this effect is mediated by task conflict. By performing correlational analyses and logistic regressions on data collected from more than 300 innovative teams in the Netherlands, significance of the proposed relationships was tested. Findings confirm that increased psychological safety has a positive influence on general team performance and that this effect is to a slight extent curvilinear; after a certain amount of psychological safety, a further increase led to a slight decrease of general team performance. However, the effect of psychological safety on general team performance was only partially mediated by task conflict. The amount of task conflict is significantly reduced in a psychologically safe climate. The main implication of this research is that psychological safety is important as it decreases task conflict and consequently improves the general team performance. However, the curvilinear effect of psychological safety underlines that there is a boundary condition; too much psychological safety will negatively affect team performance, albeit slightly.

1. Introduction

In recent years, the significance of learning and innovation in organizations has led to an increase in relevance and research of psychological safety (Edmondson & Lei, 2014). While psychological safety improves general team performance by creating perceived safety to take interpersonal risks, too much psychological safety can reduce general team performance. This is because teams that have a high level of psychological safety might exercise unethical behavior (Pearsall & Ellis, 2011). Despite existing literature pointing to detrimental effects of too much

psychological safety, there seems to be a gap in research that verifies whether there is an inverted U-shaped curvilinear relationship or not. Additionally, to the best of our knowledge, there is also no research done to verify that this curvilinear effect also exists in the mediating role of task conflict on the relationship between psychological safety and general team performance. Therefore, this research attempts to answer the following question: W*hat is the effect of psychological safety on general team performance and is this effect mediated by task conflict?*

The remainder of this report is written in the following way: First a theoretical background is given, along with an explanation of the hypothesized relationships. Then a description of the chosen methods (i.e., sample and data collection, measures, statistical analyses and procedures) is discussed. Following this, the results are presented. Furthermore, the results are discussed by providing theoretical and managerial implications. Limitations of our research and recommendations for further research are consequently given. Finally, a benchmark analysis of two innovative teams from a specific company is presented.

2. Theoretical background, hypotheses and research model

Psychological Safety and General Team Performance

Psychological safety has been researched since the 1960s and has become increasingly important in recent years partially because of the current significance of learning and innovation in organizations (Edmondson & Lei, 2014). The most common definition used to explain psychological safety is by Edmondson (1999), who describes it as a shared perception of team members that they are safe to take interpersonal risks. In their meta-analysis, Frazier et al. (2017) have found that psychological safety impacts a number of organizational outcomes such as performance, increased learning, engagement, information sharing and higher satisfaction and

commitment. Furthermore, it has been found that a psychologically safe climate leads to divergent thinking, creativity, and risk taking, and that by motivating learning, it promotes team performance (Edmondson & Lei, 2014). Contrarily, in their paper, Pearsall and Ellis (2011) proposed a significant boundary condition regarding the benefits of psychological safety. They explain that in specific team conditions, psychological safety could unintentionally contribute to behaviour that is detrimental to the long-term success of the organization. When researching the relationship between utilitarianism and unethical outcomes, they found that teams with high levels of psychological safety were more likely to engage in unethical behaviour, such as cheating (Pearsall & Ellis, 2011). In accordance with that, Zhang and Wan (2021) have researched the relationship between psychological safety climate and dysfunctional behaviour in teams. When psychological safety climate strength is weak, meaning that there is a high variation of team members' perceptions of psychological safety, it could have negative consequences and lead to more dysfunctional behaviour (Zhang & Wan, 2021). Building on the current research, it could be argued that psychological safety has both positive and negative effects on team performance depending on its level. As the amount of psychological safety varies, it could result in different levels of team performance, suggesting an inverted U-shaped curvilinear relationship. Newman et al. (2017) also called on researchers to explore the potential curvilinear effects of psychological safety on outcomes at different levels of analysis and therefore it is hypothesised:

H1a: There is an effect of Psychological Safety on General Team Performance.

H1b: The effect of Psychological Safety on General Team Performance is curvilinear.

Task Conflict and Psychological Safety

Conflict is generally defined using three themes: interdependence between the parties, perceived incompatibility among the concerns of these parties, and some form of interaction (Thomas, 1992). A distinction is made between two types of conflict, namely task and relationship conflict (Guetzkow & Gyr, 1954; Priem & Price, 1991). Task conflict is based on the substance of the task that the group is performing and relationship conflict is based on the group's interpersonal relations. Later, a third type of conflict was added; process conflict is a disagreement among group members about the logistics of task accomplishment, such as the delegation of tasks and responsibilities (Jehn & Bendersky, 2003). This research examines the mediating role of task conflict on the relationship between psychological safety and general team performance. Therefore out of the three conflicts, task conflict is the only one further discussed.

A study by Wilkens and London (2006) concluded that the more team members felt psychologically safe, the less they experienced task conflict. This indicates that more psychological safety leads to less task conflicts. Therefore, we hypothesize the following:

H2: There is a negative relationship between Psychological Safety and Task Conflict.

Task Conflict and General Team Performance

Research has found opposing effects of task conflict on team performance. A number of studies have investigated and demonstrated its positive correlation to group performance (Jehn, 1994; Pelled et al., 1999). Amason et al. (1995) further corroborate that conflict within teams is crucial for enhancing team success by increasing the effectiveness of the decision making process. A similar effect was found by Pelled et al. (1999), as they confirmed that task conflict

enhances team performance through a deeper understanding of task issues followed by sharing information needed for problem solving, decision making, and idea generation. However, task conflict's negative effects on team performance have been examined thoroughly as well (Wall & Callister, 1995; De Dreu & Weingart, 2003). Wall and Callister (1995) have found that conflict in teams can lead to frustration, mutual distrust, lack of commitment, and even physical harm among team members. Interestingly, there has also been studies exploring the dynamic nature of task conflict, suggesting that moderate levels are beneficial for task performance, while higher levels could be detrimental, and that this could depend on the current stage of the decision making process (Amason & Sapienza, 1997; Jehn & Mannix, 2001).

Jehn (1995) made the distinction between routine and non-routine tasks. Routine tasks have little task variability, which is defined as the amount of variety in methods and repetitiveness of task processes (Hall, 1972) and are therefore done the same way each time, with predictable results (Thompson, 1967). On the contrary, non-routine tasks have high variability, few set procedures, a high degree of uncertainty, and require problem solving (Van de Ven et al., 1976). The data of this research is collected in teams performing innovative tasks. It can be argued that innovation is a non-routine task, therefore only findings on non-routine tasks by Jehn (1995) are relevant for this research. According to the research conducted by Jehn (1995), there is a curvilinear effect of non-routine task conflict on group performance. Namely, absence of task conflict results in complacency about problems and decisions. A moderate level of task conflict causes critical evaluation of problems and decision options. However, high levels of task conflict interfere with group performance because the amount of conflicting information becomes overwhelming and sight on the main or original goal of the discussion is lost. This finding was also concluded by De Dreu (2006) and more recently by Bang and Park (2015).

Based on the extensive literature review, it can be expected that there is a relationship between task conflict and the performance of teams, and it is suspected that this relationship is curvilinear. It can be assumed that only moderate levels of conflict lead to more information sharing and effective decision-making, resulting in increased general team performance. Very low or very high levels of task conflict are expected to cause negative consequences in the team and thus decrease performance.

H3a: There is an effect of Task Conflict on General Team Performance.

H3b: There is a curvilinear effect of Task Conflict on General Team Performance.

Combining the aforementioned literature-supported hypotheses, it can be deduced that task conflict at least partially mediates the curvilinear relationship between psychological safety and general team performance. It is assumed that the direct effect of psychological safety is significant on its own, but that part of the total effect of psychological safety on general team performance can be explained through task conflict. The inclusion of task conflict in the model can enable a deeper and more comprehensive explanation of the relationship between psychological safety and general team performance.

H4: Task Conflict partially mediates the relationship between Psychological Safety and General Team Performance.

Figure 1 below provides a simple overview of the final research model including all construct variables and hypothesized relations.

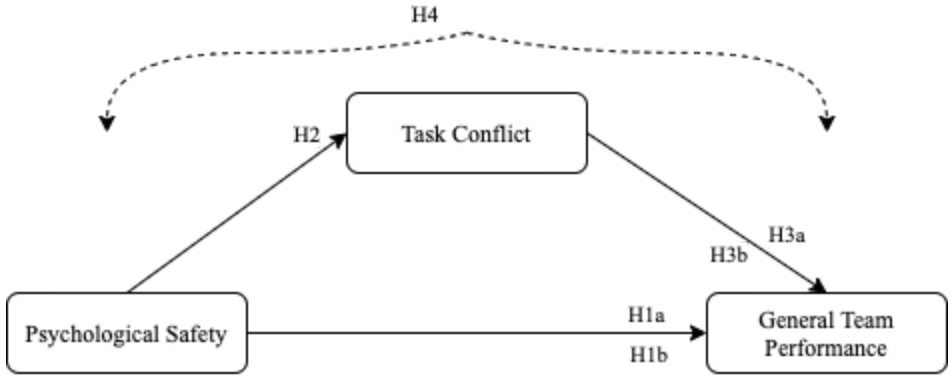

Figure 1. Overview of the research model including all constructs and hypothesized relations

3. Methodology

3.1 Sample and Data Collection

The sample of this research consists of employees operating in innovative teams within a company in the Netherlands. These teams were selected from over 300 companies. Each team member was asked to complete a questionnaire, containing 115 questions, which gathered data about various constructs relevant to new product development. A different questionnaire, containing 18 questions, was used for the team leader. 82% of the sample is male and the age ranged from 19 to 76, with an average of 34 years old.

3.2 Measures

In this research paper only three categories from the questionnaires were used. These are the following categories: Psychological Safety, Task Conflict and General Team Performance. Cronbach's Alpha was used to determine the internal consistency of the constructs. A Cronbach level of 0.70 or higher can be seen as sufficient and reliable.

Psychological Safety is measured by using the Edmondson's (1999) scale. Five items of this scale are used, including "If you make a mistake on this team it is often held against you," "People on this team sometimes reject others for being different," and "It is safe to take a risk on this team." Each item was scored on a 5-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree) and aggregated to the team level.

Task Conflict is measured using Jehn's (1995) four-item scale to measure task conflict. Three of the items are used in the questionnaire. This scale included questions such as "How often are there disagreements between team members?", "How often is there inconsistency about ideas in this team?", and "How often must this team overcome differences regarding the content of decisions?". Each item was scored on a 5-point Likert-type scale ranging from 1 (almost never) to 5 (often).

General Team Performance was measured by a shortened version of a scale developed by Rispens et al. (2017). This shorter version consists of three items. Questions are: "This team performs well at work", "This team is effective in getting things done on time" and "Working in this team is an enjoyable experience". The items were rated on a 7-point Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree).

3.3 Statistical Analyses & Procedures

The data will be checked for missing values, outliers, and errors. Missing data on items regarding General Team Performance, Task Conflict, and Psychological Safety are found for a total of 43 cases. Given the large total sample size, missingness below a negligible percentage (<10%). It was decided to delete these cases, given the negligible size. A general drawback of

this method is that it might alter results of the analyses due to patterns in data missingness, given that it is unknown whether the data is missing completely at random or not.

In order to find outliers and possibly remove them, boxplots were created; these can be seen in Appendix B. After analyzing these boxplots it was concluded to not drop the outliers since the entered data was correct and these outliers did not change the results.

In order to test the hypotheses, we will calculate Pearson's correlations, and use a logistic regression path analysis modeling tool (PROCESS) in SPSS statistics version 23.0 for windows to check for mediation. First, Pearson's correlation coefficient (*r*) will be used to conduct correlation analysis of the study variables. After this the two curvilinear hypotheses will be tested in SPSS. This will be done via the Regression and Curve Estimation commands. To test the curvilinear effects, the elements psychological safety and task conflict were squared. For each effect, the linear effect model was compared with the squared element interaction effect model. The R-squared value was an important indicator. Lastly, Model 4 of Hayes' (2017) PROCESS macro and Bootstrap method will be used to examine the mediating role of task conflict in the relationship between psychological safety and general team performance.

4. Results

This section presents the results of our research. Table 1 displays some general descriptive statistics. Based on this table it was concluded that the variables of our interest psychological safety, task conflict and general team performance satisfied the normality criteria. Furthermore, in Appendix C QQ-plots can be found for the variables, these indicate normality. A general guideline is that for both the skewness and kurtosis the value should be lying within +1 and -1 to

be considered normally distributed (Hair et al., 2016). For the variable psychology safety it is at the limit or close to.

Table 1. General statistics

Variable	N	X	σ	Skewness	Kurtosis
Psychological Safety	1357	4.08	0.66	-0.99	1.00
Task Conflict	1357	2.65	0.82	0.15	-0.18
General Team Performance	1357	5.43	0.94	-0.75	0.59
Age	1226	34.17	10.70	0.76	-0.27
Gender	1336	.82	0.38	-1.67	0.79
Hours on the Project	1303	24.81	15.19	0.24	-0.19

In order to show significant relationships between the variables a correlation matrix was constructed with the use of SPSS. Table 2 displays these correlations of the variables. In the table it can be seen that the relationship between psychological safety and task conflict is significantly negatively correlated (-0.25). Similarly, the relationship between task conflict and general team performance is significantly negatively correlated (-0.22). However, both of these relationships have a low correlation. Correlation coefficients whose magnitudes are less than 0.3 have little if any (linear) correlation. The last relationship between psychological safety and general team performance is significantly positively correlated (0.45), however this is also rather weak because correlations between 0.45 and 0.75 are moderate but our result is at the lower limit. Based on these correlations, Hypothesis 1a, 2, and 3a are supported.

Table 2. Correlations

Correlations	PS	TC	GTP
PS	1		
TC	**-0.247****	1	
GTP	**0.447****	**-0.216****	1

N = 1357

Significant at ** p < .01

PS = Psychological Safety; TC = Task Conflict;

GTP = General Team Performance

Curvilinearity between Psychological Safety and General Team Performance

Full regression outputs for testing curvilinearity and partial mediation are found in Appendix A. An interaction model was constructed in SPSS, which compares two models, and is summarized in table 3. Model 1 shows the outcome of the linear predictor variable psychological safety on general Team Performance. Model 2 shows the outcome of the interaction and the squared variable on general team performance. The R-squared value of the non-linear model is slightly higher than that of the linear model, and it is significant at the $p < 0.01$ level. H1b is thus supported. There is an inverted U-shaped curvilinear effect of psychological safety on general team performance.

Table 3. Regression outputs for Psychological Safety

Interaction model	**R**	**R-squared**	**Adj. R-squared**	**R-sq change**	**F**	**p-val**
Model 1 - Predictors: PS	0.439	**0.193**	0.190	**0.193**	88.988	**0.000*****
Model 2 - Predictors: PS, PS-Squared	0.455	**0.207**	0.203	**0.015**	6.824	**0.009****

Dependent Variable: General Team Performance

PS = Psychological Safety

Significant at ** p < .01, *** p < .001

Curvilinearity between Task Conflict and General Team Performance

The same model comparison from table 3 is applied for testing curvilinearity between task conflict and general team performance. A summary of the results can be found in table 4. The second (non-linear) model has a higher R-squared value, but it is not significant (p = 0.149). H3b is thus not supported. There is no inverted U-shaped curvilinear effect of task conflict on general team performance.

Table 4. Regression outputs for Task Conflict

Interaction model	**R**	**R-squared**	**Adj. R-squared**	**R-sq change**	**F**	**p-val**
Model 1 - Predictors: TC	0.167	**0.028**	0.025	**0.028**	10.692	**0.001*****
Model 2 - Predictors: TC, TC-Squared	0.182	**0.033**	0.028	**0.005**	2.088	0.149

Dependent Variable: General Team Performance

TC = Task Conflict;

Significant at *** p < .001

Partial mediation of Task Conflict

In order to test the hypothesis of the partial mediation of task conflict on the relationship between psychological safety and general team performance the model 4 of Hayes' (2017) PROCESS macro was used. Psychological safety was defined as an independent variable, task conflict as mediator and general team performance as outcome variable. Table 5 presents the regression analysis of the dependent variables task conflict and general team performance. The results showed that psychological safety has a positive relationship with general team performance (0.61) and a negative relationship with task conflict (-0.32) and the models are significant. Furthermore, task conflict is negatively related to general team performance (-0.13).

Based on these relationships, it can be concluded that task conflict partially mediates the relationship between psychological safety and general team performance. H4 is thus supported.

Table 5. Regression model with mediation of Task Conflict

Predictor variables	β	SE	t	R-squared	F
OUTCOME VARIABLE					
General Team Performance				**0.21*** **	**183.30**
Psychological Safety	**0.61*** **	0.04	16.92		
Task Conflict	**-0.13*** **	0.03	-4.39		
Task Conflict				**0.06*** **	**92.58**
Psychological Safety	**-0.32*** **	0.03	-9.62		
TOTAL EFFECT OUTCOME					
General Team Performance				**0.20*** **	**342.75**
Psychological Safety	**0.64*** **	0.03	18.51		

Significant at *** $p < .001$

5. Discussion

5.1 Theoretical implications

The aim of this paper was to extend the literature on psychological safety by investigating its relationship with general team performance and task conflict. The literature review has revealed some inconsistencies in the effects of psychological safety and task conflict on the performance of teams. It was decided to examine whether the effect of psychological safety on general team performance is curvilinear and whether this is mediated by task conflict. The most important findings were assessed in the previous section and will now be further discussed.

Research has abundantly focused on the positive effect of psychological safety on general team performance. However, recently, research has proven a negative effect of too much psychological safety (Pearsall & Ellis, 2011). This is called a too-much-of-a-good-thing effect

(Pierce & Aguinis, 2013) and suggests a curvilinear (inverted U-shape) relationship. To the best of our knowledge, we are the first to empirically prove a significant curvilinear effect between Psychological Safety and General Team Performance, even though the improvement of the curvilinear model to the linear model is slight.

Second, the analysis found a significant negative relation between psychological safety and task conflict. This is in line with Wilkens and London (2006), who found that teams experienced less task conflict when team members felt psychologically safe.

The relationship between task conflict and general team performance was investigated next. Existing literature suggests opposing views on the direction of the relationship, creating some inconsistencies in this aspect. A possible solution for this could be the dynamic nature of task conflict that could explain differing effects, where only a moderate amount of conflict would be beneficial (Amason & Sapienza, 1997; Jehn & Mannix, 2001). However, the analysis conducted in this research has discovered a negative effect of task conflict on team performance. Thus, Hypothesis 3 is not supported. These findings are in line with the literature suggesting a negative effect of task conflict (Wall & Callister, 1995; De Dreu & Weingart, 2003).

Lastly, the results have confirmed the expected partial mediation of task conflict in the relationship between psychological safety and general team performance. All effects were found to be significant, thus supporting Hypothesis 4.

5.2 Practical implications

From this study, several practical implications can be deducted. First of all, psychological safety is important; it decreases task conflict which in turn improves the general team performance. In addition, even with task conflict out of the equation, it still has a positive effect

on general team performance. However, the curvilinear effect of psychological safety underlines that there is a boundary condition; too much psychological safety will negatively affect team performance. It is therefore important to pay attention in the workplace to the negative behaviors associated with too much psychological safety, such as cheating (Pearsall & Ellis, 2011). Therefore, managers are recommended to monitor the workplace and if needed actively discourage these negative behaviors associated with too much psychological safety.

Besides prioritizing psychological safety, attention should also be paid separately to the amount of task conflict, as this study concluded that this is significantly impacting the team's performance. Also here managers can play an important role; for example, by defusing conflicts, increasing perspective taking, and as previously mentioned, establishing a psychologically safe climate.

5.3 Limitations

When interpreting the results of this study, it is important to take its limitations into account. First of all, a significant limitation of this research is in regards to the sampling of the data, as only Dutch companies were asked to fill in the survey. Characteristics of teams in countries differ and these characteristics could impact the construct variables of this research which would consequently affect the outcomes of this research. For example, the Netherlands ranked as the sixth nation with the most diverse labor forces according to the diversity 2011 index rankings (Egan, 2012). In conclusion, the results are not necessarily generalizable to companies outside the Netherlands.

Secondly, as demonstrated with our case as well, self-completion questionnaires often result in missing data or lower response rates (Bell et al, 2019). Greater non-response can be a

source of a non-sampling error. It is a possibility that the employees who agree to participate may differ in various ways from those who do not agree to participate or can not be contacted. This difference could mean that a significant part of the sampling population is not spoken for in the final sample, making it not representative.

Thirdly, another issue with self-completion questionnaires is potential response bias; the results depend on the participants' honesty and judgement. Considering that some of the questions regard sensitive topics (e.g., conflict), a response bias may manifest as a result of the social desirability bias (Campbell et al., 1999).

Lastly, given that the scale is a Likert scale, there is a problem regarding the center category "Neither Agree Nor Disagree", because being neutral on a topic does not go hand in hand with having knowledge about the subject of the study (Chimi & Russell, 2009). I.e., when people do not understand the question, they will choose the middle option, even though this does not have to represent their actual stance had they understood the question.

5.4 Recommendations for future research

In contrast with hypothesis 3, which suggests a curvilinear effect between task conflict and team performance, our study found a negative linear effect of task conflict on team performance. However, as previously discussed, multiple sources in the literature (Jehn, 1994; Pelled et al., 1999; Amason et al., 1995) have found a positive effect of task conflict on team performance. Further research should be conducted to explain these conflicting findings. Perhaps the conflicting findings can be explained by different conditions under which task conflict has these positive effects on team performance and under which it has negative effects. Furthermore,

there still could be a curvilinear effect as well under certain conditions, as was hypothesized in this study.

Since the effect of psychological safety on team performance is curvilinear, too much psychological safety negatively affects team performance. This study concluded this negative effect is not happening through task conflict, as task conflict was found to have a linear effect with psychological safety and task conflict's curvilinear relationship with team performance was found to be insignificant. Therefore, the question remains; through which variable does high psychological safety negatively affect team performance? Hence, in the future more analyses could be performed—e.g., with multiple mediation models—to discover the mediator of the negative effect between high psychological safety and team performance.

Benchmark analysis

An analysis was conducted on two innovative teams within ThermoFisher Scientific, a provisioner of scientific instrumentation, reagents and consumables, and software services. Project team 1 was named “Mapping Elemental Spectroscopy”, and team 2 was named “Krios G4 with Heating Contamination”. The mean scores for psychological safety, task conflict, and general team performance of the teams were compared with the means of the total sample size by conducting independent-samples t-tests. The results are shown in appendix D. Both team 1 and team 2 scored significantly ($p < 0.05$) lower on psychological safety (mean = 2.20 and 2.50 respectively,) compared to the total sample mean (4.08). On the other hand, task conflict was not found to be significantly different from the total sample mean with $p = 0.704$ and $p = 0.370$ respectively. The same holds for general team performance with $p = 0.189$ and $p = 0.721$ respectively. However, the questionnaire was only filled in by one team member of the “Mapping Elemental Spectroscopy” project and by two team members of the “Krios G4 with Heating Contamination” project. The validity of the t-test results can be questioned due to this profoundly small sample size. However, it certainly gives a signal to further investigate the (lack of) psychological safety experienced by the team members. If this future investigation confirms that it is indeed low, action has to be taken which according to our research could lead to higher general team performance.

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Appendices

Appendix A. Regression Tables

Regression analysis hypothesis 1b

Regression

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	PS[b]	.	Enter
2	PSSq[b]	.	Enter

a. Dependent Variable: GTP

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,439[a]	,193	,190	,87457	,193	88,988	1	373	,000
2	,455[b]	,207	,203	,86782	,015	6,824	1	372	,009

a. Predictors: (Constant), PS

b. Predictors: (Constant), PS, PSSq

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	68,064	1	68,064	88,988	,000[b]
	Residual	285,295	373	,765		
	Total	353,359	374			
2	Regression	73,204	2	36,602	48,601	,000[c]
	Residual	280,156	372	,753		
	Total	353,359	374			

a. Dependent Variable: GTP

b. Predictors: (Constant), PS

c. Predictors: (Constant), PS, PSSq

Regression analysis hypothesis 3b

Regression

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	TC[b]	.	Enter
2	TCSq[b]	.	Enter

a. Dependent Variable: GTP

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	,167[a]	,028	,025	,95966	,028	10,692	1	373	,001
2	,182[b]	,033	,028	,95826	,005	2,088	1	372	,149

a. Predictors: (Constant), TC

b. Predictors: (Constant), TC, TCSq

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9,847	1	9,847	10,692	,001[b]
	Residual	343,513	373	,921		
	Total	353,359	374			
2	Regression	11,764	2	5,882	6,406	,002[c]
	Residual	341,595	372	,918		
	Total	353,359	374			

a. Dependent Variable: GTP

b. Predictors: (Constant), TC

c. Predictors: (Constant), TC, TCSq

Regression analysis hypotheses 4

Run MATRIX procedure:

***************** PROCESS Procedure for SPSS Version 3.5 *****************

T

Written by Andrew F. Hayes, Ph.D. www.afhayes.com

Documentation available in Hayes (2018). www.guilford.com/p/hayes3

****

Model : 4

Y : GTP

X : PS

M : TC

Sample

Size: 1356

****

OUTCOME VARIABLE:

TC

Model Summary

R	R-sq	MSE	F	df1	df2	p
,2530	,0640	,6309	92,5757	1,0000	1354,0000	,0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	3,9355	,1357	29,0050	,0000	3,6694	4,2017
PS	-,3159	,0328	-9,6216	,0000	-,3803	-,2515

****

OUTCOME VARIABLE:

GTP

Model Summary

R	R-sq	MSE	F	df1	df2	p
,4617	,2132	,7007	183,2985	2,0000	1353,0000	,0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	3,2915	,1821	18,0779	,0000	2,9343	3,6487
PS	,6052	,0358	16,9222	,0000	,5350	,6753
TC	-,1256	,0286	-4,3853	,0000	-,1818	-,0694

********** TOTAL EFFECT MODEL **********
OUTCOME VARIABLE:
GTP

Model Summary

R	R-sq	MSE	F	df1	df2	p
,4494	,2020	,7102	342,7514	1,0000	1354,0000	,0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	2,7972	,1440	19,4318	,0000	2,5148	3,0796
PS	,6449	,0348	18,5135	,0000	,5765	,7132

********** TOTAL, DIRECT, AND INDIRECT EFFECTS OF X ON Y **********

Total effect of X on Y

Effect	se	t	p	LLCI	ULCI	c_ps	c_cs
,6449	,0348	18,5135	,0000	,5765	,7132	,6838	,4494

Direct effect of X on Y

Effect	se	t	p	LLCI	ULCI	c'_ps	c'_cs
,6052	,0358	16,9222	,0000	,5350	,6753	,6418	,4218

Indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TC	,0397	,0099	,0211	,0595

Partially standardized indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TC	,0421	,0104	,0225	,0629

Completely standardized indirect effect(s) of X on Y:

	Effect	BootSE	BootLLCI	BootULCI
TC	,0277	,0068	,0148	,0414

********** ANALYSIS NOTES AND ERRORS **********

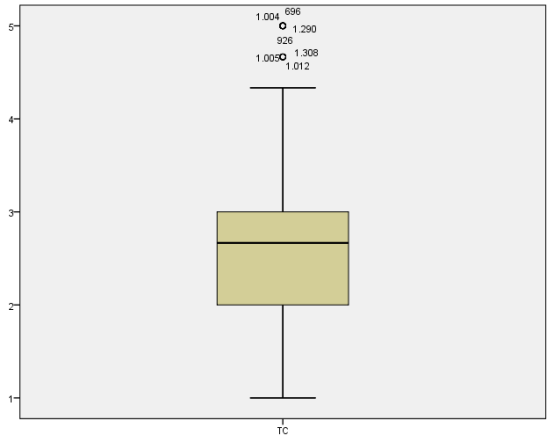
Level of confidence for all confidence intervals in output:
95,0000

Number of bootstrap samples for percentile bootstrap confidence intervals:
5000

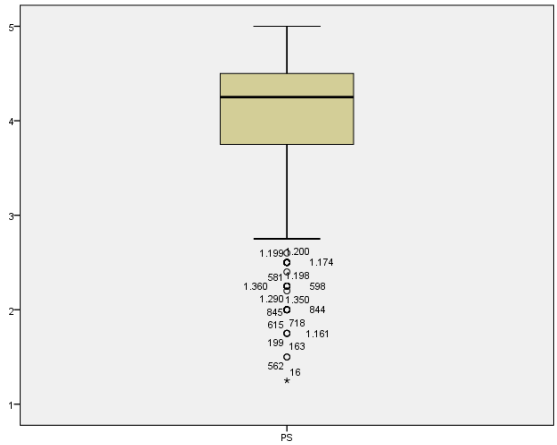
------ END MATRIX -----

Appendix B. Boxplots

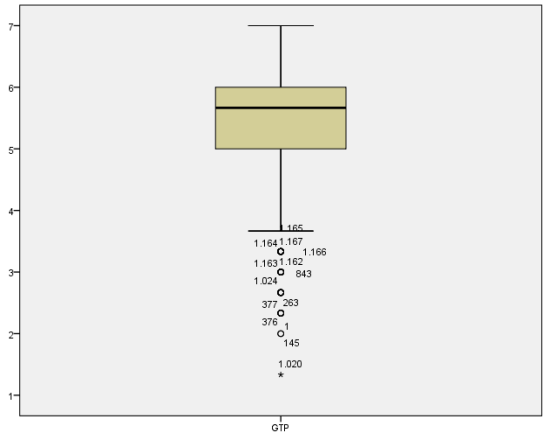
Task Conflict



Psychological Safety

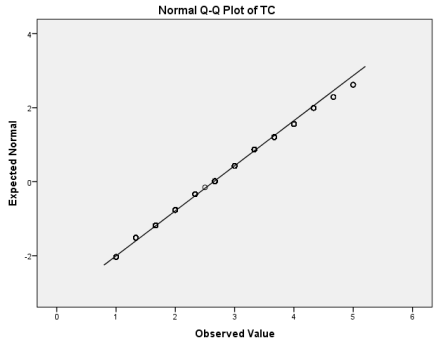


General team performance

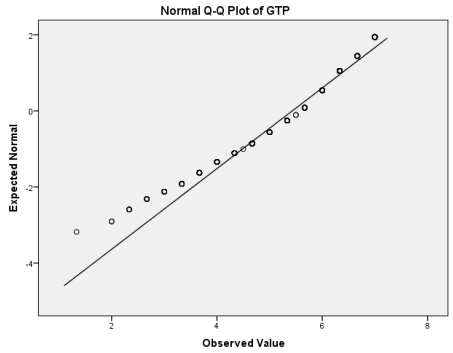


Appendix C. QQplots of the variables

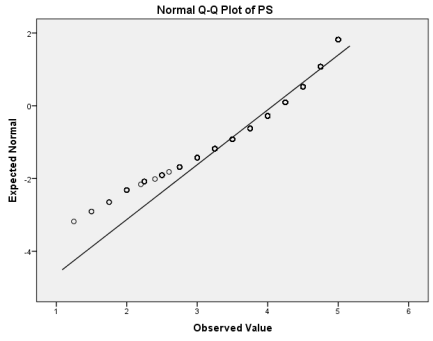
Task Conflict



General Team Performance



Psychological Safety



Appendix D. Results T-Test

Mapping Elemental Spectroscopy

T-Test

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
PS	Total	1357	4,0787	,65944	,01790
	Mapping	1	2,2000	.	.
TC	Total	1357	2,6454	,82164	,02230
	Mapping	1	2,3333	.	.
GTP	Total	1357	5,4285	,94268	,02559
	Mapping	1	6,6667	.	.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PS	Equal variances assumed	.	.	2,848	1356	,004	1,87867	,65968	,58456	3,17277
	Equal variances not assumed			.	.	.	1,87867	.	.	.
TC	Equal variances assumed	.	.	,380	1356	,704	,31209	,82194	-1,30032	1,92449
	Equal variances not assumed			.	.	.	,31209	.	.	.
GTP	Equal variances assumed	.	.	-1,313	1356	,189	-1,23815	,94303	-3,08810	,61181
	Equal variances not assumed			.	.	.	-1,23815	.	.	.

Krios G4 with Heating Contamination

T-Test

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
PS	Total	1357	4,0787	,65944	,01790
	Krios	2	2,5000	,14142	,10000
TC	Total	1357	2,6454	,82164	,02230
	Krios	2	3,1667	,23570	,16667
GTP	Total	1357	5,4285	,94268	,02559
	Krios	2	5,6667	1,41421	1,00000

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PS	Equal variances assumed	2,144	,143	3,384	1357	,001	1,57867	,46647	,66358	2,49375
	Equal variances not assumed			15,540	1,065	,035	1,57867	,10159	,46018	2,69715
TC	Equal variances assumed	1,996	,158	-,897	1357	,370	-,52125	,58122	-1,66143	,61893
	Equal variances not assumed			-3,100	1,036	,192	-,52125	,16815	-2,48953	1,44703
GTP	Equal variances assumed	,387	,534	-,357	1357	,721	-,23815	,66738	-1,54735	1,07105
	Equal variances not assumed			-,238	1,001	,851	-,23815	1,00033	-12,90928	12,43298