

“THE DEVELOPMENT OF PSYCHOLOGICAL CLIMATE WITHIN INFORMATION SYSTEMS PROJECTS AND ITS IMPACT ON PROJECT PERFORMANCE”

Research paper

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Abstract

Information systems development (ISD) success hinges upon the creation and maintenance of a supportive climate. Yet how team members' psychological climate (individual perceptions of the organizational context) is developed remains unanswered. This study contributes to understanding how relationships with co-workers are antecedents to a supportive psychological climate that in turn impact ISD project performance. Hypotheses are developed and tested using social network data from 172 dyads between employees and project managers of an information technology (IT) organization in the Southeastern United States. Results from PLS show that as hypothesized friendship and trust have a direct positive relationship and expertise has a direct negative effect with psychological climate. Further, trust positively moderates the relationship between expertise and psychological climate. Finally, psychological climate has a direct positive relationship with project performance controlling for gender, job tenure, age and race. Surprisingly, advice ties and advice ties moderated by trust did not relate to psychological climate as hypothesized. Implications of the findings are discussed.

Keywords: Information systems development project performance, Psychological climate, Antecedents, PLS

1 Introduction

Information systems development (ISD) is a highly complex organizational endeavor that most often occurs within dynamic environments typified with high reciprocal interdependence (Thompson, 1967; Uddin, 2017)). Such high interdependent nexuses of specialists demand coordination by mutual adjustment via a dynamic social process (e.g., Newman and Robey, 1992; Chakraborty, Sarker and Sarker, 2010). It is within this dynamic environment that a supportive psychological climate was a key component for successful information system development (Wastell, 1999).

Psychological climate has nascent implications for information systems development (ISD) success, as strong support was found for psychological climate associated with the quality of systems developer-user relationships (Ein-Dor 1982), as well as being a key aspect in learning within the ISD process (Wastell 1999). While a supportive climate fosters knowledge creation and sharing (Bock 2005; Durcikova 2011) and higher levels of participation on projects (Purvis, 2014). This, tied with the positive results within the organizational behavior literature (e.g., Brown 1996a; James 2008; Schneider 2011a; Schneider 2011b) offers compelling evidence of the importance of psychological climate for ISD success.

While there is a rich understanding of psychological climate (e.g., James, et al., 2008), there is no empirical evidence within either the MIS or organizational behavior literature about the antecedents of psychological climate or how it is developed. This is critical for organizations desiring to improve their information systems development success. Consequently this research is guided by the following question: *What are the antecedents of psychological climate? Further, do these antecedents impact ISD project success?* To do this, we explore employees' social interactions as antecedents of psychological climate. To understand the "emergence, spread, and sedimentation" (Bastien 1995, pg. 87) of climate is best we apply of structuration theory (Poole 1983).

2 Theory and Hypotheses

2.1 Structuration Theory

Orlikowski and Robey (1991) offer compelling arguments for the utility of using structuration theory to understand the role of information systems and information systems development within an organization. Structuration theory offers an integrative meta-theory that recognizes two traditions within the social sciences: 1) a view of social systems as the result of interaction of human behavior (social reality as subjective); and 2) a view of social systems as institutional boundaries that are independent of and constrain human action (social reality as objective). Structuration theory suggests that "both are equally important, and hence both should inform social theorizing and empirical investigation" (Orlikowski 1991, pg. 145).

Structures are rules and resources, that are properties of social systems (Giddens 1984) and have a dual role. First, structure or institutional properties of social systems are subjective as they are fashioned by human actors who enact and interpret their dimensions. Accordingly, structure does not simply spring out of subjective human activity. Secondly, "(structure) is also objective because it provides the conditions for human action to occur. Structure thereby provides the means for its own sustenance, and structure and action constitute each other recursively" (Orlikowski 1991, pg. 147). As a result, it is the human action that develops the institutional properties of social systems, while in parallel the institutional properties develop the human action (Orlikowski 1991).

To further expound upon the nature of the cyclical relationship between human actions and institutional properties, Giddens (1984) suggests that the interaction of all human actions and institutional properties are mediated by three modalities of structure that link the action and social structure: interpretive schemes, resources and norms. Through these modalities the "process of structuration" oc-

curs as institutional properties mediate human action and human action determines the social structure. These “realms” of action can be researched separately or in combination. Conceptually, organizational context constitutes the objective reality of an organization, the structure of signification serves to “represent the organizational rules that inform and define interaction” (Orlikowski 1992, pg. 404). The structures of signification provide organizational members “interpretive schemes” that are the subjective reality and “form the core of mutual knowledge whereby an accountable universe of meaning is sustained through and in processes of interaction” (Giddens 1979, pg. 83). Consequently, interpretive schemes offer “stocks of knowledge” (Orlikowski 1992) that organizational members use to interact and mediate communication of shared meanings between organizational members by organizing and essentially shaping the interaction (Orlikowski 1991).

Structuration theory offers a useful lens through which to consider the development of climate, and the impact of climate on information systems development performance “by analyzing the interpretive schemes, resources, and norms of the systems development organization, and attempting to understand how these facilitate or constrain the activities of systems developers” (Orlikowski 1991, pg. 158). Research on structuration theory demonstrates that the organizational context (or institutional properties) include “structural arrangements, business strategies, ideology, culture, control mechanisms, standard operating procedures, division of labor, expertise, ...” and specific to this research, “communication patterns” (Orlikowski 1992, pg. 409). These objective properties of an organization offer “structures of signification” that provide “interpretive schemes” or *meaning* (i.e. psychological climate) for an organizational member (Orlikowski 1992). Research on socialization in organizations offers a foundation that aids understanding of the effects of the communication patterns (i.e., social networks within the organization) on development of an individual’s psychological climate, as well as how the perceived climate consequentially affect individual’s system development task performance. Relying on this overarching framework, the conceptual model of this study is presented in Figure 1.

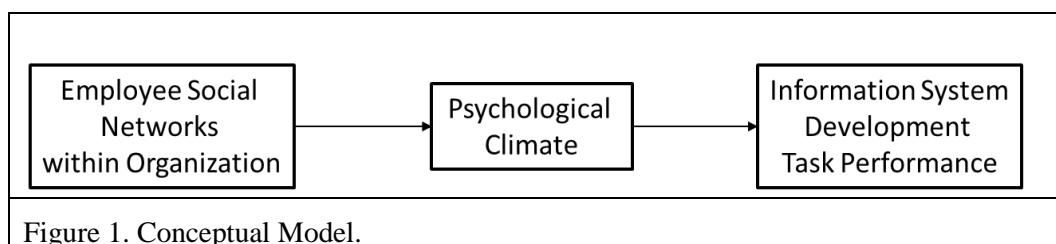


Figure 1. Conceptual Model.

2.2 Psychological Climate

Psychological climate is an individual’s *perception* of the organizational context and, as such, is a subjective measure that can differ between individuals as they perceive the organizational context differently (Baltes 2009; Dickson 2006; James 2008). Researchers have found that different psychological climates exist within organizations (James 1982; Joyce 1984). A stream of literature exists in which the nature of the relationships between individuals is shown to influence psychological climate perceptions (Schneider 1983b). This research departs from past research because it suggests that the main antecedents to psychological climate are interpersonal interactions as opposed to static, objective measures of workplace characteristics (e.g., James 1989; Joyce 1984).

As mentioned above, structuration and socialization theories were used to propose that communication patterns between organizational members are antecedents to psychological climate (Ostroff 2003; Parker 2003) and are descriptive rather than evaluative perceptions. Psychological climate may or may not align with organizational context. Although individuals within the same organizational setting are exposed to and share the same context and situations, perceptions may be unique within each individual and can be quite dissimilar. It is even possible that employees all have differential perspectives of the psychological climate (Schulte 2006).

Psychological climate has been assessed using two variations in previous research. The first method assumes that a “single higher order factor underlies measurements of psychological climate (James et al, 2008, pg. 10).” This perspective assumes that a “g factor” underlies the valuations represented by psychological climate perceptions and are a function of “deeper, more persuasive judgment of the degree to which the environment is personally beneficial or detrimental to the organizational being of the individual (James, et al, 2008, pg. 11).” A second approach, “climates for something (Schneider and Reichers (1983))” focuses on specific climate areas such as safety, service, creativity and innovation, among others (James, et al., 2008). This approach has become more popular in recent research. For example, within information systems development, Kettinger et al. 2015, developed knowledge-sharing psychological climate (KSPC), and found it as a key performance outcome of psychological climate in ISD. They define this as “a knowledge worker’s cognitive representations of the knowledge-sharing environment in the work unit (pg. 61)” using three items: 1) information about my job performance is easily accessible, 2) management shares performance information as it relates to my job, and 3) I use information about my job performance to better manage my work.

Because the goal of this research is to understand the antecedents of the development of psychological climate we used the first approach with a model specified in which first-order factors representing supportive management, clarity, self-expression, contribution, recognition, and challenge was measured using the 21-item survey developed by Brown and Leigh (1996).

2.3 Conduits of Communication: Social Network Ties, Expertise and Trust

Social networks serve as conduits of communication occurring through organizational members to understand the institutional structure and develop interpretative schemes. Social networks are the set of interactions and personal relationships occurring within social units (Ibarra, 1993) that can be individual, groups or organizations. Employees rely on co-workers to understand norms, standards, and impressions of the organization and are the predominant source of information owing to convenience, timeliness and superior understanding of the context (Sykes, 2015). Social networks research provides explanation from whom and how employees acquire information in organizations as well as to explain intentions, behaviors, and attitudes. Previous research provides ample insights into the importance of network centrality and the direction of the flow within a social network as there are different consequences considering indegree and outdegree. For example, there are two directions to examine advice ties; getting advice considers the information flowing into a team member while giving advice focuses on information flowing from a team member. Zagenczyk and Murrell (2009) found that while both advice-giving and advice-receiving are related to job involvement, only advice-receiving was related to work-unit commitment. Below we hypothesize how differences in flow direction of ties within a project team impact the development of psychological climate within the context of an ISD project team.

2.3.1 Expertise and Advice Ties

Advice (or instrumental) ties are relationships that offer guidance and recommendations to the completion of work tasks or future action (Vardaman, Taylor, Allen, Gondo, Amis, 2015). Out-degree advice centrality (advice-giving) refers to the number of employees that a team member offers advice while in-degree centrality (advice-receiving) refers to the number of team members that give advice to a team member (Vardaman et al., 2015; Zagenczyk and Murrell, 2009). While both advice centralities potentially offer insights into the development of an individual’s psychological climate, advice-receiving offers a broader source of input, giving more opportunities and flexibility to understand an organizational unit and complexities within the units interworking. This offers a richer opportunity to perceive an organizational unit correctly. Further, advice-receiving has been found to be related to work-unit commitment (Zagenczyk, et al., 2009). We perceive this as a potential outcome of a positive psychological climate. Therefore, we hypothesize:

Hypothesis 1: Advice-receiving ties have a positive impact on project member’s perceived psychological climate.

Expertise is special skill or knowledge learned from experience, training, or study. Expertise is narrower than advice that can be wide-ranging in scope. Therefore, we hypothesize:

Hypothesis 2: Expertise giving ties have a positive impact on project member’s perceived psychological climate.

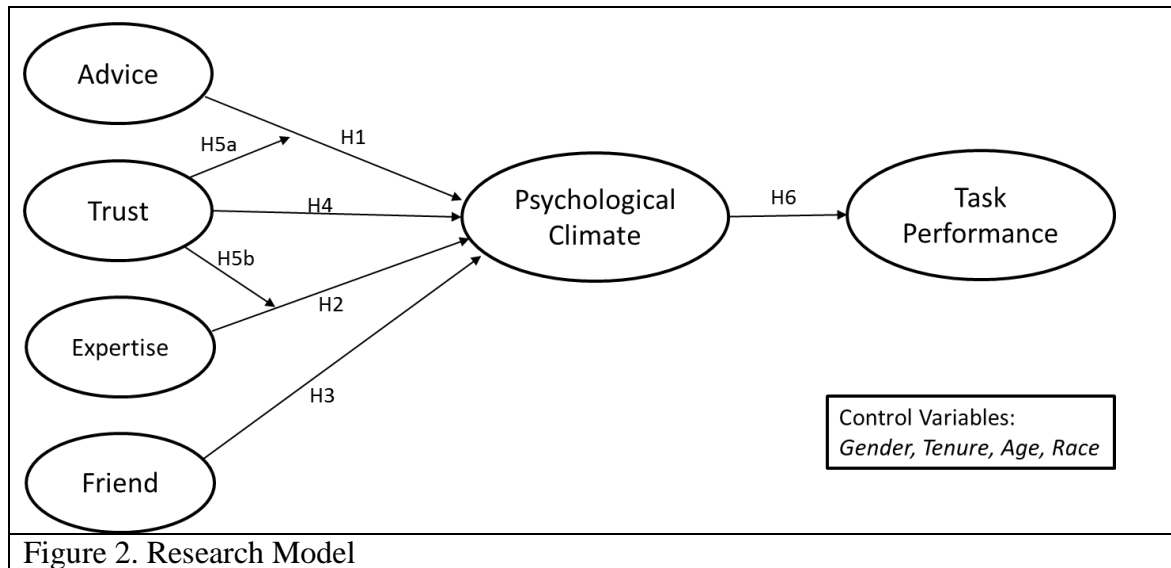


Figure 2. Research Model

2.3.2 Trust and Friendship Ties

Trust is the “willingness to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor” (Mayer 1995, pg. 712). Working together within an ISD project usually requires a team member to rely on other team members to accomplish organizational goals. Trust is particularly important in such contexts, which are characterized by high levels of vulnerability and risk (Mayer 1995). However, developing dyadic trust within organizations is more complicated than sheer interdependence. Instead, it is a function of the perceptions of ability, benevolence, and integrity of both the trustee and trustor (Mayer 1995) that have important implications for attitudes, behavior, and team performance (e.g., Ferrin 2006).

Information shared among friends is often the core for social comparison (Wheeler 1992), where individuals compare their opinions and outcomes to referent individuals to develop or validate their own perceptions (Festinger 1954). Consequently, employees use friends to fashion their opinions of outcomes received from an outside party (Ho 2005a). Comparisons become even more relevant to employees when the value of the outcomes is subjective with no objective standard for assessment, and when the evaluation is deemed important (Festinger 1954). Granting that the majority of work environment perceptions are subjective, opinions of friends is a critical comparison because they identify and value their opinions (Jehn 1997). Consequently, how an employee’s friend is treated (positively or negatively) by the organization, the employee may interpret the treatment as a signal as to how the organization will treat him/her as well (Felson 1986). Therefore, both employees’ perceptions of the work environment would change as a result of one employee in the friendship dyad. In support of this view, employees who are friends in the workplace tend to share similar perceptions of other co-workers (Krackhardt 1990), make similar career decisions (Kilduff 1990), vote the same way on union-related matters (Krackhardt 1992), and share common beliefs regarding the manner in which the organization fulfils organization-wide promises (Ho 2005b). Therefore, we hypothesize:

Hypothesis 3: Friendship ties out degree have a positive impact on project member's perceived psychological climate.

Hypothesis 4: Trust in degree has a positive impact on project member's perceived psychological climate.

2.3.3 Interaction of Trust on Advice and Expertise Ties

The importance of trust within social networks has been widely and methodically discussed within a broad array of disciplines (Bapna, Gupta, Rice and Sundarajan, 2017). Important to this study, Dirks and Ferrin (2001) argue that “trust provides the conditions under which certain outcomes, such as . . . higher performance, is likely to occur” [29, p. 450]. Dirks and Ferrin [29] also assert that the concept of trust as a moderator is not new, but it has received only “scant” attention from researchers.

While advice ties were hypothesized to have a direct effect on psychological climate, advice ties are also hypothesized to be highly responsive to the moderation of high trust (Sarker, Ahuja, Sarker and Kirkeby, 2011). Therefore, we hypothesize:

Hypothesis 5a: Trust strengthens the impact of advice relations on project member's perceived psychological climate.

The importance of trust is a critical factor in knowledge sharing of expertise (Wong, 2008). While it was hypothesized that sharing of expertise would be negative as a direct effect, the moderation of trust is thought to reverse this direction. We contend that the negative barriers to giving advice are mitigated, if not eliminated with a trusting relationship with the receiving project team member as it facilitates performance (Sarker, et al., 2011). Therefore, we hypothesize:

Hypothesis 5b: Trust strengthens the impact of perceived expertise on project member's perceived psychological climate.

2.3.4 Project Performance of Information Systems Development

So how does psychological climate impact employee's information systems development project performance? Previous research points to several different possibilities. For example, research within project team participants suggests that process skills (e.g., communication, leadership, decision-making and group management skills) are as, if not more, important than technical skills (technical knowledge, analytical skills and understanding the business) for ISD project success (White 1986). Good team process skills enhance activities between people that “increase cohesion, communication, and morale. Groups that have higher cohesion are more effective in terms of task accomplishment” (White 1986, pg. 218). Further, mutual trust and mutual influence lead to shared knowledge which in turn enhances IS performance in terms of both quality and efficiency (Nelson 1996). Nelson (1996) recommends that efforts to build effective relationships between groups must move beyond communication and focus on management of informal social interactions which form the basis for these relationships. While Nelson (1996) focused on relationships between client and developer groups, this is clearly also important within the ISD development group. Therefore, we have the following hypothesis. Figure 2 presents the research model of this study.

Hypothesis 6: A positive perceived psychological climate will increase information system development project member's project performance.

3 METHOD

3.1 Participants and Procedure

Consistent with Marsden's (1990) advice, a social network study was conducted among employees from a single computing and information technology organizational unit. This organization, in a single location provides operational support for federal benefit programs administered through a state government within the southeastern United States. Services include application development and maintenance, quality assurance, project management, and business application support functions. Data were collected during an extended lunch break during a normal working day. To minimize interruptions and solidify organizational commitment to the research respondents were provided a catered lunch. Respondents were informed of the purpose of the survey (to understand workplace perceptions) and assured that their responses would remain confidential. To encourage participation a cash incentive was given to participants.

Of the 70 members in the work unit, 65 were present at the meeting and complete data was obtained from 64 employees yielding a 91.4% response rate. Generally, it is expected that networks researchers achieve a response rate ranging between 80% and 90% (e.g., Ferrin 2006), which translates to 64% to 81% of the total relationships in a system, a number which was exceeded in this study. All employees in the organization worked full-time. The mean organizational tenure of employees was 6.75 years (s.d. = 7.99); mean position tenure was 3.29 years (s.d. = 4.27) and mean age was 50.2 years (s.d. = 9.54). The sample was 57.2% female and 85.9% Caucasian and consisted of 17 employees classified as managers (26.6%) and 47 team members (73.6%). The organization was structured as a balanced matrix, with team members employed on multiple projects simultaneously. Consequently, there were 172 unique project manager and team member dyads.

3.2 Measures

3.2.1 Social Network Measures.

To assess advice ties, friendship ties, and perceptions of trust and expertise, respondents were given a roster including the names of all employees in the organization. The roster facilitates employees to better recall relationships with co-workers and results in more accurate data than when employees are asked to recall relationships without a roster (Marsden 1990). Traditional social networks methods were used to measure a number of independent variables in the study: advice ties, friendship ties, expertise, and trust. To measure advice ties each respondent was asked whether or not they go to every other employee, "for work-related advice and knowledge" (yes/no) similar to other measures of advice or instrumental ties (e.g., Ibarra 1993b; Umphress 2003; Zagenczyk 2010). Friendship networks were measured by asking respondents to identify those co-workers who they considered to be "a close friend (e.g., do you confide in this person; yes/no)?" similar to (Morrison 2002; Zagenczyk 2010). Consistent with Gaski (1996), expertise was assessed by asking each employee to evaluate other employees that they knew "On a scale of 1 to 5 (5 being the highest, ignore if you don't know person), do you consider this person to be an expert in their work-related roll?" To make data on expertise consistent with other network tie data, an employee was considered to be an expert tie if they were rated as a 4 or 5. Employees were also asked to assess the degree to which they trusted other employees in the organization that they knew. Consistent with Ferrin (2006), employees were asked: "On a scale of 1-5 (with 5 being the highest; ignore if you don't know person), indicate the extent to which you think this individual is dependable/trustworthy".

3.2.2 Psychological Climate

Psychological climate was measured using the 21-item survey developed by Brown and Leigh (1996b). Sample items from the scale include: ‘My boss is flexible about how I accomplish my objectives’ and ‘I rarely feel my work is taken for granted.’ Cronbach’s alpha for this scale was .85. Participants responded to items using a seven-point Likert scale ranging from 1 = strongly disagree and 7 = strongly agree. Each participant’s responses to the psychological climate scale were then averaged to calculate a mean psychological climate score.

3.2.3 Project Performance

Project performance was assessed by the project managers on how each employee performed in a project in regard to timeliness, costliness, and the quality of the work delivered. The instrument was adapted from measures used in prior research (Nidumolu 1995) with the conceptualization of project performance being comprised of cost, timeliness, and quality (Keil 2010; Nelson 1996; White 1986). Questions such as “the employee completes the project in time”, to which respondents (i.e., managers) answered on a 7-point Likert scale ranging from 1 = strongly disagree to 7 = strongly agree. The items had a Cronbach’s alpha of 0.94, that were then averaged and the aggregated score was used in SEM analysis.

3.2.4 Control Variables

Demographic variables were controlled for to rule out alternative explanations for the findings, which include organizational tenure, gender, race, and age. Tenure in the organization (the number of years an employee had been a member of the organization) was controlled to rule out the possibility that employees who entered the organization at the same time had similar perceptions of the psychological climate. Additionally, gender (0 = male and 1 = female), race (0 = white and 1 = non-white), and age (in years) to ensure that individuals’ gender, race and age were controlled when examining the effect of perceived psychological climate on individual’s project performance.

4 Results

Structural equation modelling (SEM) was used to test all hypotheses. In particular, SmartPLS (version 3.2.7) was used to examine both the construct loadings and path coefficients among latent factors. Table 1 provides correlations for all latent variables with their square root of AVE values. By comparing the square root of AVE values and the correlations, we can conclude that the latent variables included in this study have achieved discriminant validity, as all correlations are below the AVE values (Fornell and Larcker 1981).

Table 1. Correlations Among Latent Factors

	1	2	3	4	5	6
1. Project Performance	0.908					
2. Psychological Climate	0.112	0.827				
3. Advice	0.313	0.292	1.000			
4. Expertise	0.329	0.284	0.958	1.000		
5. Friend	-0.021	0.387	0.303	0.257	1.000	
6. Trust	0.114	0.196	0.445	0.435	0.390	1.000

Note: Numbers in the diagonal line are the square root of average variance extracted (AVE).

The SEM model results for Hypotheses 1 to 4 are presented in the main-effect model in Table 2. In this model, the two interaction terms are not added into the model in order to test the direct effects of advice, expertise, friendship and trust on individual's perceived psychological climate. The full model presented in Table 2 includes the two interaction terms (i.e., trust × advice and trust × expertise), which test Hypotheses 5a and 5b. Result for Hypothesis 6, psychological climate's impact on project performance, is included in both models.

Hypothesis 1 argues that advice ties have positive impact on project member's perceived psychological climate. In the main effect model, as presented in Table 2, advice's impact is not significant. Therefore, our Hypothesis 1 is not supported ($\beta = 0.20$, $p\text{-value} > 0.05$). For member's giving expertise, we observe a negative impact on perceived psychological climate in the main effect model ($\beta = -0.52$, $p\text{-value} < 0.01$). This is in the opposite direction of what is hypothesized in Hypothesis 2. Hypothesis 3 states that project members' friendship ties will positively influence their perceived psychological climate. This hypothesis is strongly supported by our data ($\beta = 0.34$, $p\text{-value} < 0.001$). Trust also shows a significant impact on project member's perceived psychological climate ($\beta = 0.62$, $p\text{-value} < 0.01$). Therefore, our Hypothesis 4 is supported.

Hypotheses 5a and 5b posit that trust moderates the relationships between advice and psychological climate and between expertise and psychological climate. As presented in the full model in Table 2, the interaction between trust and advice is not significant, not supporting our Hypothesis 5a. However, interaction effect between trust and expertise is significant and positive ($\beta = 0.19$, $p\text{-value} < 0.05$). This indicates that when a project member has a high level of trust to other members in the project, he/she will no longer perceive others' expertise as pressure but support. This leads to the positive effect of expertise on psychological climate under this condition. Thus, our Hypothesis 5b is supported.

The final relationship proposed in this study is between psychological climate and project member's project performance. We posit that project member's perceived psychological climate will positively influence his/her project performance (Hypothesis 6). This argument is supported by our sample data ($\beta = 0.16$, $p\text{-value} < 0.05$). Figure 3 presents and summarizes the hypotheses results in our research model.

Table 2. Hypotheses Test Results		
Variables	Main Effect Model	Full Model
<i>Depend Variable: Project Performance</i>		
H6: Psychological Climate	0.161* (0.078)	0.161* (0.078)
Adjusted R-squared	0.065	0.065
<i>Depend Variable: Psychological Climate</i>		
H1: Advice	0.199 (0.181)	0.166 (0.186)
H2: Expertise	-0.523** (0.224)	-0.144* (0.057)
H3: Friend	0.341*** (0.076)	0.318*** (0.077)
H4: Trust	0.616** (0.213)	0.028 (0.157)
H5a: Trust × Advice		-0.050 (0.091)
H5b: Trust × Expertise		0.196* (0.080)

Control Variables:			
Gender	0.086		0.099
Tenure	0.010		-0.025
Age	-0.251***		-0.203**
Race	-0.147*		-0.120
Adjusted R-squared	0.105		0.210

Note: 1. *: p -value < 0.05; **: p -value < 0.01; ***: p -value < 0.001
 2. Numbers in parentheses are standard errors

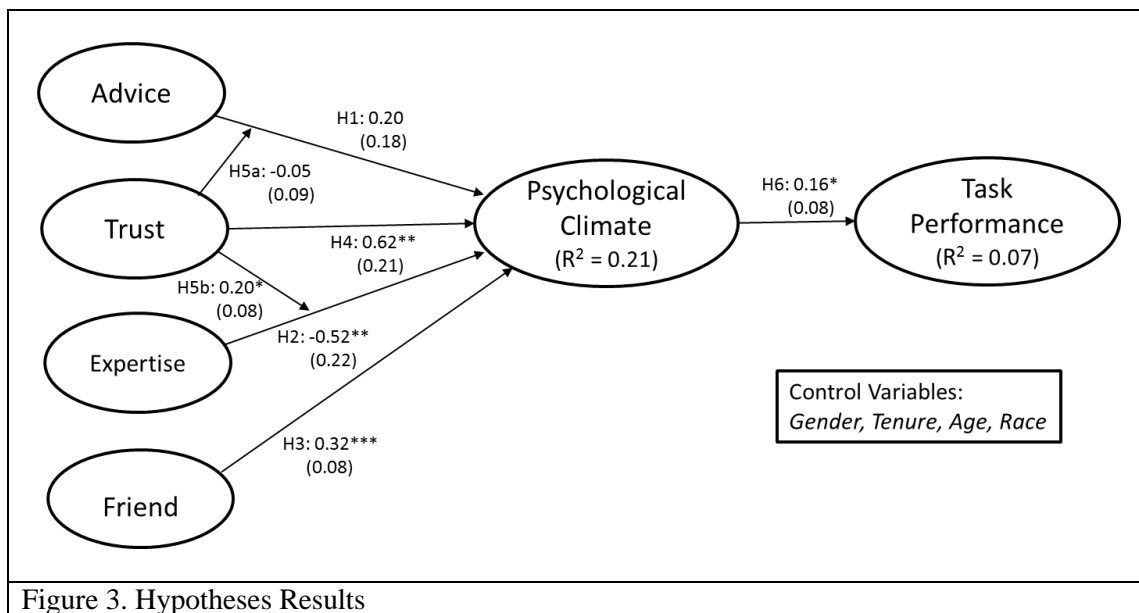


Figure 3. Hypotheses Results

5 Discussion

The purpose of this study was to explore the relationship between social network ties, psychological climate, and ISD project success. This research examined whether psychological climate perceptions are socially constructed between the individuals connected through advice, trust, expertise and friendship networks. Friendship ties directly (H3), trust ties directly (H4) and trust moderating the relationship of expertise (H5b), were found to influence perceived psychological climate.

As interesting as what was supported was what was not supported. Advice ties directly (H1), and even more confounding, advice ties moderated by trust (H5a) were not found to influence the development in psychological climate. The most viable reason for this finding is that there is a high correlation between expertise and advice (see table 1). Given that the relationship between expertise and psychological climate as well as the moderation of trust in the relationship is significant, this is most likely reducing the impact of advice on psychological climate.

Reviewing recent research, however, offers additional insights that can potentially confound the impact of advice-receiving on psychological climate. For example, (Bonaccio and Dalal (2006) contend advice can vary on role differences between the advice giver and receiver, the number of advice-givers, the decision task at hand, the advice utilization and discounting of the advice, and why advice was requested (e.g., to share accountability). While in an experiment Hooge, et al. (2014) found that emotions (anger, gratitude, shame and pride) impact advice-receiving based on the emotion valence (positive or negative) and agency (self versus other focused). Indeed, the advice-receiving can be considered an art, and harder than it looks (Garvin, Margolis, 2015) troubled by advise-seekers who think they already have the answer, choosing the wrong advisor, defining the problem poorly, and dis-

counting or misjudging the quality of advice to name but a few potential issues. This research data was collected prior to these findings and did not account for such variations that could negate the significance of the relationship.

5.1 Implications

Quite simply, organizational context matters (Johns 2006). The relationship between social network ties and psychological climate has both theoretical and practical implications. First, this study has identified certain conditions under which elements of the organizational context affect individual psychological climate perceptions. This is a significant theoretical contribution in that while the literature on psychological climate has identified that climate perceptions arise from organizational context (Baltes 2009; Dickson 2006; James 2008) there is a paucity of research exploring just how these climate perceptions form. This study has contributed to the psychological climate literature by identifying that people in organizations develop their psychological through interactions with team members that they trust, including their friends as well as experts giving advice that they trust.

However there is no evidence to suggest that climate perceptions are informed by those an individual goes to for advice, even if the focal actor considers those individuals to be trustworthy. This was surprising, and should give researchers in this area pause to reflect on the complexity of receiving advice. Literature within advice-receiving as well as knowledge sharing offers numerous avenues that need to be considered to disentangle the complexities in the communication. Team diversity, knowledge sharing capabilities, team perceptions, organizational practices, task-related and technology-related barriers (Ghobadi, 2015) all need to be considered in future research on advice ties.

The final important implication of this study is that those possessing more positive psychological climates are related to higher ISD project performance. Indeed, the importance of ISD project performance in the complicated environments faced by organizations today make ISD success difficult to achieve. Yet the stakes for such success have never been higher. Manager's attempts of developing a positive psychological climate through their supportive management, assistance in clarity of the project, enhanced self-expression, contribution, recognition, and challenge must consider the impact of the social network on their efforts. Without this understanding, the impact of a social network fraught with negativity and barriers could thwart the best of efforts.

Like most research, our study has limitations that should be considered. These limitations also provide opportunities for developing future research studies more effectively. The first and perhaps most significant weakness of our study is the research design focusing on one organization, in one industry and one country. This limits the external validity of the findings and should be considered when analyzing this paper. Further, the cross-sectional nature of our data collection, certainly the norm for social network studies that are particularly sensitive to respondent attrition (Umphress et al., 2003; for exceptions, see Burkhardt, 1994; Gibbons, 2004), does preclude us from making causal inferences. Our study design makes it impossible for us to dismiss the possibility that employees tended to form social network ties based on the fact that they had similar perceptions of the psychological climate relationships. Most, if not all, of the social network research hypothesizes that the absence or presence of ties is related to outcomes. However, the attraction-similarity-assimilation model does state that attraction (particularly in terms of similar demographic characteristics) predicts whether ties will form (Krackhardt & Kilduff, 1990). Accordingly, we controlled for similarity with respect to gender and tenure in our analysis to account for this possibility. Our analysis indicated that these variables were not related to similarity in psychological climate perceptions. This provides some evidence that employees do not form ties as a result of perceptions of psychological climate. However, longitudinal studies replicating and extending our findings will be beneficial, as they may allow researchers to draw causal inferences regarding the ordering of our variables. Future longitudinal research might also build on this work by examining temporal elements and mediators of the social network ties – psychological climate similarity relationship.

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