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**THE NET EFFECTS OF SOCIAL NETWORK DENSITY AND ORGANIZATIONAL  
CITIZENSHIP BEHAVIOR ON GROUP PERFORMANCE**

THESIS

Clifford M. Theony, Captain, USAF

AFIT/GEM/ENV/07-M14

**DEPARTMENT OF THE AIR FORCE  
AIR UNIVERSITY**

***AIR FORCE INSTITUTE OF TECHNOLOGY***

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**Wright-Patterson Air Force Base, Ohio**

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AFIT/GEM/ENV/07-M14

THE NET EFFECTS OF SOCIAL NETWORK DENSITY AND ORGANIZATIONAL  
CITIZENSHIP BEHAVIOR ON GROUP PERFORMANCE

THESIS

Presented to the Faculty

Department of Systems and Engineering Management

Graduate School of Engineering and Management

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Air University

Air Education and Training Command

In Partial Fulfillment of the Requirements for the  
Degree of Master of Science in Engineering Management

Clifford M. Theony, BS

Captain, USAF

March 2007

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CITIZENSHIP BEHAVIOR ON GROUP PERFORMANCE

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### **Abstract**

The purpose of this research was to explore the relationship between Organizational Citizenship Behavior (OCB), social network density, and group performance. Social networks have recently become a key area of interest for researchers in the study of management in organizations. OCB has, likewise, seen a considerable amount of attention in research literature as a direct and indirect contributor to group performance. This field study, conducted at a military training course, attempted to explore the possible net effects of network density and citizenship behaviors on group performance. Longitudinal social network data was used to examine whether there was a relationship between the levels of OCB displayed and the level of performance achieved in each group. Linear regression was used to explore the moderating and mediating relationships in this study. A sample of 406 students in 28 groups was studied. The data gathered provided empirical evidence that density and one dimension of OCB, sportsmanship, are negatively related to performance in both the task and friendship networks suggesting that low OCBs may actually be related to higher group performance. The results contradicted the social network density and OCB literature that predicted a positive relationship with performance.

*To Mom and Dad,*

*Your dedication to our family and to raising your children in a loving home has made me the person I am today. Your love and caring has shown me what is truly important in life. Thank you for everything you have given me.*

## Acknowledgments

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Clifford M. Theony, Capt USAF

## Table of Contents

	Page
Abstract .....	iv
Dedication.....	v
Acknowledgements .....	vi
Table of Contents .....	vii
List of Figures .....	ix
List of Tables .....	x
I. Introduction .....	1
II. Literature Review.....	5
Introduction.....	5
Organizational Citizenship Behavior.....	5
Dimensions of Organizational Citizenship Behavior .....	8
Antecedents of Organizational Citizenship Behavior.....	12
Social Networks.....	16
Social Network Density-OCB Relationship .....	19
III. Methodology.....	24
Sample.....	24
Demographics .....	24
Measures .....	26
Density .....	26
Organizational Citizenship Behavior.....	27
Performance .....	28
Control Variables.....	29
Missing Data.....	29
IV. Results.....	30
Factor Analysis .....	30
Intercorrelations .....	31
Hypothesis 1.....	33
Hypothesis 2a and 2b.....	33
Hypothesis 3a and 3b.....	34
Hypothesis 4a and 4b.....	34

	Page
V. Discussion .....	39
Introduction.....	39
Factor Analysis of Organizational Citizenship Behavior .....	39
OCB Relationship with Performance.....	43
Density-Performance Relationship .....	44
Mediating Relationship.....	44
Moderating Relationship.....	44
Limitations and Future Research .....	48
Summary .....	50
Bibliography .....	51

## List of Figures

Figure	Page
1. OCB Mediates Task Density-Performance Relationship .....	22
2. OCB Mediates Friendship Density-Performance Relationship .....	22
3. OCB Moderates Task Density-Performance Relationship .....	22
4. OCB Moderates Friendship Density-Performance Relationship .....	23
5. Illustration of Density-Performance Relationship Moderated by OCB.....	23
6. Results of Density-Performance Relationship Moderated by OCB .....	35

## List of Tables

Table	Page
1. Principal Components Factor Analysis of OCB with Varimax Rotation and Kaiser Normalization .....	30
2. Flight Means, Standard Deviations, Sample Size, Range of Scores, Reliabilities and Intercorrelations .....	32
3. Moderating Relationships of Density and Display of OCB and Performance .....	35

# THE EFFECTS OF SOCIAL NETWORK DENSITY AND ORGANIZATIONAL CITIZENSHIP BEHAVIOR ON PERFORMANCE

## I. Introduction

Recent research has seen extensive study on the many factors that influence the success and/or efficiency of an organization at achieving its goals. One factor that has been shown to affect organization/group/team performance is the concept of Organizational Citizenship Behaviors (OCB) (Bateman & Organ, 1983; Smith, Organ, & Near, 1983). Organ (1988) defined OCB as behaviors by individuals in an organization that aid in achieving the goals of that organization. These behaviors, however, are voluntary and not part of the individual's job description. Based on this definition, most organizations can benefit from promoting and encouraging OCB. The voluntary nature of OCBs is an added benefit that helps the organization achieve its goals without directly compensating individuals in the group. The informal nature of these behaviors, however, presents a challenge to any organization that wishes to increase the frequency OCB performance. A number of antecedents of OCBs have been identified including individual characteristics, task characteristics, organizational characteristics, and leadership behaviors (Podsakoff, Mackenzie, Paine, & Bachrach, 2000).

“Morale,” described as employee satisfaction, organizational commitment, perceptions of fairness, and perceptions of leader supportiveness, has frequently been studied as a predictor of OCB. Research indicates a consistent and significant relationship between Morale and OCB (Bateman & Organ, 1983; O'Reilly & Chatman, 1986; Smith et al., 1983). Additionally, indirect antecedents of OCB performance,

described as “dispositional factors,” lead to an organizational atmosphere that encourages the behaviors among co-workers and managers. Dispositional factors were described as agreeableness, conscientiousness, positive and negative affectivity (Organ & Ryan, 1995).

There are several ways that researchers have suggested that OCB affect organizational performance. Podsakoff and MacKenzie (1997) summarized these mechanisms as: (a) enhancing co-worker and managerial productivity, (b) freeing up resources so they can be used for more productive purposes, (c) reducing the need to devote scarce resources to purely maintenance functions, (d) helping to coordinate the activities both within and across work groups, (e) strengthening the organizations ability to attract and retain the best employees, (f) increasing the stability of the organization’s performance, and (g) enabling the organization to more effectively adapt to environmental changes. An empirical review of several studies (Podsakoff & MacKenzie, 1994; Podsakoff, McKenzie, & Bommer, 1996b; Walz & Niehoff, 2000) provides general support for the idea that OCB is significantly related to performance. The studies found that OCBs account for 16% to 43% of a wide variety of organizational performance measures.

The four antecedents empirical research has used in studying OCB are individual characteristics, task characteristics, organizational characteristics, and leadership behaviors (Podsakoff, MacKenzie, Paine, & Bachrach, 2000). Organizational characteristics have been shown to have both positive and negative relationships with OCB. Bowler and Brass (2006) have studied one aspect of organizational characteristics that suggests OCBs, and a subset of OCB called Interpersonal Citizenship Behavior,

(ICB) are influenced by social network characteristics derived from social exchange theory (Blau, 1964, 1986) and impression management theory (Bolino, 1999). The results of this study suggested that affective relationships may provide conduits for information flow between friends. These conduits of information flow are believed to increase the likelihood of a helping behavior exchange between friends. The results showed that individuals display ICB to their friends and that friendship is a key variable in predicting performance at the individual level (Bowler & Brass, 2006). Considering the positive relationship between ICB and individual performance, it can be argued that a greater number of affective relationships among members in a group will create more opportunities for group members to display OCB, thus increasing group performance (Bateman & Organ, 1983).

Other research indicates similar outcomes of affective relationships. Balkundi and Harrison (2006) found that expressive ties, relationships that are more affect laden and represent the informal connections group members make, were positively and moderately related to team performance while instrumental ties, or work related advice channels, were positively yet not strongly related. Therefore, a greater number of expressive ties in a social network led to better team performance (Balkundi & Harrison, 2006). This emphasis on interpersonal relationships lends itself to a social network analysis perspective.

Social network analysis is a tool that has emerged among management researchers to more effectively investigate organizational behavior (Borgatti & Cross, 2003; Brass, 1984; Cross, Parker, Prusak, Borgatti, 2001; Tichy, Tushman, & Formbrun, 1979). Members in any organization create informal networks of social interaction.

Social network density measures the number of communication dyads between individuals (Scott, 2000). Studies have shown that the informal social network (e.g., affective relationships) often has greater impact on team performance than the hierarchical, formal network structure of the organization (Cross & Parker, 2004). These studies argue that the obstacles inherent in a bureaucratic organization are not present in the informal network and therefore allow a co-worker to gain access to information necessary to accomplish their job more efficiently (Cross & Parker, 2004). The informal individual relationships that are formed by group members provide an informal conduit of information exchange among members (Borgatti & Cross, 2003). A greater number of information exchanges may provide members the opportunity to exchange OCBs or present an opportunity for members to become good citizens in the eyes of their co-workers and supervisors.

This study will test the idea that social network characteristics and OCBs are related. Social network density in task and friendship networks was calculated in 28 training groups. The combined affects of density and display of OCB were studied to determine if there is a significant relationship with group performance.

## II. Literature Review

### Introduction

Smith, et al. (1983) introduced the idea that citizenship behaviors in an organization promote effective performance by “lubricating the social machinery” within the organization. The net effects of these voluntary behaviors by individuals assist in the effective accomplishment of organizations goals (Smith, et al., 1983). Since then, studies (Podsakoff, Ahearne, & MacKenzie, 1997; Podsakoff & MacKenzie, 1994; Walz & Niehoff, 2000) have addressed this concept with objective performance measures and have shown that OCBs do in fact affect performance in organizations. A summary of these studies indicate OCB accounts for 19% of the variance in performance quantity, 18% of the variance in quality of performance, 25% of the variance in financial efficiency indicators, and 38% of the variance in customer service indicators (Podsakoff, MacKenzie, Paine, & Bachrach, 2000). These results are based on the definition and constructs researchers have compiled to explain what OCBs are and why they are important to organizational effectiveness. The following sections describe the definitions and constructs used in these research endeavors.

### Organizational Citizenship Behavior

Organ (1988) defined OCB as “individual behavior that is discretionary, not directly or explicitly recognized by the formal reward system and that in the aggregate promotes the effective functioning of the organization (pg. 4).” A key word in this definition is discretionary. These behaviors are not required by the organization and therefore are voluntary. Researchers have argued (Organ 1988, 1990; Smith, et al., 1983) that organizational citizenship behaviors serve to “lubricate” the social machinery of an

organization which has an effect of increasing its efficiency. MacKenzie et al. (1991, 1993), Organ (1988), and Podsakoff and MacKenzie (1994) said that OCBs enhanced organizational effectiveness by increasing co-worker and managerial productivity by helping new co-workers “learn the ropes” and becoming productive sooner than if they were left to figure it out on their own. This on-the-job training provides new workers the information and knowledge required to perform required tasks rather than requiring those new workers to attend formal training that would take the worker away from a productive position. OCBs also allow managers to redirect some resources that would otherwise be required to develop and teach the formal training classes. Instead, managers can use those resources more efficiently on value adding tasks (MacKenzie et al., 1991, 1993; Organ 1988).

OCBs may also improve organizational performance by not dedicating scarce resources to maintenance functions such as managing group conflicts (Organ, 1988). OCBs may also provide an informal coordinating function among work group activities which serves to reduce group conflict that would otherwise need management time and resources to resolve (Smith et al., 1983). These helping behaviors also foster group cohesion, teamwork, morale, and spirit through their voluntary nature because it does not require dedicating other resources for this function (Podsakoff & MacKenzie, 1997). It follows that an organization with good morale and cohesion has group traits that would serve to attract and retain the best people for the organization which, in-turn serves to improve performance (George & Bettenhausen, 1990; Organ, 1988).

Podsakoff and MacKenzie (1997) suggested several ways that OCB may enhance organizational effectiveness. They suggested that managers may be able to more

efficiently use their resources because there is consistent performance across its groups. OCBs can minimize variability across an organization by “voluntary acts such as: picking up the slack for others that are absent or who have heavy workloads (helping), coming in early or staying late to finish important projects (conscientiousness), and/or going ‘above and beyond the call of duty’ in performing one’s work responsibilities (conscientiousness).” While these behaviors may be seemingly insignificant individually, when taken together, they serve the organization when aggregated across the members of the organization (Podsakoff & MacKenzie, 1997).

OCBs may enable organizations to adapt to changing environments more easily (Podsakoff & MacKenzie, 1997). When employees attend additional training and seek out other opportunities to learn about their industry or niche, they are learning about the trends that may be looming in the future. Although it requires extra time and effort by the individual, these selfless behaviors may allow the organization to more easily adapt to changes in the organizational environment (Podsakoff & MacKenzie, 1997).

This thesis will attempt to reconfirm the conclusions from prior research (Podsakoff & MacKenzie, 1997) on the positive relationship between OCB and performance using the data collected for this research and will expect similar results as that of established empirical literature.

H(1): Organizational citizenship behavior will be positively related to group performance.

### **Dimensions of Organizational Citizenship Behavior**

Since Organ’s (1988) definition, several researchers have attempted to refine this definition by identifying major dimensions or themes: (a) Helping Behavior, (b)

Sportsmanship, (c) Organizational Loyalty, (d) Organizational Compliance, (e) Individual Initiative, (f) Civic Virtue, and (g) Self Development (Podsakoff, MacKenzie, Paine, & Bachrach, 2000). The following paragraphs will discuss each of these dimensions in detail.

Helping behaviors are voluntary actions performed to aid co-workers in work problems and/or avoid work related problems. This dimension of OCB has been studied in almost all OCB literature (George & Brief, 1992; George & Jones, 1997; Organ, 1988, 1990; Smith, et al., 1983). Most research indicates that helping behaviors are positively related to group performance (MacKenzie, Podsakoff, & Ahearne, 1996; Podsakoff & MacKenzie, 1994; Podsakoff, et al. 1997). Empirical research (MacKenzie et al., 1993; Podsakoff & MacKenzie, 1994; Podsakoff, et al., 1997) has shown that helping behaviors such as altruism, peacemaking, and cheerleading (Organ, 1988, 1990a), interpersonal facilitation (Van Scotter & Motowidlo, 1996), helping others constructs (George & Brief, 1992; George & Jones 1997), and the notion of courtesy (Organ, 1988, 1990b) can be measured by the single dimension of helping behavior.

Sportsmanship is coping with issues that may be unattractive or inconvenient to the worker without complaint (Organ, 1990b). This behavior is displayed by workers that maintain a positive attitude toward their work despite having inconveniences inherent in that job. Group members are willing to sacrifice there own personal interests for the good of the organization in achieving its goals (Organ 1990b).

Organizational loyalty “entails promoting the organization to outsiders, protecting and defending it against external threats, and remaining committed to it under even adverse conditions” (Podsakoff, et al., 2000: 517). Loyal boosterism and organizational

loyalty (Graham, 1991), spreading goodwill and protecting the organization (George & Brief, 1992; George & Jones, 1997) and endorsing and defending organizational objectives construct (Borman & Motowidlo, 1993, 1997) are all behaviors displayed and measured by this dimension of OCB.

Organizational compliance is strictly adhering to all rules and policies of the organization despite the temptation and opportunity to circumvent the rules for the convenience of the worker. Other terms used to describe this dimension are generalized compliance (Smith, et al., 1983), organizational obedience (Graham, 1991), OCB-O (or behaviors that benefit the organization in general) (Williams & Anderson, 1991) and following organizational rules and procedures (Borman & Motowidlo, 1993).

Researchers have considered this an OCB because despite the requirement that all employees follow the rules of the organization, many do not out of convenience, laziness, or any number of other reasons (Podsakoff, et al., 2000).

Individual initiative can be thought of as going so far beyond what is required for normal job performance that it takes on a voluntary nature because the organization does not expect the level of effort performed. Researchers have described this behavior as conscientiousness (Organ, 1988), personal industry and individual initiative (Graham, 1989, Moorman & Blakely, 1995), making constructive suggestions (George & Brief, 1992; George & Jones, 1997), persisting with enthusiasm and volunteering to carry out task activities (Borman & Motowidlo, 1993, 1997), taking charge at work (Morrison & Phelps, 1999) and some aspects of job dedication (Van Scotter & Motowidlo, 1996) . Each of these descriptions is a construct definition of their respective authors. Organ

(1988) has said that this behavior is among the most difficult to measure because it is distinguished by degree of performance and not as a separate kind of behavior.

Civic virtue is the participation in an organization's macro-level interest. This behavior promotes the health of the organization through participation in the organization's governance and ensuring threats to the organization are dealt with even at great personal cost (Podsakoff, et al., 2000). These behaviors are described as expressing opinions about company strategies and policies, reporting fire hazards or suspicious activities, and locking doors. Researchers have referred to civic virtue as organizational participation (Graham, 1989), and protecting the organization (George & Brief, 1992).

Self development refers to voluntary endeavors taken by the individual or group to improve its knowledge, skills, and abilities with respect to the organization's industry or work environment (George & Brief, 1992). George and Brief (1992) describe this behavior as seeking out and taking advantage of advanced training courses, staying current on the latest developments in one's profession, or even learning new skills to expand one's contribution to the mission of the organization (Podsakoff, et al., 2000). This measure does not have much empirical support, however by its very nature would seem to serve as a dimension of OCB given its implied output of improving the organizations performance (Podsakoff, et al., 2000).

Common practice of OCB researchers involves measuring the seven dimensions of OCB from individual level inputs, then aggregating the individual measures to a group level measure of OCB. This trend is due to the OCB research goal aimed at the group and organizational effects of OCBs. Podsakoff, et al. (1997) studied the relationship between OCB and work crew performance and cited Organ (1988: pg 8) who said, "Most

OCB actions, taken singly, would not make a dent in the overall performance of the organization...But that is the nature of OCB—any single occurrence of it usually is modest or trivial.” Additionally, Ehrhart and Nauman (2004), in a study to determine how group norms affect OCB performance, used similar reasoning that the group norms affecting OCB performance are a unit level measurement, not individual level measures of normative behavior. Research has found that the dimensions of OCB are highly related to one another and “approached or exceeded the typical levels of reliability” (Lepine, Erez, Johnson, 2002: pg 57) and therefore are not nomologically distinct (Bommer, Miles, Grover, 2003). This leads to the common practice in OCB research of aggregating the different dimensions to assess the general OCB construct (Bommer, Miles, Grover, 2003).

Law, Wong, and Mobley (1998) raised some concern as to the validity of aggregating the measures of dimensions as many researchers have done in studying the effects of OCB on an organization. Law, et al. (1998) point out that the OCB literature does not discuss the relationship between this multidimensional construct and OCB’s five (or seven as described in Podsakoff, et. al. 2000) dimensions. Treating OCB as a latent or aggregate variable is a key consideration in this study. The measure used in this study (Podsakoff, et al. 1997) was developed to determine the levels of three of the dimensions of OCB. When considering OCB as an aggregate construct, this suggests that the dimensions of OCB are added together in an algebraic equation that represents the OCB score. However, considering OCB as a latent variable suggests that when a group possesses a level of OCB, it leads to a manifestation of the various dimensions of OCB. LePine, et al. (2002) used a meta-analytic study to explore and resolve the issue of

categorizing OCB as an aggregated or latent variable. LePine, et al. concluded that the OCB dimensions and overall construct should be thought of as a latent construct. From a research method point of view, the dimensions of OCB “should be thought of as somewhat imperfect indicators of the same underlying construct,” (Lepine, et al., pg 61). Furthermore, when OCBs are the focus of a study, researchers should avoid distinguishing among the five (or seven) dimensions (Lepine, et al., 2002). Finally, Lepine, et al. concluded that since the reliability estimates across dimensions is high and there are no meaningful differences with the predictors across dimensions of OCB, the dimensions may be thought of as “imperfect indicators” of OCB. Therefore, it is suggested that OCB be defined as a latent construct.

### **Antecedents of OCB**

In attempts to enhance OCBs, researchers have sought to identify and understand the salient antecedents to OCB. Such research has focused on four major areas of antecedents to OCB: (a) individual characteristics, (b) task characteristics, (c) organizational characteristics, (d) and leadership behaviors (Podsakoff, et al., 2000).

Early research into individual employee characteristics focused on two main causes of OCB; the general affective “morale” factor and various dispositional factors. The “morale” factor had a significant relationship to OCB using measures of employee satisfaction, organizational commitment, perceptions of fairness, and perceptions of leader supportiveness (Organ & Ryan, 1995). Dispositional factors were found to possibly be indirect causes of OCB; however, there is support that shows this may be due to common method variance (Podsakoff & Organ, 1986). For example, Organ and Ryan (1995) found that conscientiousness and altruism were significantly correlated ( $r = .22$ ,  $p$

< .05) when all measures of OCB were included, however, when self-rated OCB were excluded, the correlation was not significant ( $r = .04$ ). Dispositional factors measured were agreeableness, conscientiousness, and positive and negative affectivity (Organ & Ryan, 1995). In general, demographic variables are not related to OCBs (Podsakoff, et al., 2000). Finally, the only remaining individual characteristic demonstrating a consistent relationship to OCB performance is indifference to rewards. Studies have found employees that are indifferent to organizational reward systems are negatively related to altruism and courtesy (helping behavior), sportsmanship, and civic virtue (Podsakoff, et al., 2000).

Task characteristics as they relate to OCB are often studied in substitutes for leadership literature (Kerr & Jermier, 1978; Podsakoff & Mackenzie, 1995; Podsakoff, MacKenzie, & Bommer, 1996a, 1996b; Podsakoff, Niehoff, MacKenzie, & Williams, 1993). These task characteristics are considered substitutes because they replace the need for leadership guidance while completing the task. The substitutes for leadership literature shows that task feedback, task routinization, and intrinsically satisfying tasks are all positively related to altruism and courtesy (helping behavior), conscientiousness (individual initiative), sportsmanship, and civic virtue (Podsakoff, et al., 2000). Task feedback and intrinsically satisfying tasks were positively related to OCB while task routinization was negatively related (Podsakoff, et al., 2000).

Research has shown that organizational characteristics produce both positive and negative relationships with OCB. Organizational formalization, organizational inflexibility, advisory/staff support, and spatial distance were not consistently related to OCB (Podsakoff, et al., 2000). Group cohesion, however, was significantly and

positively related to altruism and courtesy (helping behavior), conscientiousness (individual initiative), sportsmanship, and civic virtue; and perceived organizational support was significantly related to altruism. Rewards outside the leader's control were negatively related to altruism, courtesy, and conscientiousness (Podsakoff, et al., 2000).

The literature on leadership behaviors are divided into four categories. Transformational leadership behaviors had significant and positive relationships with altruism, courtesy, conscientiousness, sportsmanship, and civic virtue. Two types of transactional leadership behaviors had significant relationships with OCB. Contingent reward behavior had a positive relationship and non-contingent punishment behavior was negatively related. Supportive leader behavior from path-goal leadership theory was positively related to altruism, courtesy, conscientiousness, and sportsmanship. Lastly, leader member exchange theory dimensions were all found to be positively related to altruism and an overall OCB measure (Podsakoff, et al., 2000).

Since the leadership and characteristics of an organization cannot by definition enforce or expect members to display OCB, the voluntary nature of OCB suggests that the seven dimensions and four antecedents are operationalized through an informal mechanism. Since helping behavior is the only dimension of OCB that would normally require social interaction between group members, one way to increase helping behavior is by a greater degree of connectedness between members. Balkundi and Harrison (2006) found that teams with dense configurations of informal interpersonal ties perform better. While six of seven dimensions of OCBs do not necessarily require a social interaction among members of the organization, it can be argued that there is an indirect motivation

to display OCB because individuals who observe other group members displaying OCB may be motivated to mimic such behavior.

Bowler and Brass (2006) introduced a construct that is considered a subset of OCBs called Interpersonal Citizenship Behavior (ICB). These behaviors are similar to OCB in that they are actions taken voluntarily to help a fellow co-worker accomplish work related tasks without compensation from the organization for such acts. The distinction between ICB and OCB is that ICB actions are aimed at a single individual, not necessarily for the good of the organization. While the action may, in the long run, be measured by some researchers as OCB because these behaviors often affect the organization (Bateman & Organ, 1983; Settoon & Mossholder, 2002), the motivation behind such behaviors does not stem from altruistic feelings toward the organization (Bowler & Brass, 2006). The argument continues that often the person displaying an OCB is motivated by social exchange theory dimensions (Blau, 1964, 1986); however, another factor influencing the display of OCB may be an attempt at impression management (Bolino, 1999). The Bowler and Brass (2006) study found significant support showing that the effort of a group member to influence the opinions of others toward that member and, in doing so, may be displaying ICBs to enhance their image in the eyes of co-workers. Additionally, the study concluded that when controlling for the traditional motivating factors behind OCB, the receipt of ICB was not significantly affected (Bowler & Brass, 2006).

Bowler and Brass (2006) found that friendship was a key variable in predicting display of ICB. The greater the strength of the friendship tie, the greater the occurrence of ICB. Although Bowler and Brass (2006) were focused on the strength of friendship

ties, it may be argued that a higher number of friendship ties will also provide greater opportunity for observing citizenship behavior and thus friends of those performing ICB (or OCB) to be motivated to do the same.

### **Social Networks**

This thesis used relational data that described the ties and interactions of individuals that characterize the group as a whole. This relational data used network analysis techniques to develop quantitative and statistical information to determine network structure and characteristics (Scott, 2000). Organizational structure is extensively studied throughout the academic literature as a management tool (e.g. Blumberg, Hare, Kent, & Davies, 1983; Hare, 1976; Weber, 1978). The formal structure of an organization can be thought of as the “organizational chart” (Thompson, 1966). The organizational chart is the hierarchy of positions and departments in an organization that dictates which groups within the organization report to whom, leads to standard operating procedures, and organizes work flow processes (Weber, 1978). The formal structure of an organization communicates through formal channels based on task interactions designed to allow each level of the hierarchy to control and manage subordinate members or groups (Mintzberg, 1979).

The leadership of an organization creates the formal structure of an organization in an effort to maintain control over the organizations processes to achieve its goals (Mintzberg, 1979). On the other hand, informal social networks are formed within the formal structure by socialization of group members of the organization (Moreland & Levine, 1982; Wanous, Reichers, & Malik, 1984). Thus, the formal structure and

informal social networks co-exist in the same organization independent of each other (Doloff, 1999).

The structure of a social network is the pattern of connections between individuals or parties. These individuals or parties are referred to as “nodes” (Nadel, 1957). Social network density is a measure of the inter-connectedness or ratio of existing ties between members of an organization relative to the total connections possible among all members of the organization (Scott, 2000). Density is perhaps the most common way to index network structure as a whole (Scott, 2000). Since density can be viewed as an organizational characteristic, this study will use social network analysis to determine if density affects the performance of OCB and its effects on organizational performance.

Balkundi and Harrison (2006) defined two types of ties that are formed in a group member’s social network. Instrumental ties are those social connections members form to accomplish their work-related tasks (Ibarra, 1993), also referred to as the task network in this study. Expressive ties are more affect-laden and act as information conduits for the team’s social support and values (Ibarra, 1993, Lincoln & Miller, 1979), or what could be called their friendship network. Balkundi and Harrison (2006) used instrumental and expressive ties to research the effects of social network density on team performance. Their results indicate that density in a team’s instrumental network is positively but not strongly related to team performance ( $r = 0.15$ ,  $p < .05$ ,  $N = 2442$  teams). Furthermore, density in a team’s expressive network was positive and slightly stronger than the instrumental ties to team performance ( $r = 0.22$ ,  $p < .05$ ,  $N = 515$ ). Additionally, their meta-analytic review found that there was statistically no difference in the prediction that expressive ties would better predict team task performance (Balkundi

& Harrison, 2006). Consistent with Balkundi and Harrison's (2006) research a similar relationship between density and group performance was explored in this research.

H(2a): Social network density in the task network will be positively related to group performance

H(2b): Social network density in the friendship network will be positively related to group performance.

All theories and arguments included in Balkundi and Harrison's (2006) study presumed that social network characteristics were an antecedent to team performance. Researchers have suggested (Kilduff & Tsai, 2003) that there is a gap in literature concerning the causal chain of events that may not be clear with respect to network characteristics and performance. Specifically, it has not been clearly shown that network characteristics are antecedents rather than results of group performance. Theory predicts (Jehn & Shah, 1997), and meta-analytic data suggest (Balkundi & Harrison, 2006) that network structures are more likely antecedents of team performance because the effects of network structure on group performance are greatest immediately upon formation of a group. Additionally, it has been shown that as team members become more familiar with each other (over time); the network structural influences on team task performance weaken (Balkundi & Harrison, 2006). This observation supports the assumption that network characteristics precede group performance in causal precedence (Balkundi & Harrison, 2006).

Cross and Parker (2004) using the phrase, "how work really gets done in organizations," found that social network characteristics are often better predictors of organizational performance with respect to performance, learning, and innovation than

the traditional items managers control such as operational reports, financial statements, and sales figures. Their research indicates that technology use and individual expertise did not lead to high performance marks, but rather the high performers had larger and more diverse personal networks than average and low performers (Cross & Parker, 2004). Other research supports the idea that individuals are more likely to query co-workers in their informal advice networks when searching for information. Linden, Ball, Waldir, and Haley (2002) found that the prevalence of large databases across the business world was underused because employees are more apt to turn to a colleague to get information on performing their tasks. Allen (1977) found that engineers and scientists were five times more likely use colleagues than a database or file cabinet when searching for answers to unfamiliar problems.

### **Social Network Density-OCB Relationship**

As previously indicated, affective ties are not only predictive of group performance (Balkundi & Harrison, 2006), but are also the foundation of social network structure (Scott, 2000). This suggests a symbiotic relationship between OCB and network characteristics.

Social exchange theory (Blau, 1964, 1986) and impression management theory (Bolino, 1999) are two mechanisms that may provide the foundation for the possible density/OCB relationship studied in this thesis. First, a higher social network density measurement may result in an increased opportunity for group members to display OCBs such as helping behavior as a means of social exchange between members. Secondly, the mere fact that increasing social network density is caused by interaction with many members of a group, may have the effect of members actively pursuing impression

management techniques by displaying OCBs. Display of OCBs may be a way of looking favorably in the eyes of other group members and/or provide opportunity for better standing with a supervisor. Researchers have attempted (Bowler & Brass, 2006) to understand this process by dissecting the group-level OCB construct into its individual components, identified as ICB, and shown that there is a significant relationship in certain aspects of impression management such as strength of friendship and third party influence. The relationship of performance and social network structure may suggest that there is a relationship to display of OCB since the degree of density measures the number of conduits available for information exchange.

Social exchange theory was first introduced by Blau (1964) to explain an unseen mechanism of exchange that group members participate in and is informally accounted for in anticipation of future dealings with those members. Social exchange is generated when a one actor provides an action for another in anticipation that the exchange will be completed during an unspecified future exchange (Blau, 1986). The distinction of social exchange from economic exchange is that the actual act that will be exchanged is not determined, and instead is based on a trust that actors will reciprocate the exchanges in the future and in the long run the exchange between the members will balance out (Holmes, 1981). This exchange structure is one way that OCB may act as a mechanism for members of a social network that display OCB and/or ICB.

Impression management refers to a process of taking actions to influence the image and opinion of one actor in the eyes of those around them (Rosenfeld, Giacalone, & Riordan, 1995). Several researchers (Eastman, 1994; Fandt & Feris, 1990; Ferris, Judge, Rowland, & Fitzgibbons, 1994) have suggested that citizenship behaviors may be

one way that actors in an organization portray a positive self-image to fellow organization members. An example is an actor's citizenship behavior toward a supervisor may be an organizationally or an image enhancing act (Bolino, 1999). Wayne and Green (1993) found that impression management behaviors were positively correlated ( $r = .49, p < .01$ ) with altruistic citizenship behaviors. Bolino (1999) suggested three reasons that impression management may account for display of citizenship behaviors: (a) actors may feel that display of these behaviors will label them as "good citizens" among other members, (b) they feel value in being seen as a good citizen, and (c) the actor feels as though their image is currently not one of a good organizational citizen and they further wish to be viewed as such. Bolino (1999) also suggested that citizenship behaviors that are more visible to those that can influence positive outcomes to an actors self image will be more likely used to manage that actors image. This argument also suggests that greater interconnectedness among members of a social network will present more opportunities for an actor to efficiently display citizenship behaviors and thus have it observed by the organization members for impression management purposes.

Research has shown that social network density (Balkundi & Harrison, 2006) and ICB (Bowler & Brass, 2006) have a positive relation to team performance. The positive relationship between OCB and performance is also well documented in the literature (Podsakoff & MacKenzie, 1997). The possible relationship between density and OCB is the focus of this study and suggests the following hypotheses:

H(3a): Social network density in the task network is positively related to group performance and is mediated by display of organizational citizenship behavior.

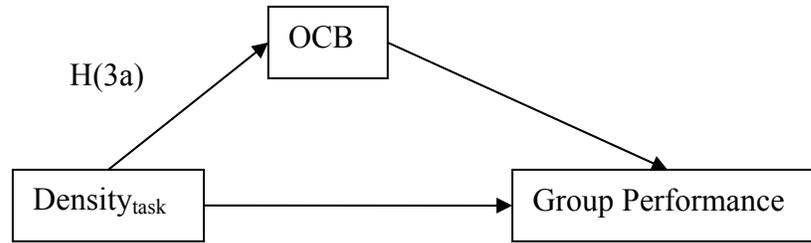


Figure 1: OCB Mediates Task Density-Performance Relationship

H(3b): Social network density in the friendship network is positively related to group performance and is mediated by display of organizational citizenship behavior.

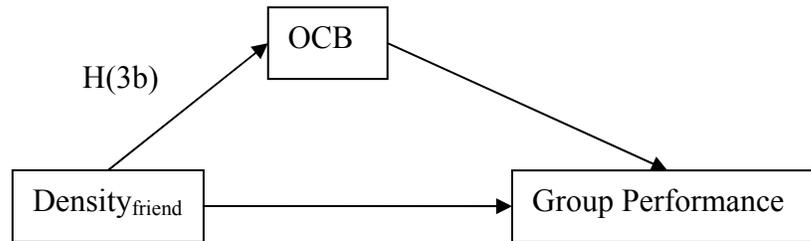


Figure 2: OCB Mediates Friendship Density-Performance Relationship

H(4a): The relationship between network density in the task network and group performance will be moderated by display of organizational citizenship behavior such that performance will increase with increased levels density and display of OCB.

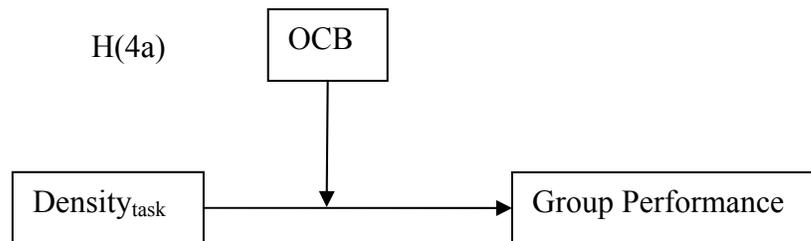


Figure 3: OCB Moderates Task Density-Performance Relationship

H(4b): The relationship between network density in the friendship network and group performance will be moderated by display of organizational citizenship behavior such that performance will increase with increased levels density and display of OCB.

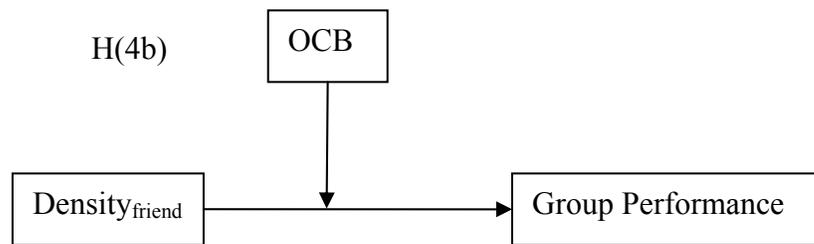


Figure 4: OCB Moderates Friendship Density-Performance Relationship

Figure 5 illustrates the expected moderation relationship of Density and OCB's combined effect on group performance. Hypotheses 2a and 2b suggest a positive relationship with group performance. Hypotheses 4a and 4b suggest that the moderating effect of OCB will cause the net effect of density and OCB to intensify the density-performance relationship.

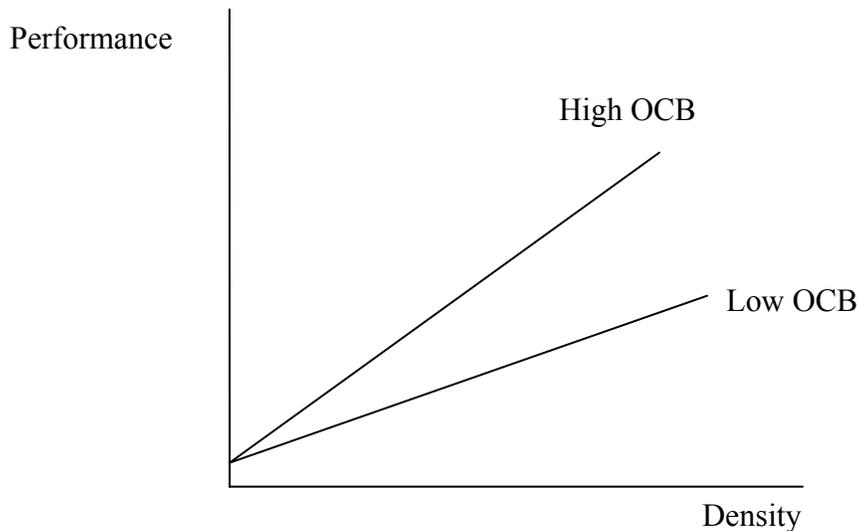


Figure 5: Illustration of Density-Performance Relationship Moderated by OCB

### **III. Methodology**

#### **Sample**

The population studied in this research was comprised of 406 active duty senior enlisted military personnel attending a 7-week professional leadership development course designed to prepare enlisted members in the grade of E-7 through E-9 for the responsibilities inherent in that pay grade. This population was broken into 28 flights (i.e., groups) each consisting of 12 to 16 members. Program administrators purposely consider demographic variables of each member of the flights when assigning individuals to ensure diversity of knowledge and career field experience across the 28 flights. Additionally this assignment process ensures the demographics of each flight reflect the demographics of the student body as a whole.

#### **Demographics**

Respondent's age range was 32 to 50 years, with an average age of 40 years. The population was 74% male (n = 406). Racial demographics were: 87% Caucasian, 16% African American, 5% declined to answer, 2% Asian, 1% Pacific Islander, and the remaining 2% were of mixed descent (n= 406). All respondents had at least a high school education. 53% had an associates degree, 20% had a bachelors degree, 8% had a masters degree or higher (n = 406). Of the remaining 19%, all but 4% had some college credit. The individuals in the study came from a wide variety of AF career fields and specialties. The population studied was representative of Air Force demographics for enlisted members eligible for this course with respect to gender, race, and education (USAF Almanac, 2006). This course teaches students from all the military branches. The population studied consisted of 85% active duty AF, 8% AF Guard and Reserve, and

the remaining 7% from the U.S. Army, U.S. Navy, U.S. Coast Guard or other foreign military.

### **Procedure**

Social network surveys were administered weekly over a 7-week period to gather task and friendship network data. Surveys were administered by the instructors by giving questionnaires to the students during a morning class session. Completed questionnaires were sealed in an envelope and returned to the researcher. The first survey was completed on the second day of class. This survey was used to determine whether previous relationships existed among flight members prior to attending the course. Knowledge of previous relationships verified whether any flight benefited from previous relationships among flight members that might influence social networks that each flight formed during the 7-week training course. Social network data was collected in six subsequent weekly surveys to observe the longitudinal characteristics of the new social networks. OCB data was collected during the sixth week of the course so that each group had time to mature, and display of OCB among respondents might be realized. Two of the 28 flights involved in the data collection did not respond to the sixth and seventh survey administrations; thus, all of their cases were eliminated from analysis. The sample was 374 individuals in 26 groups (flights) when analyzing OCB data.

Previous social network research generally requires an 80 percent response rate (Wasserman and Faust, 1994) because low response rates limit the researchers ability to accurately characterize the social network.. Weekly response rates for the seven social network surveys in this study were 91%, 92%, 97%, 89%, 86%, 79%, and 75%

respectively. OCB data was collected during week 6 with a 79% response rate which may warrant some caution when making generalizations about the analysis of this data.

## **Measures**

### **Density**

Social network density was measured using a 5-item measure from Wasserman and Faust (1994). Respondents received a package each week of a survey listing the names of each group member. The respondents were asked to respond with how they view their relationship with each of the members of the group for that week. Each of the four statements was rated from 1 (not at all) to 5 (frequently). Formal or task related network characteristics were gathered from items such as “I spend time on work related tasks with this person (projects, studying, etc.),” and, “I go to this person for work-oriented advice.” Informal or friendship networks data were gathered from items such as, “I spend time in social-oriented activities with this person (dining out, movies, sports, etc.),” and “I enjoy hanging out with this person.”

Density is a group level measure expressed as a percentage of observed dyads to the total possible number of dyads among group members (Scott, 2000). Density can vary from 0 (zero connected individuals) to 1 (maximum number of connected individuals) (Cross & Parker, 2004). To characterize the friendship and task networks in this study, two items were used to collect data for each network. This allowed for scale reliabilities to be calculated. Internal reliability was .72 for the friendship network and .74 for the task network which exceeds the 0.70 reliability recommended for social network research (Nunnally, 1978).

## **OCB**

OCB data were gathered using a modified 12-item measure developed by Podsakoff, et al. (1997). Reliability estimates from the Podsakoff, et al. (1997) measure for helping behavior ( $\alpha = .95$ ,  $n = 218$ ), civic virtue ( $\alpha = .96$ ,  $n = 218$ ), and sportsmanship ( $\alpha = .88$ ,  $n = 218$ ) exceeded the .70 standard for social science research (Nunnally, 1978). Helping behavior data were gathered from items such as, “Members of my flight help each other out if someone falls behind in his/her work,” and “Members of my flight willingly share their expertise with other members of the flight.” Civic Virtue data were gathered from items such as, “Members of my flight provide constructive suggestions about how the flight can improve its effectiveness,” and “Members of my flight attend and actively participate in flight meetings.” Sportsmanship data were gathered from items such as, “Members of my flight always focus on what is wrong with our situation,” and “Members of my flight consume a lot of time complaining about trivial matters.” The measurement instrument collected data on helping behavior from six items. Civic virtue and sportsmanship were each 3-item measures.

## **Performance**

Students attended daily academic instruction from standardized lessons that test performance from standardized evaluation instruments. These standardized lessons and performance measures present a good opportunity for comparison of performance among groups. This study researched five types of performance evaluated throughout the 7-week course. (a) Communications performance, (b) change in physical fitness performance, (c) change in formative academic performance, (d) summative final

academic performance, and (e) overall performance were analyzed in this study. A group mean score of performance was calculated in each category.

First, communications performance is a measure of the student's ability to communicate in writing and through oral presentations. This measure was based on subjective instructor evaluation of two papers and three oral presentations. Second, fitness tests were administered during the first and last week of the course and each respondent's performance was based on the difference of those scores. Physical fitness performance was based on net change of the fitness score during the period of the course. Third formative academic performance was also calculated using the difference of scores on a test administered at the beginning and end of the course. This measure determines whether students are learning what the course is teaching. Fourth summative academic performance is a summation of two test scores at the end of the course that measures the overall knowledge gained by students throughout the course.

Finally, overall performance is a combination of performance measures. Overall Performance was determined by an overall measure of grades and ratings on one written academic test, two papers, and three oral presentations and subjective leadership ratings by instructors and peers accomplished during the 7-week course. The test was objectively evaluated while the papers and oral presentations were subjectively evaluated by the flight instructor. The subjective instructor and peer leadership ratings relied on a point system in which students and flight instructors assigned a limited pool of points to those individuals they felt were the best leaders in the flight. Instructors were given 45 points to allot in 5-point increments while students were given one 5-point, one 3-point, and one 1-point allotment. The overall performance measure was determined by

aggregating the individual's overall performance scores in each area using a formula developed by the administrators of the course.

### **Control Variables**

Education Level was used as a control variable in this theoretical model since many of the performance measures were based primarily on academic performance. Education was categorized as 1 = high school education, 2 = some college or an associates degree, 3 = bachelors degree, and 4 = masters degree or higher education. This control variable was used to determine if the overall group education score significantly affected the performance scores that were primarily based on academics.

### **Missing Data**

For this study, if a response was missing for either of the two items in the task or friendship networks, the respondent was excluded from the network all together. Therefore, the calculation for density was averaged by the number of actual respondents. For example, if there were 15 members in a group but only 12 members replied to all items in the task network and 15 members replied to all items in the friendship network, the score for the task network was averaged over 12 and the friendship network as average over 15. This procedure allowed for meaningful comparisons across the flights regardless of response rates between flights.

## IV. Results

### Factor Analysis

OCB factor structure was examined with principal components analysis using varimax rotation with Kaiser Normalization to examine whether the items loaded on the hypothesized factors suggested by Podsakoff, et al. (1997). A Kaiser-Meyer-Olkin measure of sampling adequacy of .92 suggested that factor analysis was useful with this data. Additionally, Barlett's test of sphericity had an index of 3869.17 ( $p = .000$ ), also suggesting that factor analysis was useful for the OCB data collected. Extraction communalities for each item from the Podsakoff, et al. (1997) OCB instrument were all above .60, suggesting that each item represented the OCB sub-dimensions well.

Principal components analysis revealed a 2-factor solution.

Table 1  
Principal-Components Factor Analysis of Organizational Citizenship Behaviors with Varimax Rotation

Members of my flight:	Overall	Helping	Sportsmanship
Help each other out if someone falls behind in his/her work.	<b>.90</b>		.06
Willingly share their expertise with other members of the flight	<b>.85</b>		.03
Try to act like peacemakers when other flight members have disagreements	<b>.78</b>		-.13
Willingly give of their time to help flight members who have work-related problems.	<b>.88</b>		.10
Touch base' with other flight members before initiating actions that might affect them.	<b>.86</b>		.02
Encourage each other when someone is down.	<b>.90</b>		.09
Provide constructive suggestions about how the flight can improve its effectiveness.	<b>.89</b>		.00
Are willing to risk disapproval to express their beliefs about what's best for the flight.	<b>.81</b>		-.08
Attend and willingly actively participate in flight meetings	<b>.83</b>		-.01
Always focus on what is wrong with our situation, rather than the positive side. <sup>a</sup>	-.05		<b>.86</b>
Consume a lot of time complaining about trivial matters. <sup>a</sup>	.08		<b>.93</b>
Always find fault with what other flight members are doing. <sup>a</sup>	.00		<b>.92</b>
Eigenvalue	6.60		2.48
Percentage of Variance	54.98		20.70
Cumulative Percentage of Variance	54.98		75.68
Cronbach's Alpha ( $\alpha$ )	.88	.95	.88
Mean	3.93	3.89	4.03
Standard Deviation	.68	.83	1.04
Sample Size (n)	373	374	373

Notes:

- 1) Boldface indicates factor loading for this study.
- 2) Civic Virtue items were loaded and characterized as Helping Behavior for this study
- 3) Items were rated on a Likert scale range from 1 (not at all) to 5 (frequently)
- 4) <sup>a</sup>Reverse Scored

The cumulative percentage of variance explained by these two factors was 75.7% of the original 12 items. Table 1 reports the factor loadings for the OCB items. The

Cronbach's alpha reported for OCB overall is .88. The scale response was from 1 to 5 with a mean of 3.93 (SD = .68; n = 373). The Cronbach's alpha reported for OCB Helping Behavior is .95. The scale response was from 1 to 5 with a mean of 3.89 (SD = .83; n = 374). The Cronbach's alpha reported for OCB Sportsmanship is .88. The scale response was from 1 to 5 with a mean of 4.03 (SD = 1.04; n = 373).

### **Intercorrelations**

Overall trends in bivariate correlations among the variables of interest indicated density in both the task and friendship networks were significantly related to display of overall OCB and helping behavior, but were not significantly related to sportsmanship behaviors. The performance measures in this study were not significantly correlated with either density or display of OCB. Results of the bivariate correlations are summarized in Table 2.

There was a significant positive relationship between density in the friendship network and display of overall OCB ( $r_{T4} = .49, p < .05, n = 26$ ;  $r_{T5} = .61, p < .01, n = 26$ ;  $r_{T6} = .66, p < .01, n = 26$ ). There was a significant positive relationship between density in the task network and display of overall OCB ( $r_{T5} = .43, p < .05, n = 26$ ;  $r_{T6} = .61, p < .01, n = 26$ ).

Although this study considered OCB as a latent construct, sub-dimensions of OCB were included in the bivariate correlation calculations. There was a significant positive relationship between density in the friendship network and display of helping behavior ( $r_{T4} = .52, p < .01, n = 26$ ;  $r_{T5} = .67, p < .01, n = 26$ ;  $r_{T6} = .68, p < .01, n = 26$ ). There was a significant positive relationship between density in the task network and display of helping behavior ( $r_{T5} = .47, p < .05, n = 26$ ;  $r_{T6} = .58, p < .01, n = 26$ ).

Table 2: Flight Means, Standard Deviations, Sample Size, Range of Scores, Reliabilities, and Intercorrelations

	M	SD	N	Score Range	Correlations													
					1	2	3	4	5	6	7	8	9	10	11	12	13	
1. Density <sub>friend T4</sub>	2.63	.37	28	1.91-3.26														
2. Density <sub>friend T5</sub>	2.61	.43	28	1.83-3.37	.75**													
3. Density <sub>friend T6</sub>	2.71	.33	26	1.90-3.31	.747**	.87**												
4. Density <sub>task T4</sub>	2.53	.33	28	1.99-3.25	.76**	.64**	.68**											
5. Density <sub>task T5</sub>	2.57	.43	28	1.83-3.45	.60**	.82**	.81**	.76**										
6. Density <sub>task T6</sub>	2.62	.42	26	1.49-3.34	.719**	.77**	.87**	.79**	.81**									
7. OCB <sub>overall</sub>	3.93	.29	26	3.11-4.33	.49*	.61**	.66**	.31	.43*	.61**	(.88)							
8. OCB <sub>help</sub>	3.89	.30	26	3.30-4.44	.52**	.67**	.68**	.30	.47*	.58**	.94**	(.95)						
9. OCB <sub>sports</sub>	4.04	.45	26	2.5-4.62	.22	.23	.33	.21	.16	.41*	.70**	.40*	(.88)					
10. Overall Performance	316.09	6.42	28	302.42-327.01	.07	.30	.15	-.03	.07	.19	.27	.27	.15					
11. Delta Physical Fitness	4.25	1.86	26	.84-8.73	.10	.05	.28	.13	-.20	.33	.22	.20	.15	.21				
12. Delta Academic Performance	28.33	11.21	28	13.89-60.90	.21	.21	.19	.20	.18	.33	.05	.23	-.33	.38*	.16			
13. Communications Performance	450.33	13.28	28	410.92-470.93	.13	.42*	.24	.12	.32	.36	.14	.20	-.06	.79**	-.01	.41*		
14. Academic Performance	172.99	3.07	28	164.27-177.65	.12	.27	.16	.08	.06	.24	.35	.28	.36	.84**	.27	.33	.45*	

Cronbach's alpha reliabilities in parentheses.

T represents the time for each survey. (e.g. T6 is the correlation at time 6.)

\* p < .05

\*\* p < .01

Sportsmanship behavior was significantly correlated to task density at time 6 ( $r = .41$ ,  $p < .05$ ,  $n = 26$ ).

### **Hypothesis 1**

Hypothesis 1 tested whether a positive relationship between display of OCB and group performance. To test hypothesis 1, bivariate correlation analysis was used to determine if overall group performance and four sub-components of group performance were related to display of OCB. These performance measures were similar by definition since they were all academic measures (except for physical fitness). Each OCB-performance relationship was analyzed to determine whether unique relationships exist for different kinds of performance. Just as Podsakoff, et al. (1997) found differences in the relationship between OCB and performance with respect to quality and quantity produced, this study examines different performance measures to determine if there are differences between five types of performance. Results indicate there were no significant relationships between OCB and all types of group performance measured in this study (academic test scores, communication scores, and physical fitness scores, as well as the delta between initial and final academic tests). Thus, hypothesis 1 was not supported. Results are summarized in Table 2.

### **Hypotheses 2a and 2b**

Hypothesis 2a analysis tested a positive relationship between density in the task network (H2a) and friendship network (H2b) and group performance. Bivariate correlation analysis was used to test hypothesis 2a and 2b. Each density-performance relationship was analyzed to determine whether unique relationships exist for different kinds of performance. No significant relationships were found between task density and

any of the types of group performance measures. Thus, hypothesis 2a was not supported. The data indicate a positive significant relationship ( $r = .42$ ;  $p < .05$ ,  $n = 28$ ) between density in the friendship network at time five and performance in communications exercises. All other friendship network-group performance relationships were not significant ( $p > .05$ ) at times four, five, and six. The results are summarized in Table 2.

### **Hypotheses 3a and 3b**

Hypothesis 3a and 3b tested whether OCB mediated the relationship between density in the task and friendship networks and group performance. To test hypothesis 3a and 3b, overall performance and four sub-components of performance were regressed on social network density and display of OCB using the sobel test method. These performance measures were similar by definition since they were all academic measures (except for physical fitness). Each OCB-density-performance relationship was analyzed in a separate regression equation using the sobel test method (Preacher & Hayes, 2004) to determine whether unique relationships exist for different kinds of performance. No significant relationships from time four through six resulted. Thus, hypotheses 3a and 3b are not supported.

### **Hypothesis 4a and 4b**

Hypotheses 4a and 4b tested whether a positive relationship between density in the task and friendship networks and group performance was moderated by display of OCB. To test hypothesis 4a and 4b, overall performance and four sub-components of performance were regressed on social network density and display of OCB. These performance measures were similar by definition since they were all academic measures (except for physical fitness). Each OCB-density-performance relationship was analyzed

in a separate regression equation to determine whether unique relationships exist for different kinds of performance. Education level was used as a control variable in the regression analysis since four of the five performance measures were primarily based on academic performance measures. Sportsmanship was the only OCB that had a significant moderating effect on the density-group performance relationship. Table 5 and Figure 6 summarize the results of these relationships.

Table 3  
Moderating Relationships of Density and Display of OCB and Performance

	Performance				
	Overall	Δ Academic	Communication	Academic Knowledge	Δ Physical Fitness
Std. $\beta_{\text{friend \& sports T4}}$	-.52*	-.60**	.40	-.52*	.27
Std. $\beta_{\text{friend \& sports T5}}$	-.58*	-.72**	-.44	-.55*	-.25
Std. $\beta_{\text{friend \& sports T6}}$	-.73**	-.74**	-.57*	-.39**	-.41
Std. $\beta_{\text{task \& sports T4}}$	-.41	-.53**	-.35	-.36	-.21
Std. $\beta_{\text{task \& sports T5}}$	-.32	-.45*	-.34	-.21	-.09
Std. $\beta_{\text{task \& sports T6}}$	-.64*	-.50*	-.43	-.55*	-.37

Notes:

This table summarizes the standardized  $\beta$  for the interaction term in each performance relationship.

T is the time each survey was administered. (e.g. T6 data was collected at time 6)

\*  $p < .05$  \*\*  $p < .01$  \*\*\*  $p < .001$

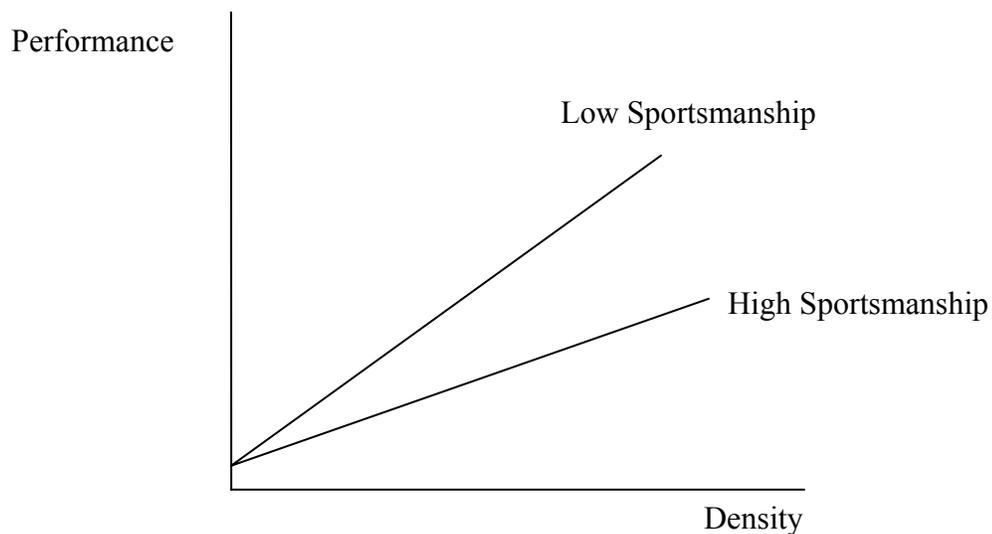


Figure 6: Results of Density-Performance Relationship Moderated by OCB

**Overall Performance.** For overall performance, the interaction term between the friendship network and display of sportsmanship was negative and significant at time four, five, and six (standardized  $\beta_{T4} = -.52, p < .05$ ; standardized  $\beta_{T5} = -.58, p < .05$ ; standardized  $\beta_{T6} = -.73, p < .01$ ). These interactions accounted for 17.1%, 19.7%, and 28.1% of the variance in this relationship at times four, five, and six respectively. The interaction term between the task network and display of sportsmanship was negative and significant only at time six (standardized  $\beta_{T6} = -.64, p < .05$ ). This negative interaction accounted for 21.9% of the variance in this relationship at time six.

**Academic Performance.** For the overall academic performance measure, the interaction term between the friendship network and display of sportsmanship was negative and significant at time four, five, and six (standardized  $\beta_{T4} = -.60, p < .01$ ; standardized  $\beta_{T5} = -.72, p < .01$ ; standardized  $\beta_{T6} = -.74, p < .01$ ). These interactions accounted for 22.3%, 30.3%, and 29.2% of the variance in this relationship at times four, five, and six respectively. The interaction term between the task network and display of sportsmanship was negative and significant at time four, five, and six (standardized  $\beta_{T4} = -.53, p < .01$ ; standardized  $\beta_{T5} = -.45, p < .05$ ; standardized  $\beta_{T6} = -.50, p < .05$ ). These negative interactions accounted for 21.8%, 18.2%, and 13.1% of the variance in this relationship at times four, five, and six respectively.

**Change in Academic Performance.** For the change in academic performance measure, the interaction term between the friendship network and display of sportsmanship OCBs was negative and significant at time four, five, and six (standardized  $\beta_{T4} = -.52, p < .05$ ; standardized  $\beta_{T5} = -.55, p < .05$ ; standardized  $\beta_{T6} = -.69, p < .01$ ). These negative interactions accounted for 17.0%, 17.8%, and 25.8% of the

variance in this relationship at times four, five, and six respectively. The interaction term between the task network and display of sportsmanship was negative and significant at time six (standardized  $\beta_{T6} = -.55$ ,  $p < .05$ ). This negative interaction accounted for 16.1% of the variance in this relationship at time six.

**Communication Performance.** For the communication measure the interaction term between the friendship network and display of sportsmanship was negative and significant at time six (standardized  $\beta_{T6} = -.57$ ,  $p < .05$ ) when measuring overall communication performance. This negative interaction accounted for 17.2% of the variance in this relationship at time six. The interaction term between the task network and display of sportsmanship did not show a significant relationship.

**Physical Fitness Performance.** The interaction term between the task and friendship networks and display of sportsmanship did not show a significant relationship when measuring change in physical fitness test performance.

#### **Hypothesis 4a and 4b Summary**

Hypothesis 4a and 4b were not supported for display of overall OCB or helping behaviors. Hypothesis 4a and 4b were partially support for the sportsmanship dimension of OCB. Hypothesis 4a (task network) was supported for overall performance at time 6 ( $p < .05$ ), change in academic performance at time 4, 5, and 6 ( $p < .01$ ,  $p < .05$ ,  $p < .05$  respectively), and academic knowledge performance at time 6 ( $p < .05$ ). Hypothesis 4a was not supported for communication performance or change in physical fitness performance. Hypothesis 4b (friendship network) was supported for overall performance at time 4, 5, and 6 ( $p < .05$ ,  $p < .05$ ,  $p < .01$  respectively), change in academic performance at time 4, 5, and 6 ( $p < .01$ ), communication performance at time 6 ( $p <$

.05), and academic knowledge performance at time 4, 5, and 6 ( $p < .05$ ,  $p < .05$ ,  $p < .01$  respectively). Hypothesis 4b was not supported for change in physical fitness performance.

There is a note of caution when determining significant relationships based on multiple kinds of performance to avoid overstating some of the significant relationships. The Bonferroni correction is a method used to avoid overstating significant results (Stevens, 2002). This method is used when multiple tests are used to determine whether a relationship exists. In this study, five different kinds of performance were used to analyze the mediating and moderating relationship of density and OCB on group performance. The Bonferroni correction method is based upon the idea that if, for example,  $\alpha = .05$ , five tests have an overall  $\alpha = .25$ . This means there is a 1 in 4 chance of rejecting the null hypothesis when the null hypothesis is true (Stevens, 2002). Therefore, in this study, although p-values less than .05 are reported, such values may be the result of sampling error versus effect. P-values of .01 or less, which account for multiple comparisons, are more stringent boundaries of the reject regions.

## V. Discussion

### Introduction

The purpose of this research was to determine if social network density and organizational citizenship behavior were related and to investigate their effects on group performance. Previous research has shown positive relationships between density and group performance (Balkundi & Harrison, 2006), and it is well documented that OCBs are positively related to group performance (Podsakoff, et al., 1997; Podsakoff & MacKenzie, 1994; Walz & Niehoff, 2000). However, since research has not yet investigated the interaction between density and OCBs, this study helped to fill the gap in the literature. This study indicated partial support of a moderation model, with the sportsmanship dimension of OCB moderating the relationship between density and group performance.

The results of this study indicated that no significant relationships existed during the first three weeks. The results of this analysis suggest that groups are still in the forming and storming phases (Tuckman, 1965) of network development. After each network stabilizes, characteristic OCB and density relationships can be measured to determine whether or not a significant mediating or moderating relationship exists. For times four, five, and six, the relationships were not much stronger, but there were enough statistically significant relationships to merit further investigation of mediation and moderation.

### Factor Analysis of OCB

Unlike OCB factor loadings observed by Podsakoff, et al. (1997), this study did not extract the same factors as expected from the OCB survey instrument. Using

Varimax rotation with Kaiser Normalization, only sportsmanship and helping behavior were extracted, with no items significantly loading on civic virtue. One possible explanation for absence of the civic virtue dimension that Podsakoff, et al (1997) found and intended to measure was the setting and background of the respondents. The original instrument was developed and used on machine crews working in a paper mill as opposed to senior enlisted military with supervisory positions in a classroom environment. Three reasons related to the type of task, time the respondents knew each other, and indifference toward the survey instrument may explain the factor analysis results.

The paper mill respondents accomplished the survey instrument from the perspective of manual labor workers accomplishing labor intensive tasks. The respondents in this study were in an academic environment where respondents are focusing on developing supervisory skills. Statements from the survey instrument asking whether group members “provide constructive suggestions...” or are “willing to risk disapproval to express their beliefs...” may not have been extracted on a separate factor because these items may not have evoked the same feelings from the respondents that correspond to civic virtue in the classroom setting.

The time the respondents spent together was vastly different between the Senior Non-Commissioned Officers studied here and the paper mill crews. The paper mill crews were presumably a much more mature study group in terms of time spent in the group than the groups studied over a seven week training course. The lack of opportunity for the respondents in this study to adequately display civic virtue may have caused respondents to answer survey items intended to measure display of civic virtue behaviors as helping behavior.

Finally, the respondent's survey results showed signs of indifference when completing surveys in the sixth and seventh survey. The indifference was observed while accomplishing the data compilation. Many of the surveys had identical Likert scale scores on all 12 items in the measure regardless of the reverse phrasing in the last three items. This trend suggested a possible threat to internal validity due to response acquiescence among some respondents (Campbell & Fiske, 1959; Podsakoff & Organ, 1986). There were several instances of respondents realizing the reverse wording of the last three items, and thus changing those scores and scratching out their first score. This trend in some groups suggested the scoring on items intended to extract the civic virtue dimension may not have happened due to some respondents scoring civic virtue items the same as the helping behavior items.

### **OCB Relationship with Performance**

In contrast to previous literature (Podsakoff, et al, 1997; Podsakoff & MacKenzie, 1994; Walz & Niehoff, 2000), OCB was not found to be significantly related to performance in this study. Several possible explanations may exist for the unexpected result. First, the sample used for this study was one of convenience. Although the respondents were fully aware that participation in the study was voluntary, the specifically scheduled time in their academic schedule to participate in the survey was introduced with some artificial influence. Trends in response rate in many of the flights showed some mortality as evidenced by a decreasing response rate for each of the last 3 surveys (Campbell & Stanley, 1963). This is most likely due to fatigue of completing six consecutive weekly surveys.

In addition to decreased response rates, survey fatigue may have resulted in response acquiescence or indiscriminate responses resulting in reduced variance. Just as in the previous factor analysis discussion, the survey responses themselves showed evidence of the indiscriminate responses on the items that were reverse scored. Many of the respondents were obviously picking a number from the Likert scale that seemed to fit their mood state at the time toward the first one or two questions and applying them throughout (Podsakoff & Organ, 1986). However, many respondents read the last three questions and realized the reverse wording of the questions and went back to change their answers on the last three items. Some respondents never realized the reverse wording and their scores did not seem to make intuitive sense based on the way the questions were phrased.

Survey fatigue may also have contributed to negativity toward the survey itself as indicated by comments written on the survey. Additionally, since much of the most important training course performance evaluations took place near the end of the course, this may have distracted respondents from fully participating in the survey. Fatigue may have resulted in response acquiescence which led to indiscriminate item responses, consequently reducing variance in the OCB measure (Podsakoff & Organ, 1986). Response acquiescence may have been one reason civic virtue and helping behavior items loaded on the same factor.

Another possible cause for the apparently non-significant relationship between OCB and group performance is the validity of the measurement instrument in this type of environment. The short term academic and transient nature of the respondents may not have allowed for the OCB-performance relationship to fully mature. Previous studies

(Bowler & Brass, 2006; Konovsky & Pugh, 1994; Podsakoff, et al., 1997; Smith, et al., 1983; Wayne & Green, 1993) of OCB have mainly focused on groups that are relatively mature. The opportunity for the groups in previous studies has focused on groups that have had the opportunity to develop relationships within their social networks that allows a more smooth exchange of different kinds of OCB. In this study, the sample studied was a short term group that was formed for a 7-week period. The first survey in the beginning of the course confirmed that there was essentially no social network that existed among the respondents in each group. In this relatively short time period, the opportunity and mechanisms necessary for OCBs to have an effect on group performance may not have existed with enough intensity to significantly influence performance. These results may suggest that groups need to be more mature and beyond the initial forming stage in order for display of OCB to significantly affect group performance or that a different instrument should be formed to measure OCB effects on short term group performance (Tuckman, 1965).

### **Density-Performance Relationship**

Similar to the results of the OCB-performance relationship, this study did not support the hypothesized positive relationship between density and performance. Similar arguments can be made with respect to the time that respondents may have required to develop networks that could significantly affect the density-performance relationship. When the administrators of the course assigned individuals to flights, efforts were made to use stratified random assignment, meaning each flight had relatively similar demographics. The first survey on the second day of the course specifically asked whether respondents knew each other before beginning the course. All flights showed

little or no prior relationship with their group members so density was zero or very low. This meant that each group had the same amount of time to form their social networks. Since administrators formed diverse groups, it is likely to influence the rate of group development. In this study, there may be a lack of significant results in the density-performance relationship due to a relatively short length of time to develop task and friendship networks that could affect the relationship as hypothesized. The results suggested that the groups may not moved far enough on the forming, storming, norming, performing progression to significantly affect the hypothesized relationship (Tuckman, 1965).

### **Mediating Relationship**

This study did not support the hypothesized mediating density-OCB-performance relationship. Full mediation in this study was not considered. Previous research (Balkundi & Harrison, 2006) has shown that density has a direct relationship with performance. Partial mediation, therefore, was the only possible mediating relationship for this study because a direct density-performance and OCB-performance relationship has been shown to exist. Possible causes for the absence of significant partial mediation may be caused by several factors such as a lack of density-OCB relationship, however, since Hypotheses 1, 2a, and 2b were not supported, the partial mediating effect of OCB was not investigated further.

### **Moderating Relationship**

The hypothesized moderation of density and display of OCB on group performance showed some surprising results from one of the three types of OCB measures tested in this study. Contrary to the definition of helping behavior, the display

of this OCB sub-dimension did not show any significant relationship with any of the 5 kinds of performance measured in this study. This lack of a relationship may be due to the same unique contextual situation as those in Hypothesis 1, 2a, and 2b. In this classroom setting, the course was relatively short compared to paper mill workers that presumably worked together for years before a study was conducted on their performance (Podsakoff, et al, 1997). The short duration of this course may not have been enough time for respondents to develop their social networks, and therefore did not provide the intensity and informal mechanisms of both displaying OCB and using their social networks effectively. Thus, the benefits of increased group performance were not realized.

Sportsmanship OCBs, however, was significant in this moderating relationship, but in the opposite direction expected. Despite the lack of a significant direct relationship in hypotheses 1, 2a, and 2b, it seems there was a relationship between performance and the amount of “complaining” that was recognized in this environment. The results indicated that there was a negative moderation in this relationship. The questions that measured sportsmanship behaviors were reverse scored on this survey instrument. These questions measured how much members of the group “focused on what was wrong” in the flight or by “finding fault” with other group members. The negative relationship suggested that as sportsmanship behaviors increased, performance decreased.

The definition of the sportsmanship dimension of OCB suggests members that do not complain about the undesirable parts of the course or members of the group have an effect of enhancing group performance. However, the results of this study implied the opposite. In other words, when respondents displayed behaviors perceived by group

members as complaining, group performance was enhanced in all the performance measures except physical fitness.

At first glance, this negative relationship may seem like an anomaly; however, when considering the context of a classroom environment, it makes good sense. In a classroom environment, when students are encouraged and feel free to ask questions, the class as a whole can benefit from increased discussion raised by students who may not understand the material presented by the instructor. This is a benefit that may be realized toward the later portions of the course as social networks are denser because students feel more comfortable asking questions. Earlier in the course, some students may not feel comfortable asking the “dumb” question that in reality may be a question held by many of the students. In this study, asking the “dumb” question may be viewed as complaining when filling out the survey instrument because respondents may feel the increased questions raised during class are holding up the progress of the lesson. However, as is evidenced in this study, this “complaining” may actually be a benefit to the learning process. The results of this study suggested that as more questions or “complaining” were recognized by respondents, the better the group performs on four of the five types of performance measured in this study.

Therefore, as defined by Podsakoff et al. (2000) the negative relationship found in this study suggested that when display of sportsmanship is high, complaining is low. For the setting of these respondents, however, respondents actually benefit when display of sportsmanship is low. A possible explanation for this result may be that students are asking questions during class more frequently. Therefore, the negative relationship between display of OCB and higher density actually supports the same conclusion as

hypothesized in this study and as implied by previous research on density and OCB (Balkundi & Harrison, 2006; Bowler & Brass, 2006; Podsakoff & MacKenzie, 1994; Podsakoff, et al., 1997; Walz & Niehoff, 2000).

Another possible explanation for a moderating relationship that was not realized until surveys 4, 5, and 6 was the emotional or affect-laden nature of a growing social network. As respondents became more aware of what other students felt about the course, they presumably discussed the progress and final tests and evaluations that were looming at the end of the course. The social network density that developed within each flight over the 7-week course formed conduits for individuals to express their feelings toward the course. If the students were concerned about their evaluations, expressing those views to their group members may be seen as “complaining” and “focusing on what is wrong...” with the course. However, simultaneously, at the end of the course, these students were also preparing for final course evaluations for which they were no doubt preparing. Consequently, although they may have been complaining more frequently, they were still performing.

These results suggested that constructive conflict in the academic environment helps groups perform and should be encouraged by leaders in the classroom. In a labor intensive environment such as the paper mill, groups that focused on “what is wrong...” or complained about undesirable parts of their job (Podsakoff, et al. 1997) may have been hurting the morale of the crew or limiting motivation to get the job done. However, in academics, students in a dense social network may have had an increased opportunity to hear other students that complain about the amount of work required to achieve good grades on their upcoming evaluations. While this may be seen as a low level of

sportsmanship behavior, it may have motivated other students in the group to study harder to keep up with their peers on upcoming tests and evaluations.

### **Limitations and Future Research**

Despite the limited findings in this study, as previously discussed, there may have been some issues that detracted from the results of the analysis. This study suggested that future measurement instruments may be needed that are more appropriate for short term groups that cease to exist shortly after forming. In today's world of problem solving "tiger teams" that form to complete short-term projects and then move on and cease to exist as a group, research could benefit on measuring how quickly networks form and whether OCB is a variable that influences group performance in these circumstances. The limited significant findings in this research suggest that OCB and density do affect some kinds of performance; however, they may not work in the same manner as previous research suggests.

Factor analysis extracted two factors instead of three as suggested by Podsakoff, et al. (1997) resulted in a potential limitation of the use of this instrument in short term or classroom environments. The civic virtue items in the instrument may not have been meaningful for a group that was still in the forming and storming stages of development (Tuckman, 1965). Additionally, in an academic environment, the items intended to measure respondents feelings toward how their peers participate in the governance of the group may not have been interpreted as intended by the instrument.

The trend of survey fatigue in this study suggests that future measurement instruments be used more sparingly so that respondents are not overwhelmed. The voluntary nature of the survey is itself an OCB, so for researchers to gather meaningful

data, the setting and frequency of survey instruments completed by the respondents must be considered. In this case, respondent networks grew denser in their social networks and may have decided in some cases that the surveys were not worth the time to complete (Campbell & Stanley, 1959; Podsakoff & Organ, 1986). Researchers must maintain a level of motivation and may need to limit the amount of data gathered in such a short time period.

Both of the independent variables in this study were self-report measures that gathered data based on how the respondents interpreted the measure and how they felt when the survey was administered. Common method variance is a common limitation and threat to internal validity when gathering and analyzing social network and behavioral research data due to the mood respondents are in when they complete the survey (Podsakoff & Organ, 1986). Additionally as the groups matured during the course, the evidence of response acquiescence discussed earlier supported the suggestion that the respondents may not have been fully engaged when completing the survey instrument.

Future research on short term groups should use instruments that are more suitable for groups that are formed for a limited time period. Researchers must focus on how the groups form in that short time period and how it may affect that group in the setting the survey instrument is administered. Behavior among respondents in a short term group is presumably different from groups that are well established. That difference suggests that researchers use tools that are sensitive to different characteristics of short and long term groups and their performance. Response acquiescence might be addressed by limiting the frequency of the measurement instruments and varying the items that are

used to gather the data so that respondents are more interested and motivated to truthfully complete the survey.

### **Summary**

This research explored the net effects of social network density and OCB on group performance. A negative moderating relationship between sportsmanship, density, and group performance has been shown to have the same net effect on performance as previous research that showed a positive relationship (Balkundi & Harrison, 2006; Bowler & Brass, 2006; Podsakoff, et al. 1997). This research confirmed some of the hypothesized relationships and shows that the combined effects of density and display of OCB is an important contributor to group performance. This relationship is an encouraging first step for future research in this relationship that should encourage the development of tools that are appropriate for short term network and OCB analysis.

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<b>14. ABSTRACT</b> The purpose of this research was to explore the relationship between Organizational Citizenship Behavior (OCB), social network density, and group performance. Social networks have recently become a key area of interest for researchers in the study of management in organizations. OCB has, likewise, seen a considerable amount of attention in research literature as a direct and indirect contributor to group performance. This field study, conducted at a military training course, attempted to explore the possible net effects of network density and citizenship behaviors on group performance. Longitudinal social network data was used to examine whether there was a relationship between the levels of OCB displayed and the level of performance achieved in each group. Linear regression was used to explore the moderating and mediating relationships in this study. A sample of 406 students in 28 groups was studied. The data gathered provided empirical evidence that density and one dimension of OCB, sportsmanship, are negatively related to performance in both the task and friendship networks suggesting that low OCBs may actually be related to higher group performance. The results contradicted the social network density and OCB literature that predicted a positive relationship with performance.					
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