

WHEN SILENCE SPEAKS LOUDER THAN WORDS: COMPUTER-MEDIATED
COMMUNICATIONS AND PERCIEVED OSTRACISM

By

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To the Faculty of Washington State University:

The members of the committee appointed to examine the dissertation of GREGORY MICHAEL SCHECHTMAN find it satisfactory and recommend that it be accepted.

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COMMUNICATIONS AND PERCIEVED OSTRACISM

ABSTRACT

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This dissertation addresses a need for theoretical insight into virtual teams and individual reactions to online silence. Integrating psychology's social ostracism theory and IS' Media Synchronicity Theory, it offers a new theoretical framework for understanding what happens when members of virtual teams encounter silence in an online environment. This dissertation consists of three essays. The first essay develops a framework called the Cyberostracism Effects Theory (CET), which identifies four dimensions of technology-mediated interactions that affect perceptions of ostracism in virtual teams; message characteristics, interpersonal characteristics, individual characteristics, and media characteristics. The second essay provides a psychometric analysis of the Williams' Need-Threat model instrumentation used in a virtual ball toss simulation and a chat room. The third essay utilizes a laboratory experiment to manipulate ostracism and evaluative tone to understand their impact on ostracism perceptions and important downstream organizational outcomes. This research provides implications for information systems practice and theory in the area of interface design and virtual team leadership.

Key Words: Cyberostracism Effects Theory, Virtual Teams, Computer-Mediated Communication, Ostracism, Silence, Group HCI, Cyberball, Media Synchronicity Theory (MST), Perceived rejection

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Dedication

This dissertation is dedicated to my loving wife Susie.

*I may not have a mansion, I haven't any land
Not even a paper dollar to crinkle in my hands
But I can show you morning on a thousand hills
And kiss you and give you seven daffodils*

Without your passionate belief in me, this dissertation would never have become a reality.

My beloved, I will forever be yours, faithfully

CHAPTER 1: INTRODUCTION AND OVERVIEW

*Reality is what we take to be true.
What we take to be true is what we believe.
What we believe is based upon our perceptions.
What we perceive depends upon what we look for.
What we look for depends upon what we think.
What we think depends upon what we perceive.
What we perceive determines what we believe.
What we believe determines what we take to be true.
What we take to be true is our reality.
~ Gary Zukav ~*

This dissertation is a compendium of three research essays drafted with the intention of publication in a premier Information Systems journal. The author is the primary contributor for each manuscript and was responsible for all data collection, analysis, and presentation. The inspiration for this dissertation lies in a relatively unexplored area of information systems: cyberostracism. As the opening quote implies, in some situations, perception *is* reality and this investigation seeks to understand technology-mediated perceptions of rejection. While social ostracism has a strong extant research stream, the investigation of cyberostracism is a relatively new concept in psychology and barely tapped within the IS field. It is envisioned that the research presented in these three essays will provide the groundwork for better understanding of the cognition and affect of people communicating online and the systems by which they interact.

The topics addressed in these essays center around three intertwined concepts. The first of these is distributed or “virtual” teamwork. Virtual teams are a well-plumbed research stream that continues to present new challenges as technology rapidly evolves and the global economy blurs national borders. The second concept is that psychological distress potentially exists in the symbiotic connection between silence and ostracism. Some psychology researchers (Sommer, et

al., 2001; Williams, 2001; Zadro, et al., 2006) assert that humans have evolved a hypersensitivity to feeling they belong. It is interesting to consider what occurs in virtual team situations such as having one member of a distributed oil exploration team in Astana Kyrgyzstan suddenly notice that he is no longer getting email from his cohort spread across the Venezuelan oil fields or his boss in Houston Texas. This dissertation investigates how such silence is interpreted. It assumes that, as technology advances and connectivity increases, situations such as this will become increasingly commonplace. Therefore, there is considerable value in understanding the resultant effects. The third core concept framing this dissertation is the subjective view that perception is reality and not all actions are objectively rational. The connection between growing virtual teams, technology-mediated communications, and subjective perceptions of ostracism is a fascinating triangulation that drove the research presented in this dissertation.

The goal of this dissertation is to lay the foundation for a stream of research investigating perceived ostracism within virtual teams. It adopts the theoretical perspective of the Need-Threat model of ostracism (Williams 1997, 2001) developed by the field of psychology. With its basis of innate negative reactions to even slight rejection, cyberostracism (Williams, et al., 2000b) provides unique insights into the reactions of people interacting via information and communication technologies. This input is subsequently integrated with the conceptualization of technology-mediated communication processes and media characteristics presented in Media Synchronicity Theory (Dennis, Fuller, & Valacich, in press) to form a framework that crosses all three essays.

Essay One is a conceptual paper that theoretically extends ostracism theory to virtual teams. The proposed Cyberostracism Effects Theory (CET) identifies four dimensions of technology-mediated interactions that affect perceptions of ostracism in virtual teams: message

characteristics, interpersonal characteristics, individual characteristics, and media characteristics. Past literature has examined how ostracism, the act of ignoring and excluding individuals from participation, can be a powerful force capable of reducing team effectiveness. This essay extends this research into the area of computer-mediated communication and group HCI, specifically proposing a framework for understanding how media characteristics can influence the formation of perceived ostracism, and its downstream consequences on a number of important virtual team variables. The CET framework expands current IS literature on virtual teams, provides a new understanding of a powerful force and a foundation for both research and practice in the areas of interface design and virtual team leadership.

Essay Two seeks to investigate the reliability of the instrumentation used by researchers of Williams' model of ostracism effects. To do so, it conducts two studies. The first study is a replication of Williams' original Cyberball game in an experimental research setting. The second study is a similar ostracism experiment done in a chat room. The results of these two studies are used to analyze the items Williams employs in measuring his constructs. Factor analysis is applied to examine convergent and discriminant validity. The results show that while the entire instrument accurately depicts the effects of ostracism, its individual items have validity issues. The paper's overall contribution is to identify issues with prior instrumentation, identify useful changes to the instrument, and then test them in a different cyberostracism context.

Essay Three empirically tests the concept of computer-mediated ostracism in the context of virtual team decision-making. Its objective is to further the understanding of online silence as it affects team member psychology and virtual team decision-making by integrating Williams' Need-Threat model and the extant team satisfaction research. Specifically, this essay clarifies the effect of perceived ostracism within virtual teams interacting via text-based communication.

In doing so, it describes an experiment testing perceived ostracism effects on satisfaction with other group members, the processes they use, and the decision reached during a participative decision-making task carried out in a distributed environment. This contributes to the dissertation by empirically testing the impact of changes in feedback frequency (i.e., silence) and evaluative message tone on perceptions of ostracism, psychological distress, and satisfaction during participative decision-making. The results show that individuals are highly sensitive to breaks in anticipated communications with their virtual teammates, but not to critical messages from them.

CHAPTER 2: ESSAY--CYBEROSTRACISM EFFECTS THEORY

EXAMINING SILENCE IN COMPUTER-MEDIATED COMMUNICATION: A THEORY OF PERCEIVED OSTRACISM

INTRODUCTION

*Men are disturbed not by the things that happen,
but by their opinion of the things that happen.*

~ Epictetus ~

Groups are a vital organizational element, contributing to organizational efficiency and effectiveness. Research has consistently shown teams yield potential increases in valuable areas such as increased employee empowerment, lower costs of operations, higher product quality, worker productivity and service levels (Wellins and Byham, 1991). The use of a group structure within organizations is becoming an increasingly common foundation for competition in the globalizing business environment (Devine, et al., 1999). Over 50% of all organizations (Devine, et al., 1999) and 80% of Fortune 500 companies (Cohen and Bailey, 1997) employ group work in some way or another. This is a reflection of the increasing importance of leveraging their benefits as competition and quality pressures mount (Douglas and Gardner, 2004). Business have come to understand that the synergy created within groups benefits everyone and that advantages of the team-based structure ultimately enhance organizational effectiveness (Griffith and Neale, 2001).

In the advent of modern communication technologies, many of these groups are now interacting via new forms of technology-mediated communication, such as instant messaging, email, teleconferencing, and distributed groupware. Such technologies allow the formation of virtual teams, that is “groups of geographically and/or organizationally dispersed coworkers that are assembled using a combination of telecommunications and information technologies to

accomplish an organizational task” (Townsend, et al., 1998, p.17). Using virtual teams enables firms to draw on expertise from individuals anywhere within same company or even outsourced units and merge it into a focused group connected only by technology-mediated communication (Lipnack and Stamps, 2001). As companies absorb new information technologies and become open to these new systems, there is greater emphasis on the inter-functional, inter-organizational, and inter-national collaboration that virtual teams empower (Axtell, et al., 2004). Jarvenpaa and Leidner (1999) noted that virtual teams promise flexibility, responsiveness, lower costs, and improved resource utilization, and as a result virtual teams have become key components of many organizations.

While CMC-enabling technologies hold great promise, they can have significant influence on how such teams interact. For example, computer-mediated teams interact less and exchange less information than collocated groups (McGrath and Hollingshead, 1994). CMC groups also tend to show greater intimacy and achieve higher levels of interpersonal communication than face-to-face groups (Walther, 1992; Walther, 1996). Conversely, other research has shown that technology-mediated communication fosters less open communications (Alge, et al., 2003; Hollingshead, 1996) and may lead to increased decision-making time (McLeod, 1992). These examples highlight the emergent nature of technology’s impact on people interacting with it (Orlikowski and Robey, 1991; Poole and Desanctis, 1990). Our research draws on research in psychology to explore an under-researched area in virtual teamwork, i.e., the effects of perceived ostracism on virtual team performance.

A sense of perceived ostracism may be created through explicit or implicit signals. In the case of explicit signals, someone may be informed in a very direct fashion that they are being excluded from the group, for example by telling them that communication will not be

forthcoming, blocking their communication via observable technological methods, or removing their access in the CMC environment. Alternatively, ostracism may be more implicit, for example through subtle signals such as silence, reduced message frequency, or a change in tone.

Dealing with perceived ostracism, or what is commonly been referred to as silence in some literatures, is one of the inherent problems faced by global virtual teams (Cramton, 1997). Yet, little research has been done on this topic, possibly because a lack of communication is more difficult to study than other, more overt, acts (Van Dyne, et al., 2003).

Past research in social and cognitive psychology (e.g., Smith and Williams, 2004; Sommer, et al., 2001; Williams, 2001; Williams, et al., 2000b; Williams, et al., 2005) has explored the concept of ostracism and shown how silence can be interpreted as ostracism and lead to negative outcomes. Social ostracism is commonly known as “the silent treatment” and its influence is everywhere. Sommer and colleagues (2001) note that the silent treatment is a form of social rejection and point to research (Faulkner, et al., 1997) showing that nearly 70% of American citizens admitted applying it to their romantic partners. In basic terms, ostracism is simply the act of being excluded and/or ignored by another individual or group (Williams, 1997; Williams, 2001). It frequently occurs among school peers (Asher and Coie, 1990; Asher and Parker, 1989) and coworkers in organizations (Gruter and Masters, 1986; Miceli and Near, 1992). The evolutionary roots behind ostracism are so profound that they have made people hypersensitive, seeing the slightest perceived exclusion as ostracism (Williams and Zadro, 2001).

Specifically focusing on CMC environments, we have developed a theoretical model that seeks to delineate the contextual media characteristics and personal characteristics that drive people to interpret a particular level of communication as ostracism, and how this perceived ostracism may influence team outcomes. The overall objective of this research is to fill gaps in

the information system literature by exploring the development of perceived ostracism in distributed teams. Several principal research questions guide this work. First, *how do individual characteristics, interpersonal characteristics, media characteristics, and message characteristics interact to influence perceived ostracism?* Next, *how do people, believing they are being ostracized react to that ostracism?* Finally, *how does perceived ostracism influence the performance of virtual teams.*

This research has theoretical as well as practical importance. Theoretically, we provide a foundation for studying the effects of ostracism in virtual teams. Table 2.1 illustrates how theoretical perspectives employed in IS research may be extended through an understanding of the effect of online silence.

Table 2.1 Silence and Ostracism: Theoretical Implications for IS Research

<u>Theoretical perspective</u>	<u>Summary</u>	<u>Ostracism Research Contribution</u>
Attribution theory (Heider, 1958; Weiner, 1974; Weiner, 1986)	Focuses on determining why people do what they do, i.e., attribute causes to behavior	Impact of attribution on interpretations of silence.
Group Support Systems Information exchange (Dennis, 1996), increased participation (Dennis and Garfield, 2003) etc.	Identifies IT factors that predict group systems successful use	Perceived ostracism's affect on IT-supported communication
Media Theories: Media Richness Theory (Daft, et al., 1987), Media Synchronicity Theory (Dennis, et al., Forthcoming; Dennis and Valacich, 1999)	Identifies important media characteristics affecting information flow	Focus the effect of media supported cues to create and/or moderate perceived ostracism.
Social Cognitive Theory (Bandura, 1977; Bandura, 1986; Bandura, 1997)	Identifies human behavior as interaction of personal factors, behavior, and the environment	Extends view of behavior to contextual differences in reactions to silence
Structuration Adaptive Structuration Theory (Desanctis and Poole, 1994)	Emphasis on group interaction and socio-technical aspects of systems	Impact of ostracism on decision-making within the structuring process
Technology Adoption Models: Technology Adoption By Groups (Sarker, et al., 2005)	Identifies IT factors that predict group technology acceptance	Impact of perceived ostracism during group valence negotiations

This paper further provides practical implications for managers by exploring how perceived ostracism affects employees who work in distributed environments. Since breaks or delays in communications are ubiquitous within distributed teams, employees may develop negative feelings at times during their computer-mediated interactions. We hope to provide managers with a way of understanding this phenomenon, as well as potentially counteracting it.

THEORETICAL DEVELOPMENT

This section develops the theoretical foundation for our proposed model. Perceived ostracism refers to the feelings of exclusion aroused in an individual who interprets communication partners to be avoiding contact with them. For the purposes of this research, it is unimportant whether the communication cues that create a perception of ostracism are intentional or not. In recognition of this, throughout this paper the terms ostracism and perceived ostracism are used interchangeably. While we recognize their inherent difference, in this situation, perception is reality. Next, we explore silence's emergent context and the possibilities that the link from silence to perceived ostracism may be driven by variations in individual traits, the situations people face, or some interaction of these two factors.

Person-Situation Interaction

Past research in psychology has examined behavior as the function of two divergent factors: personal disposition and the environmental situation. Yet, social behavior within a group needs to account for the complex interplay of multiple unique individuals interacting within a situation (Snyder and Ickes, 1985). Identifying the primary driver or drivers of each person's behavior largely depends upon which psychological lens researchers apply. On the one hand, social behavior can be seen as being driven by individual innate and learned differences

that are stable and consistent over time (i.e., the person’s disposition). These individual dispositions are “situationally invariant” (Mischel, 1968). Yet it is a matter of some debate whether such an extreme stance is appropriate since many definitions of these dispositional traits include a modifier such as “relatively enduring” (Roberts and Caspi, 2001). Conversely, other research has shown that behavior is driven by the external influences of the situational environment (Snyder and Ickes, 1985). The two divergent views broadly mirror the different approaches employed within the psychology field. Whereas situationists examine how variations in the situation affect behavior, personality psychologists are interested in the relationship between traits and behavior (Swan and Selye, 2005). While the situational view may sometimes seem to be at odds with the dispositional view (Kenrick and Funder, 1988), these views are actually complementary. A potentially overlooked view is that behavior may be a function of the characteristics of both the person and the environment (Lewin, 1936).

This third perspective is offered by Swan and Selye (2005) who posit that an interactionist approach is the best way to view social behavior. The interactionist approach is an emergent approach where sometimes personal characteristics determine behavior while at other times the situational characteristics dominate. Table 2.2 shows the differences between the three perspectives of how behavior is determined.

Table 2.2 Social Behavior Perspectives

<u>Perspective</u>	<u>Behavioral Determinant</u>	<u>Mathematical Equivalent</u>
Personal Position	Stable individual traits and characteristics	$B = f(P)$
Situational Position	Environmental or situational characteristics	$B = f(E)$
Interactionist Position	The <u>interaction</u> of person and situational characteristics is the main determinant of behavior	$B = f(P \times E)$ (i.e., Lewin’s equation)

Bandura's work (e.g., 1977; 1978; 1986) provides a widely accepted contribution that further helps to understand the person-situation interaction. In his treatment of the person-situation interaction, Bandura argued that 'behavior, personal dispositions, and the environment are all interlocking determinants of each other' (Bandura, 1978, p. 346). His concept of reciprocal determinism was conceived to address the relative influence of personality, situation, and behavior. Bandura asserted that personal factors affect behavior, which in turn alters the individual's surrounding environment that itself ultimately affects personal factors. This cycle is constantly repeating itself. Furthermore, "... people do not simple react mechanically to situation influences—they actively process and transform them" (Bandura, 1978, p. 351). In line with Bandura's views, the relative causal influence of behavior (e.g. cues that might signal ostracism), the person (e.g. how receptive a communicator is to being ostracized), and the environment (e.g. the media to which the ostracism is taking place); all interact to help explain how ostracism can occur in technology mediated teams. The current research into perceived ostracism in online environments is based upon such an interactionist approach.

Silence and Ostracism

After speech, silence is the greatest power in the world.

~ Jean-Baptiste Henri Lacordaire~

Ostracism perceptions occur in part because communication cues, such as silence, can have different meanings that people struggle to comprehend. At the simplest level, silence may be understood as the discrete antithesis of speech. Silence and speaking are complementary components of effective communication. It is silence that makes communication possible because someone needs to be listening (Scott, 1993). Accordingly, silence is an equivocal part of communication. It needs to be understood within different contexts and as expressing a wide

range of meanings. Jensen (1973) also asserts that silence serves different functions, from linking people to showing dissent. In many cases the positive or negative meaning silence takes is contextual. The ubiquity of communication has contributed to silence being studied with varying lenses in the fields of linguistics, sociology, management, education, and communication (Tannen and Saville-Troike, 1985; Van Dyne, et al., 2003). The most useful of these illustrate how silence can be multidimensional.

Silence is not a one-dimensional construct. It can be seen from different perspectives depending upon its context. Van Dyne et al. (2003) created a useful framework in their study of employee silence which helps illustrate the multidimensionality of the construct. Van Dyne and colleagues' work identifies three types of silence based upon its underlying motive (see Figure 1 adapted from (Van Dyne, et al., 2003)). The first two types are derived from the silence research of Morrison and Milliken (2000) and Pinder and Harlos (2001) within the management literature. *Acquiescent silence* is the withholding relevant ideas, information, or opinions due to resignation (Van Dyne, et al., 2003, p. 1366). It is a passive act closely linked to an individual's disengagement and low involvement. This can be contrasted with *defensive silence*. Whereas acquiescent is passive, defensive silence is actively withholding relevant ideas, information, or opinions as a form of self-protection, due to fear (Van Dyne, et al., 2003, p. 1367). It is an intentional choice to protect one's self from perceived threats. Finally, *prosocial silence* is the withholding work-related ideas, information, or opinions in order to be considerate of others (Van Dyne, et al., 2003, p. 1368).

Table 2.3 Types of Silence (Van Dyne 2003)

<p style="text-align: center;">Type of Behaviour →</p> <p style="text-align: center;">↓ Employee Motive</p>	<p>EMPLOYEE SILENCE: Intentionally withholding work-related ideas, information, and opinions</p>
<p>Disengaged Behaviour Based on Resignation Feeling unable to make a difference</p>	<p>ACQUIESCENT SILENCE</p> <p>Examples: Withholding ideas based on resignation Keeping opinions to self due to low self-efficacy to make a difference</p>
<p>Self-Protective Behaviour Based on Fear Feeling afraid and personally at risk</p> <p>Other-Oriented Behaviour Based on Cooperation Feeling cooperative and altruistic</p>	<p>DEFENSIVE SILENCE</p> <p>Examples: Withholding information on problems based on fear Omitting facts to protect the self</p> <p>PROSOCIAL SILENCE</p> <p>Examples: Withholding confidential information based on cooperation Protecting proprietary knowledge to benefit the organization</p>

From the view of the source, silence can be of different types and serve different functions within the organization; however, the target of silence has few clues upon which to analyze this lack of communication. Due to this, people who encounter it may misunderstand the reasons behind silence, which may lead to problems in teams communicating via technology-mediated means.

Ostracism: There are many ways to express ostracism, from avoidance of eye contact to the silent treatment. Williams (2001) describes three categories of ostracism. Social ostracism refers to being excluded while in the physical presence of others. The second category, physical ostracism, happens when the individual being ignored is bodily removed from the ostracism source. The final category is cyberostracism, being ignored or excluded via an electronic medium. In fact, ostracism in its many forms is so common that most people have experienced

some form of it (Faulkner, et al., 1997). Perceived ostracism creates feelings of being overlooked and undervalued. In doing so it creates a negative social environment (Snoek, 1962) and can be a tool of social rejection. What makes ostracism especially problematic is that it is often ambiguous and its targets feel shunned and ignored (Williams, et al., 2002) with no tangible act to fight back against.

Ostracism has been studied in a wide number of contexts and has been found to be a robust and ubiquitous influence on interpersonal relationships (Gruter and Masters, 1986; Williams and Sommer, 1997; Williams and Zadro, 2001; Zadro, et al., 2004). Ostracism's effect on interpersonal relationships has been studied across genders (Cairns, et al., 1989), in children's playground behavior (Barner-Barrey, 1986), and within the context of society's treatment of the elderly (Madey and Williams, 1999). It has been noted in primitive cultures (Basso, 1970; Boehm, 1986; Mahdi, 1986) as well as modern ones (Woods, 1978). Ostracism effects have been noted in diverse academic settings such as academies, schools, and institutions (Davis, 1991; Heron, 1987), the workplace (Faulkner and Williams, 1999; McInnis, 1999), and within religious groups (Gruter and Masters, 1986).

Ostracism, and our sensitivity to it, is an outflow of people's innate desire to belong to a group, which social psychologists have suggested is a fundamental need of tremendous evolutionary value (Baumeister and Leary, 1995; Leary, et al., 1995). For animals, the group is protection from the environment and ostracism means potential starvation and death (Goodall, 1986; see also Williams, 2001). Gruter and Masters (1986) argue that humans became adept at detecting ostracism because the loss of group membership threatened survival. They further posit ostracism as a valid adaptive behavior because it maintains group cohesiveness by fostering normative behavior and removing members who refuse to conform. Evolutionary success

demanded the creation of coping skills to counter the survival-threat ostracism presented. Due to this, man evolved the ability to quickly detect ostracism (Eisenberger, et al., 2003; MacDonald, et al., 2005) through registering it as pain. Indeed, studies have shown that ostracism activates the same area of the brain as does physical pain (Eisenberger, et al., 2003), suggesting a link between the systems regulating physical and social pain reactions (Leary, 2005; MacDonald, et al., 2005). Ostracism targets react differently to their exclusion, with actions ranging from hostility and aggression (Leary, et al., 2003b; Twenge and Baumeister, 2005; Twenge, et al., 2001) to becoming socially pliable in order to get back their positive group standing (Ouwerkerk, et al., 2005; Williams, et al., 2000b; Williams and Sommer, 1997). From a collective standpoint, ostracism lets groups control and maintain solidarity among its members (Ouwerkerk, et al., 2005). MacDonald and Leary (2005) believe that people are more sensitive to ostracism than other negative social interaction because it is more likely to threaten their group membership.

Need -Threat Ostracism Model: Williams' Need-Threat model of ostracism (Williams, 1997; Williams, 2001; Williams and Zadro, 2001) provides a social ostracism lens for understanding the consequences of exclusion on its targets. According to this model, ostracism targets move through three sequential stages: reflexive, reflective, and resignation (van Beest and Williams, 2006; Williams, 2001). When individuals detect ostracism in the reflexive stage, they suffer and are in pain (Eisenberger, et al., 2003; Zadro, et al., 2004). Targets immediately respond to this threat with sadness and anger (Zadro, et al., 2004). The effect is so powerful and deep (Brewer, 2003) that it overwhelms other factors that require cognitive processing (Smith and Williams, 2004). After a time though, people may move to the reflective stage where they consider the situational constraints of the ostracism episode and begin to cope with it. If the ostracism continues, individuals enter the final resignation state where all coping mechanisms

are depleted (van Beest and Williams, 2006; Williams, 2001). To understand this sequence requires comprehending that, at the most basic level, ostracism threatens fundamental psychological needs.

Ostracism is posited to cause psychological distress because it deprives individuals of their *sense of belonging* to the group. The need to belong is a basic psychological need which feeds people's mental well being (Baumeister and Leary, 1995). Ostracism's impact on belonging is very strong, an effect that transcends the source of this ostracism. Research, for example, has shown an individual's sense of belonging is threatened when they are ostracized by strangers (Baumeister and Leary, 1995), by reviled groups such as the Ku Klux Klan (Gonsalkorale and Williams, 2004) and even by an inanimate computer (Zadro, et al., 2004). Ostracism threatens a person's belongingness more harshly than other negative interactions (Baumeister and Leary, 1995), such as criticism, presumably because ostracism carries the harsher risk of losing all attachments forever (Williams, 2001).

Self-esteem is the second fundamental need threatened by ostracism. Ostracism, which may occur without the target knowing the reason, challenges an individual's perceptions of how others measure their self worth (Leary and Baumeister, 2000). In such situations, individuals are left to speculate on the many possible reasons and personal shortcomings that may have caused their exclusion. The inability to reason why has even greater impact on self-esteem than just causally clear rejection (Williams and Zadro, 2005b) because it drives people to think over many potential problems instead of just one.

The third fundamental need that is threatened by ostracism is the desire to *control* one's surroundings. Control of one's environment is a basic human drive (Friedland, et al., 1992), which when thwarted may create feelings of learned helplessness and depression (Seligman,

1975). Ostracism removes an individual's sense of control because it eliminates the give and take of group interaction (Williams, 2001) and so leaves them with no mechanism for regaining group acceptance after they've been rejected.

Finally, ostracism threatens an individual's sense of having a *meaningful existence*. Since it involves a withdrawal of attention, ostracism is “a strong metaphor for what life would be like if the target didn't exist” and symbolizes death (Williams, 2001, p. 63). This fear of death and a meaningless existence is a basic driver of human behavior (Gruter and Masters, 1986). Case and Williams (2004) saw ostracism as such a severe form of punishment because it increased the salience of one's mortality.

Consequences of Ostracism: The psychology literature is replete with studies showing the adverse impacts of ostracism. Even brief exposures to ostracism have been shown to result in subjects reporting a worse mood, being angry, and having decreased levels of the four needs suggested by Williams' Need-Threat model (Williams, 1997; Williams, 2001). Individuals who are excluded from the group become depressed, lonely, frustrated, and feel invisible (Geller, et al., 1974; Sommer, et al., 2001; Williams and Zadro, 2001). This negative impact is further magnified when people believe their own actions caused the ostracism (Dittes and Kelley, 1956; Nezlek, et al., 1997; Pepitone and Wilpizeski, 1960) or when the ostracism is blatant (Snoek, 1962; Williams, et al., 2002). The literature shows that even people simply imagining (Craighead, et al., 1979) or role-playing ostracism (Williams, et al., 2000a; Zadro, et al., 2005) react with bad mood and hurt feelings (Zadro, et al., 2000). Studies examining mood have produced results that are more mixed though. While Leary et al. (2001) and Williams (2001) found that mood worsened after rejection and ostracism, research by Twenge et al. (2001; 2002) into social exclusion found no such negative effect on mood.

People react to ostracism by fortifying their threatened needs. In accordance with Williams' Need-Threat model, this may be done cognitively, emotionally, or behaviorally (Williams, 1997; Williams, 2001; Williams, et al., 2000b). For example, a threatened need to belong, can be buttressed by selectively remembering group information (Gardner, et al., 2000), increasing the attempts to affiliate (Lakin and Chartrand, 2005), reminding oneself of group membership, intensifying the love one has for others, or conforming to group norms (Baumeister and Leary, 1995). This helps to understand how individuals, even when they've been rejected, try to get back into the ostracizer's good will if given the opportunity (Snoek, 1962; Williams and Sommer, 1997). People's reactions can even go so far as to agree with an ostracizing group's obviously wrong judgment (Williams, et al., 2000b).

Ostracism actions may be responded to with aggression or acceptance behaviors depending on individual and contextual differences. Williams and Sommer (1997) found women subjects contributed more effort than men to a group project after an ostracism episode in order to improve their inclusionary status. Williams and Zadro (2005b) described a qualitative study of real-world ostracism episodes, where targets coped with ostracism by "specifically seeking clarity, forgiveness-seeking, discussion, ingratiation, abuse, defensive ostracism, mediation, acceptance, and resignation". In addition, Kupersmidt et al. (1995) in their longitudinal study of elementary and middle school students found that rejection and aggression were related and that increased rejection led to even greater aggression levels. This is supported by Leary et al.'s (2003) study of 15 recent US school shootings where 87% of the cases cited "acute or chronic rejection in the form of ostracism, bullying and/or romantic rejection" as a causal factor (Leary, et al., 2003b, p.202).

Technology-Mediated Environments

Media Richness: The link between communication and perceived ostracism in technology-mediated environments is in part a function of the richness of the media by which teammates interact. Daft and Lengel understood uncertainty (absence of information) and equivocality (conflicting interpretations) as fundamental forces affecting information processing (Daft and Lengel, 1986). Their Media Richness Theory (Daft and Lengel, 1986) posits that task performance improves when its information requirements match the medium's richness (Daft, et al., 1987). Daft and Lengel further define information richness as the "ability of information to change understanding within a time interval" (Daft and Lengel, 1986, p. 560) and posit that media differ in their ability to support this. Under MRT, face-to-face communication is considered the richest communication medium. It is followed by (in order of decreasing richness ability) the telephone, addressed documents (e.g. letters) and unaddressed documents (e.g. fliers and bulletins).

Daft and Lengel do not say that the richest media is best in all situations. Rather, MRT asserts that efficiency increases when media that support rich information transmission are used for tasks requiring equivocal information and less rich media are used for tasks dealing with uncertain information. As explained by Shannon and Weaver's (1949) widely accepted communication process model, communication is the process of a source creating a message, encoding it with a transmitter and sending it over a channel to a receiver who then decodes the message for use. Media type significantly influences this process through its ability to enable and constrain communication cues. Short et al. (1976) stress that MRT is founded upon social presence theory (Dennis and Valacich, 1999). Yet others have posited that a media's ability to

change understanding is affected by more than just its ability to convey social cues. It also includes the medium's information processing capabilities (Dennis and Valacich, 1999).

Media Synchronicity Theory: Recently a new media theory has been offered which promises to provide unique insights into understanding communication performance within computer-mediated communication. Unlike MRT, Media Synchronicity Theory (Dennis, et al., Forthcoming; Dennis and Valacich, 1999) is a theory of communication performance within technology-mediated communication rather than of media choice per se. The authors posit that media differ not just in their characteristics but the range of capabilities they bring as well.

Table 2.4 Select Media Characteristic (Dennis et. al)

	Transmission Velocity	Parallelism	Symbol Sets	Rehearsability	Reprocessability	Information Transmission	Information Processing	Synchronicity
Face-to-face	High	Medium	Few-Many	Low	Low	Fast	Low	High
Video Conference	High	Medium	Few-Medium	Low	Low	Fast	Low	High
Telephone Conference	High	Low	Few	Low	Low	Fast	Low	Medium
Synchronous Instant Messaging	Medium-High	Low-Medium	Few-Medium	Medium	Medium-High	Medium	Low-Medium	Medium
Synchronous Electronic Conferencing	Medium-High	High	Few-Medium	Medium	High	Medium	Medium	Low-Medium
Asynchronous Electronic Conferencing	Low-Medium	High	Few-Medium	High	High	Slow	High	Low
Asynchronous Electronic Mail	Low-Medium	High	Few-Medium	High	High	Slow	High	Low
Voice Mail	Low-Medium	Low	Few	Low-Medium	High	Slow	Medium	Low
Fax	Low-Medium	Low	Few-Medium	High	High	Slow	High	Low
Documents	Low	High	Few-Medium	High	High	Slow	High	Low

The breakdown depicted in Table 2.4 highlights the authors' vision that no one media is superior to all others across every dimension. Moreover, media may bring different capabilities (richness) depending upon its configuration. To that end, media should not be ranked by their richness. Instead, media should be understood as possessing a range of capabilities that make it

suitable for any number of contexts. Per MST, “the "richest" medium is that which best provides the set of capabilities needed by the situation: the individuals, task, and social context within which they interact” (Dennis and Valacich, 1999, p. 3).

MST founds its understanding of sensemaking in an electronic medium on the work of Weik (1985). This approach provides a useful lens to examine people interacting on a virtual team. First, as posited by Dennis et al. these groups must come to an agreement on the meanings they adopt in any situation. Second, each individual in the geographically dispersed team can only understand that which the media presents. Thus, sensemaking occurs at two levels within the team: initially at the (internal) individual level and subsequently at the (external) group level.

According to MST, group members use five strategies to make sense of their world (reduce equivocality). They can take action by externally seeking information. Moreover, they can triangulate the data they possess with other sources to create a complete picture with a coherent theme. Next, they could try to contextualize the event to understand it with reference to related past events. The most salient strategy though may be deliberation. This involves “undertaking the slow and careful reasoning required to induce plausible patterns from the information gained through action, triangulation, and contextualization” (Dennis and Valacich, 1999, p.4). The fifth strategy, affiliation, emphasizes seeking other individuals’ interpretations in order to reach an agreed understanding. Virtual team members interact with their world via technology. As such, these strategies are used whenever people must understand an equivocal situation. Comprehending what silence means is just such a task.

Absence of Cues: Silence is common in technology-mediated environments. Separated by time and space, communication in distributed teams can occur through both asynchronous (phone calls, video conferencing, chats, etc.) and synchronous (email, voicemail, etc.) forms of

communication. In such conditions, where there are additional communication hurdles for team members to overcome, there may also be increased opportunities for communication to lapse. Additionally, given that different communication media have the potential to constrain communication cues (e.g. e-mail would typically be less effective at conveying nonverbal communication cues such as facial expressions) interpreting silence in such environments can become even more problematic.

While research on ostracism in computer-mediated environments is somewhat rare, some past research has examined the concept of “cyberostracism” (being ignored in online environments). These studies showed that the effect of ostracism in online environments is so robust that it can affect people who don't know each other, can't see each other, and have no reason to interact at a later date (Williams, et al., 2000b, p.759). Being ignored online reduced individuals' sense of belonging and feelings of being part of the group, worsened their mood, and increased their feelings of exclusion. Similar results were reported by Zadro and colleagues (2004) who found that individuals playing an Internet game were keenly sensitive to even small signs of being excluded regardless of the source's intent or whether their teammates were humans or computers. While these studies illustrate that ostracism can occur in online environments, the interaction between media characteristics and ostracism has yet to be systematically explored.

The Cyberostracism Effects Theory Framework

*And then the silence came, there was not a word to say
One hour, felt like a day
When the silence came
~ Kurt Nilsen, Silence~~*

Drawing on prior IS and psychology literature it becomes possible to postulate how media characteristics may be expected to affect perceived ostracism. Figure 2.1 depicts our theoretical model. Drawing upon Williams' Need-Threat theory and media characteristics as captured by Media Synchronicity Theory, our Cyberostracism Effects Theory (CET) helps to understand how silence and ostracism perceptions play out in the information and communication technologies used by virtual teams.

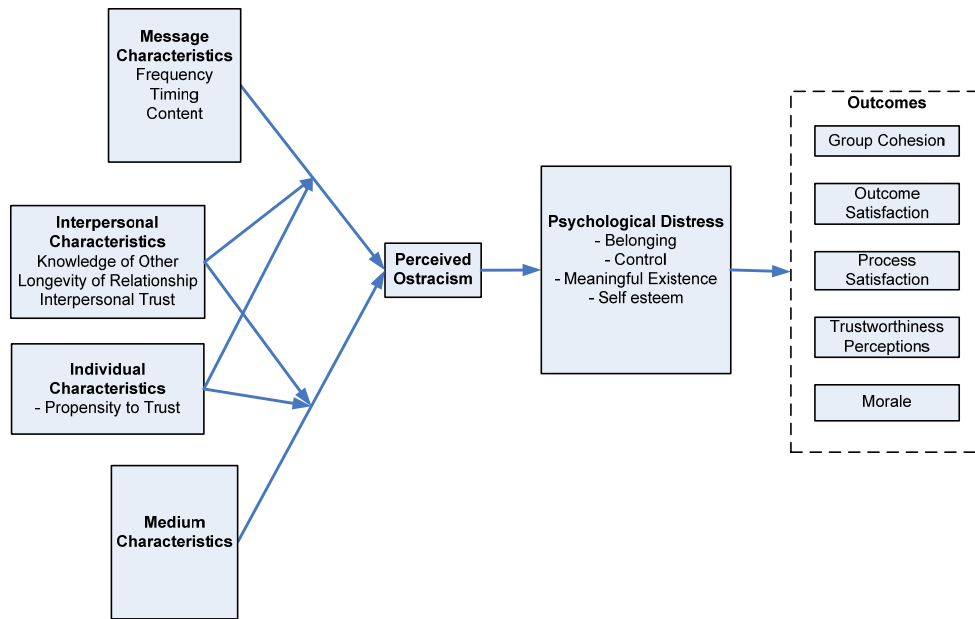


Figure 2.1 Cyberostracism Effects Model

During computer-mediated communications, we propose that perceived ostracism is a function of media characteristics, message characteristics, individual characteristics, and interpersonal characteristics. In turn, perceived ostracism is proposed to psychologically distress people (affecting their sense of belonging to the group, control over their environment, feelings of meaningful existence, and self-esteem). Finally, psychological distress variables are proposed

to influence various types of group outcomes. The specific justifications for each of the sets of hypotheses follow.

JUSTIFICATION FOR PROPOSITIONS

Having laid the foundation for the CET, this section presents the linkages between characteristics associated with the media, message, individual and interpersonal relationships and perceived ostracism.

Media Characteristics and Ostracism

Communication frequency: Low communication frequency (including silence) in virtual teams is perceived as breaks in extensive communication between geographically and/or temporally separated team members. Sensemaking in technology-mediated teams like this is constrained by their ICTs which reduce the feedback people receive (Weick, 1985). When feedback or interaction with their teammates is not reestablished, individuals question whether something has gone wrong. Once repeated attempts at reestablishing contact have failed, people may assume others are excluding them from the core of the team.

Proposition 1: Low communication frequency resulting in reduced feedback will lead to increased likelihood of perceived ostracism

Virtual teams interacting via information and communication technologies encounter silence through their information systems. As opposed to collocated teams who communicate face-to-face, their interaction is primarily through electronic media. Due to this, silence signals are also mediated through these systems, (e.g. email, shared webspace, telephone calls, etc.). The characteristics of each media thus contribute to perceptions of ostracism. MST characterizes media with five capabilities. Four of these (symbol sets, transmission velocity, parallelism, and

reprocessability) have the potential to influence ostracism perceptions. Only rehearsability does not because it is solely focused on the message sender and not the recipient.

Symbol sets: Per MST, symbol sets “are the number of ways in which a medium allows information to be encoded for communication ... the "height" of the medium” and is related to the variety of cues and language found in media richness theory (Daft and Lengel, 1986)” (Dennis, et al., Forthcoming). However, isolated by time and distance, cues are lessened in an electronic environment (Weick, 1985). This leads to silence in high symbol set media being harder to justify since it seems like the silence is happening in multiple ways. Therefore, whenever silence is noted across a high symbol set environment it is more likely to be perceived as ostracism.

Proposition 2a: Silence over high symbol set media will more likely lead to perceived ostracism than silence over low symbol set media.

Transmission velocity: MST also categorizes media by the speed at which messages can reach the recipient. Dennis and colleagues note that transmission velocity is closely related to the concept of rapid feedback (Burgoon, et al., 1999-2000; Daft and Lengel, 1986). Media supporting faster transmission velocity allow quicker feedback and communications which border on natural conversation (Dennis, et al., Forthcoming). Thus, such media engender faster feedback and drive expectations of shorter response turnaround. Failing to meet those timing expectations feeds the interpretation of online silence as inappropriately long, which in turn, may foster feelings of exclusion and unimportance. However, it is more likely that the ability to respond to a teammate’s queries quickly will be a greater influence on ostracism since any message that is sent will quickly ameliorate the notion of group exclusion

Proposition 2b: The impact of faster feedback will outweigh the influence of increased timing expectations, leading to individuals interacting through ICTs that support slower transmission velocity being more likely to feel ostracized than individuals using faster velocity media.

Parallelism: While being ignored by one person might be rationalized away, being ignored a larger scale is likely much harder to rationalize. In accordance with MST, parallelism is the width of the medium, that is, “the number of simultaneous transmissions that can effectively take place” (Dennis, et al., Forthcoming). Parallelism measures media on how well they can simultaneously support signals from multiple senders. Highly parallel media allow many concurrent and multidimensional transmissions. This leads to the conclusion that when silence is encountered over media supporting multiple simultaneous channels (high parallelism) the likelihood of perceiving ostracism from silence will increase.

Proposition 2c: Silence over media high in parallelism will more likely lead to perceived ostracism than silence over low parallelism media.

Reprocessability: Reprocessability measures how greatly a medium supports message reexamination during or after the communication event. High reprocessability allows recipients greater opportunity to understand the message through reexamining it and thereby better understand its meaning (Nunamaker, et al., 1991). Dennis et al. note that in line with Weik and Meander (1993) it is this availability which improves communication performance as it allows individuals to revisit messages to support information processing and helps develop mutual understanding. In the context of perceived ostracism, such reprocessability is important to virtual teams who are connected via ICTs. To the degree that silence is understandable within the context it is encountered (for example, no email from a teammate who has previously communicated that he will be very busy for the near future), silence is less likely to be construed

as ostracism. The ability to reach back into archival records is therefore believed to decrease the likelihood that silence becomes ostracism.

Proposition 2d: Silence over media low in reprocessability will more likely lead to perceived ostracism than silence over high reprocessability media.

Message Characteristics and Ostracism

ICTs differ on their ability to provide sufficient cues to understand the true message being conveyed. Therefore, the preceding section reviewed the impact of media's cue-filtering capabilities. Still, media is far from the sole influence on ostracism perceptions. Three message characteristics are posited to have the potential to affect feelings of ostracism. First, messages vary in their frequency or volume (e.g., received often or rarely). When a person is accustomed to receiving a large number of messages and this volume stops, it may seem like he person is no longer important to their partners. Second, message timing may affect ostracism perceptions as well. For example, when a message is sent, how quickly is a reply received? The degree to which partners are responsive to each other is important because it affects when silence is seen as out of the ordinary. With each of these first two message characteristics, the perceived delta (that is, the change from the expected norms) becomes salient. It is at this point that the lack of communication may be interpreted as silence and possibly exclusion. In the third and final message characteristic, the actual content (i.e., text) may have an ostracizing influence as well. For example, messages can be explicitly addressed to the all but one member of a group. In addition, it is possible that the words in the body of the message can contain verbiage denying the value of a member to the group. In either case, the message itself would contain the ostracizing force, separate from its volume or timing. This leads to the following propositions:

Proposition 3a: Changes in messaging volume will affect perceptions of ostracism.

Proposition 3b: Changes in messaging timing will affect perceptions of ostracism.

Proposition 3c: Message content will affect perceptions of ostracism.

Individual Characteristics and Ostracism

Ostracism is an artifact of the mind and is uniquely individual. A person's distinctive characteristics therefore contribute to silence being perceived as ostracism. First, trust comes into play. Trust is can be understood as an interpersonal connection between people that comes into being as they form impressions about each other's trustworthiness (Mayer, et al., 1995).

These connections are likely to affect silence interpretations.

Trust: Since ostracism is derived from interpersonal interaction, the greater the ostracism target's propensity to trust (McKnight, et al., 1998), the less likely they are to perceive the silence they encounter as ostracism. While this is not a main effect in and of itself, an individual's inherent tendency to be trusting is likely to decrease the degree to they interpret a dearth of media cues and/or negative message characteristics as being indicative of ostracism. Instead, those with a high propensity to trust are likely to rationalize their experience and diminish its import whether perceived silence is due to message or media characteristics.

Proposition 4a: Increased propensity to trust on behalf of the silence target will moderate the effect of message characteristics on ostracism perceptions.

Proposition 4b: Increased propensity to trust on behalf of the silence target will moderate the effect of media characteristics on ostracism perceptions.

Interpersonal Characteristics and Ostracism

Relationship Richness: Ambiguity is aversive (Grieve and Hogg, 1999). Smith and Williams (2004) noted that individuals become uncomfortable with situations about which they are uncertain. In such cases they are motivated to find ways to lessen it (Evans and Over, 1996;

Jetten, et al., 2000) through introspection and wondering what happened to cause the situation. This internal investigation has the potential to lead individuals to attribute the silence to their own acts, which increases the ostracism effect (Fenigstein, 1979; Nezlek, et al., 1997). To that end, the richness of the relationship between the communication partners is anticipated to affect how ostracism targets interpret their silence.

Trust is another significant dimension of a rich relationship and Mayer et al.(1995) posit three factors of perceived trustworthiness: benevolence, ability (i.e., competence), and integrity. Trust thus becomes a function of the perceived trustworthiness of the communication partner and is “the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustee, regardless of the ability to monitor or control that other party”(1995, p. 712). Ultimately, the more an individual encountering silence trusts the source of the silence, the less likely they are to attribute negative motives to them. Therefore,

Proposition 5a: Increased interpersonal trust with the silence source will moderate the effect of message characteristics on ostracism perceptions.

Proposition 5b: Increased interpersonal trust with the silence source will moderate the effect of media characteristics on ostracism perceptions.

Moreover, a relationship that has persisted over an extended period will likely engender a greater degree of mutual understanding than a shorter, but otherwise similar relationship. It is expected that targets of silence that are engaged in longer-term relationships will be less likely to construe silence in a negative light those in shorter-term ones. Related to this, length alone is inadequate to capture the impact of relationship richness. In addition to a long relationship, it is expected that the depth of understanding that develops over that time will have at least as strong

effect as the relationship's length. Consider, for example, coworkers sharing an assembly line over the course of a 20-year span. It is very likely that they will learn a great deal about each other. Yet, contrast this with a husband and wife of the same period. The depth of their marital relationship will yield a richness of mutual knowledge over and above what is possible among coworkers. This variability in communication partner knowledge will further moderate the effect of negative media and/or message characteristics that are leading toward ostracism perceptions. Therefore,

Proposition 6a: Length of relationship with the silence source will moderate the effect of message characteristics on ostracism perceptions.

Proposition 6b: Length of relationship with the silence source will moderate the effect of media characteristics on ostracism perceptions.

Proposition 7a: Depth of knowledge of the silence source will moderate the effect of message characteristics on ostracism perceptions.

Proposition 7b: Depth of knowledge of the silence source will moderate the effect of media characteristics on ostracism perceptions.

Ostracism Impacts

Ostracism effects: Based upon the psychology literature, ostracism has been shown to immediately and negatively impact fundamental psychological needs. Ostracism threatens the need for belonging because it divorces the individual from the group. Next, it threatens self-esteem because individuals attribute the cause of their exclusion to be their unworthiness. Ostracism further threatens people's need for control because, unlike an argument, ostracism is unilaterally directed at them. Finally, ostracism, is a metaphor for social death (Case and Williams, 2004) threatening one's sense of existence and recognition. Together these forces

foster psychological distress and are a negative influence on group characteristics and performance.

In the short term, ostracized people feel frustrated (Geller, et al., 1974) and think poorly of themselves (Geller, et al., 1974; Williams and Sommer, 1997). Moreover targets of ostracism become angry (Geller, et al., 1974; Twenge, et al., 2001) and lose their sense of group belonging and control (Williams, et al., 2000b). The emotional impact of ostracism, both internal (e.g. anger) and external (e.g. sense of belonging) isolates the target from the group. In doing so, the target's satisfaction and perceptions of the group's cohesion are negatively impacted. Additionally targets may lose trust in the benevolence of a ostracizing group when they no longer believe the group has their best interests at heart (Mayer, et al., 1995). This lack of trust, when combined with feelings of isolation, will negatively influence how ostracism targets view the group's cohesion and effectiveness. Therefore

Proposition 8a: Individuals with increased psychological distress due to ostracism will perceive their group to be less cohesive.

Proposition 8b: Individuals with increased psychological distress due to ostracism will be less satisfied with the outcomes of their teammates.

Proposition 8c: Individuals with increased psychological distress due to ostracism will be less satisfied with the processes used by their teammates.

Proposition 8d: Individuals with increased psychological distress due to ostracism will trust their teammates less.

Proposition 8e: Individuals with increased psychological distress due to ostracism will have decreased morale.

DISCUSSION

As discussed, the CET sets the stage for understanding how a lack of feedback in virtual teams can lead to ostracism perceptions by team members. This perceived ostracism has

tremendous negative psychological impacts. The personal characteristics of the individual are also likely to affect the degree to which silence is perceived as ostracism. Consider an individual who implicitly trusts the source of the silence. In such a context, the person is less likely to attribute negative connotations to said silence. When the context of communication breaks encounters the correct mix of media, message, personal, and interpersonal characteristics, individuals may interpret that silence in a negative light as ostracism. In line with the extensive psychology literature, these people are adversely impacted, as is the group in which they reside.

Throughout this paper, practical and theoretical implications have been highlighted regarding the contribution CET brings to research regarding the psychology of virtual teams. The CET compliments past IS research on virtual teams (Jackson, 1999; Jarvenpaa and Leidner, 1999; Knoll and Jarvenpaa, 1998; Sarker and Sahay, 2003; Warkentin, et al., 1997), as well as the media effects research stream (Daft and Lengel, 1986; Dennis, et al., Forthcoming; Dennis and Valacich, 1999). Specific contributions include the following: 1) increased understanding of the how unintentional breaks in communications within distributed teams may engender strong negative feelings during computer-mediated interactions; 2) the CET model highlights the mechanisms by which a lack of online feedback may become perceived as ostracism; 3) the CET shows how psychological distress can adversely affect virtual team members; and 4) the CET ultimately brings a fresh psychological perspective to distributed teamwork which heretofore had been overlooked (i.e., that even unintentional gaps in feedback can hurt). Therefore, the CET provides valuable insights to both virtual team and media research.

The CET also offers actionable insight for group HCI designers and organizations employing virtual teams. This perspective supports the notion that group system interfaces should contain facilities to provide feedback. The CET further suggests that members of virtual

teams may need different interface support based on the characteristics of the members and the type or relationships they maintain. Derived from this, leaders of virtual teams need to be sensitized to the dramatic effect even inadvertent online silence can have on their goals and employees. Early in team's life cycle, greater attention should be given to providing feedback to all team members. Later, this may decrease as communication styles become understood and relationships mature. Ultimately, using this theoretical framework, businesses will be able to tailor team structure and communications to improve the group moral, cohesion, and trust freeing them from unnecessary psychological distress in order to increase group effectiveness.

CONCLUSIONS

People have evolved a hypersensitivity to even slight indications of being excluded from their groups. Research in the social psychology field has consistently shown that even unintentional silence can cause ostracism perceptions. The psychological distress such perceptions bring has the potential to cause significant damage to the members of virtual team who must solely rely on technology-mediated communication for their group interactions. As noted in the media richness research stream, technology-mediated communication has the potential to influence the volume and interpretation of the cues available to virtual teams. We offer the Cyberostracism Effects Theory to provide organizations a valuable understanding of the role silence plays in the context of virtual teams and how information systems can affect ostracism perceptions.

CET opens up many potential avenues for future research. Initially, this theoretical model needs to be adapted to applied models, which may then test the corresponding propositions presented in this paper. Future research can also test out the technological factors

that may ameliorate ostracism perceptions at the group level. A related area for future research might address investigating possible moderating factors such as situational factors (e.g., source of the silence (boss, spouse), context (task type), etc.) individual differences (e.g., personality traits such as neuroticism, introversion, etc), and examine the impact of specific interface designs.

This theoretical framework has been written from a positivist perspective, presenting rationale and propositions drawn from this method of research. Such an approach allows follow on studies to test the CET in a similar vein. It is acknowledged that over reliance on just the positivist perspective is limiting and that unique insights might be added through a qualitative examination of the phenomena surrounding perceived ostracism. A further limitation of this paper is that it offers non-empirical research due to its intended emphasis on theory building. It is anticipated that future theory testing further highlight and evolve the theoretical model presented in this paper.

CHAPTER 3: ESSAY--CYBERBALL INSTRUMENTATION ANALYSIS

REEXAMINING THE STRUCTURE OF WILLIAMS' NEED-THREAT MODEL

INTRODUCTION

I feel like I am a ghost on the floor that everyone hears, but no one can talk to.

I want to be noticed!

~ Mr. Blue (Williams, 2001)~

Humans are gregarious social creatures seeking out each other's companionship. They have a fundamental need to form meaningful relationships and are motivated to maintain these bonds over time. To that end, the start of new relationships often brings happiness and positive feelings. Conversely, the breaking of social ties has negative emotional and cognitive influences, creating anxiety, depression, and loneliness. Many current researchers have examined ostracism and its related effects (Baumeister and Leary, 1995; Leary, 2005; Zadro, et al., 2006). However, ostracism is not solely a modern phenomenon. In fact, deliberate exclusion of group members has been identified in most civilizations and cultures (Gruter and Masters, 1986).

Ostracism, defined as being ignored or excluded, and is found even in ancient societies (Williams, 2007a). The term ostracism is most likely rooted in Athens around 487 B.C. where ostrakismos was the practice whereby the citizenry who would vote by marked shards of clay to remove a political leader for ten years who seemed to threaten societal harmony (Zippelius, 1986). Over time, similar activities have been seen in many primitive cultures and tribes (Basso, 1970; Boehm, 1986; Mahdi, 1986) as well as modern societies (Woods, 1978). Today, the Amish, following the old ways, still practice a form of ritual ostracism. In Meidung, the entire community shuns a member who fails to follow their religious and community rules (Gruter and Masters, 1986). Meidung is appropriately named "the slow death" because both the target and

their family situation worsens to the point of becoming destitute due a lack of community ties (Williams, 2001). Ostracism as a ubiquitous force has interested researchers who are intent on better understanding how rejection affects people.

Social psychologist have studied ostracism for over a century, but it is only within the past ten years that academics have systematically examined its effects (Williams, et al., 2003). Psychologists now believe the subject is worthy of greater scrutiny in part because ostracism so broadly affects society ranging from religions excommunicating deviant members to husbands and wives using the silent treatment on each other (Williams, 2001; Zippelius, 1986). Even the violent events of modern society such as school shootings can be tied to people feeling deliberately excluded (Leary, et al., 2003a). As such, the study of exclusion is finding renewed interest from researchers looking to understand the dimensions of ostracism, what causes it, and ultimately how it affects people exposed to it (Williams, et al., 2003). Many such psychology studies (e.g., Gonsalkorale and Williams, 2004; Smith and Williams, 2004; Zadro, et al., 2005) have followed a framework offered by Kip Williams and found the adverse impacts of ostracism to be robust across diverse contexts and groups.

According to Williams' Need-Threat model, ostracism negatively affects feelings of belonging, meaningfulness, self-esteem, and control. This essay seeks to investigate the Williams model of ostracism effects. To do so, it conducts a pair studies. The first study is a replication of Williams' original Cyberball game in an experimental research setting. The second study is a similar ostracism experiment done in a chat room instead of an electronic game of catch. The results of these two studies are used analyze the items Williams employs in measuring his constructs. This essay is organized as follows. First, the ostracism literature is reviewed to understand the various types of ostracism as well as its effects. Next, Williams'

Need-Threat model is looked at in depth to understand evolutionary ostracism and its effects. Following that, studies one and two are described. Finally, the results of a factor analysis are presented and the implications for future ostracism research are discussed.

LITERATURE REVIEW AND THEORETICAL DEVELOPMENT

Types of Ostracism

While ostracism, social exclusion, and rejection are psychologically identical (Williams, 2007a), and for the purposes of this paper will be used interchangeably, ostracism is not a unidimensional phenomenon. In accordance with Williams' seminal work (2001) there are three distinct types of ostracism. *Physical ostracism* refers to the situation where the target is "removed from the physical presence of others, such as with exile, banishment, and "time out" used as a punishment for children" (Williams and Zadro, 2005a, p. 24). This type of ostracism invokes a severing of the physical connection via leaving the relationship. Often targets of such actions are able to rationalize their situations by emphasizing the degree of control they must be able to exert over others that forces them to depart. Ostracism occurs in nonphysical ways too. A second type of ostracism is the familiar silent treatment. *Social ostracism* occurs when the target is ignored, but remains physically proximate to the ostracism source. Williams (2001, p.2) specifically refers to it as the "phenomenon of feeling invisible, of being excluded from the social interactions of those around you". Social ostracism can be seen as form of rejection (Sommer, et al., 2001). A complex ubiquitous phenomenon, events such as the Amish shunning or spousal silent treatment highlights ostracism's lack of physical or verbal interaction (Williams, 2001). Familiar to most people, nearly 70% of American citizens have used it at some time on their romantic partners (Faulkner, et al., 1997). The final form of ostracism,

cyberostracism, lies outside face-to-face interaction and is that ostracism which is mediated by technology. Cyberostracism is a different form of ostracism in that rapidly changing technology such as chat rooms; text messaging and interactive computer games provide new forums with unique sets of cues indicative of ostracism. Cyberostracism is oriented around breaks in anticipated communications. When that interaction does not happen within an acceptable time period, targets react in much the same way as with physical and social ostracism (Williams, 2007a).

Ostracism Models

There are three generally accepted perspectives on ostracism. One view is that ostracism thwarts the need to belong (Pickett and Gardner, 2005) and that people have developed a psychologically-oriented social monitoring system to regulate their internal levels of belongingness. From this perspective, people observe their environment for social cues indicative of decreases in belonging and take action to address it. Leary (1998; 1995) proposed a similar notion in his Sociometer Theory linked to levels of self-esteem. In both views, individuals are cast as social monitors examining their levels of either belonging or self-esteem in order to maintain group inclusion. Baumeister and colleagues offer a second perspective and see the effect of ostracism to be much like the blow of a blunt instrument causing a temporary state of cognitive deconstruction (Baumeister, et al., 2002). This state is characterized by a lack of emotion and an altered sense of time which people use to escape from situations of poor self-awareness (Baumeister, et al., 1990). Individuals use this deconstructed state as a sort of defense against the negative feelings of social rejection (Twenge, et al., 2003). Williams and colleagues

(1997; 2001) taking a more evolutionary point of view offer the third and perhaps most insightful perspective.

Williams' Need-Threat Model: Williams asserts that when an individual perceives social rejection, they construe it as a threat, which causes them to experience profound psychological distress. His model, depicted in Figure 3.1, posits that ostracism threatens four fundamental human needs to include belongingness, control, self-esteem, and meaningfulness (meaningful existence). Ostracism targets react differently based on how long the rejection endures. When individuals *initially* detect ostracism they are distressed to the point of pain (Eisenberger, et al., 2003; Zadro, et al., 2004), often reacting with sadness and anger (Zadro, et al., 2004). Their ostracism causes immediate decreases in all four psychological resources. If the ostracism continues, in the *short term* people reflect upon the ostracism episode and begin to cope with it through such actions as strengthening group ties and making self-affirming statements (Williams, 2001). In the *longer term* though, individuals perceiving continued ostracism find their coping mechanisms become depleted (van Beest and Williams, 2006; Williams, 2001). They become despondent and lose all hope of regaining their sense of belonging, control, self-esteem, and meaningful existence. These psychological needs are next discussed in detail to obtain a better understanding of the Need-Threat model's proposed ostracism effects.

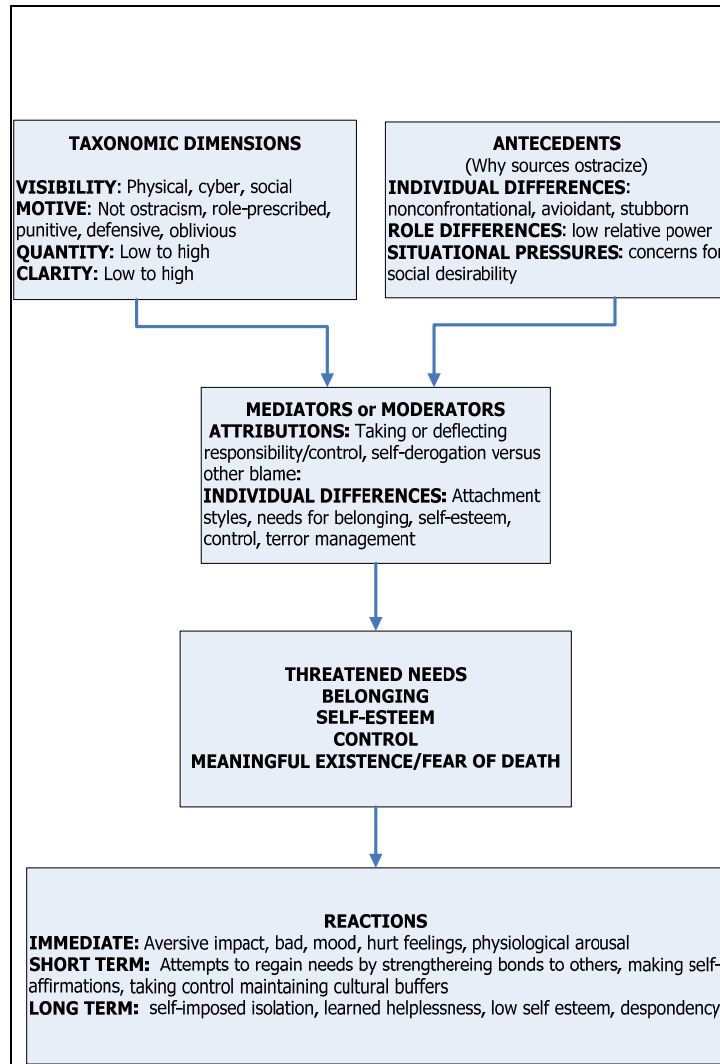


Figure 3.1 Need-Threat Ostracism Model (Williams 2001)

Belonging: The need to belong can be understood to be a psychological feeling of connection and emotional involvement with other individuals or groups (Williams, 2001). Ostracism is distressing because it threatens to deprive individuals of this valued resource. Such a threat can be understood as of a “perceived loss of, or decrease in the relational bond” (Sommer, et al., 2001, p.229) and is painful irrespective of the source. Interestingly, similar effects have been found when an individual is ignored by strangers (Baumeister and Leary,

1995), hated groups such as the Ku Klux Klan (Gonsalkorale and Williams, 2004) and even inanimate computers (Zadro, et al., 2004).

Self-esteem: Self-esteem, a “favorable global evaluation of oneself” (Baumeister, et al., 1996, p. 5), is the second psychological resource affected by ostracism and entails an assessment of the implications of one’s behavior on social inclusion (Leary, 1990). Ostracism magnifies perceived personal shortcomings (Leary and Baumeister, 2000). This internal self-evaluation is tied “at least as strongly to people’s beliefs about others’ evaluations of them as to their own” (Leary, 2003, p. 270). When rejection is sensed, esteem levels are negatively affected as the individual sees that others are now deeming them unworthy. The societal implications of understanding changes in esteem levels are significant as self-esteem levels have been linked to many types of violent offenders such as, murderers, rapists, wife beaters, and youth gangs (Baumeister, et al., 1996).

Control: Next, ostracism affects the individual’s innate desire to control their surroundings. When such a basic human drive (Friedland, et al., 1992) is frustrated, individuals experience feelings of helplessness and depression (Seligman, 1975). Ostracism affects perceived control by creating an apparent inability to influence either personal behavior or that of others (Sommer, et al., 2001) by removing the give and take of group interaction (Williams, 2001). This appears as a spiral. Without reasserting such contact, the person sees no hope of regaining control over their environment in the future. Hence, control encompasses a perceived inability to influence one’s social situations (e.g. through conversations or interaction).

Meaningful Existence: Finally, ostracism threatens the individual’s ability to have a meaningful existence by creating internal doubt as to whether their continued existence matters to anyone (Sommer, et al., 2001). Since ostracism involves a withdrawal of attention, the event

becomes “a strong metaphor for what life would be like if the target didn’t exist” (Williams, 2001, p. 63). Similar to control, such fear of death and meaningless existence is also a basic drive of human behavior (Gruter and Masters, 1986). In a related study, Twenge and colleagues (2003) found support for this connection in their study of exclusion and cognitive deconstruction. Their research showed that ostracized subjects had a greater tendency to see life as meaningless as predicted by terror management theory (Greenberg, et al., 1990). Twenge et al. concluded that extended ostracism might even drive people to despair of life itself. Case and Williams (2004) perceive ostracism as so severe because it increases the salience of an individual’s mortality and so doubt life itself.

In summary, ostracism has been studied in a wide number of contexts in which its affects has been found to be both robust and ubiquitous (Gruter and Masters, 1986; Williams and Sommer, 1997; Williams and Zadro, 2001; Zadro, et al., 2004). Research has further shown that ostracism harms interpersonal relationships (Sommer, et al., 2001; Williams and Zadro, 2001) whether in the context of children on the playground (Barner-Barrey, 1986), abandoned elderly (Madey and Williams, 1999), academia (Davis, 1991; Heron, 1987) or the workplace (Faulkner and Williams, 1999; McInnis, 1999). Williams and colleagues have proposed an evolutionary perspective and found strong support for ostracism negatively affecting individual feelings of belonging, control, self-esteem, and meaningful existence. However, to date we have been unable to locate any research analyzing the instruments used in these studies. The following study seeks to replicate Williams’ cyberball study (2000b), examine its instrumentation, and provide insight into the study of cyberostracism. In study 1, the primary aim is to reproduce the findings of Williams in the same context as the original electronic ball toss study. It first seeks to answer the question “Would Cyberball induce ostracism and its attendant negative affect if the

study were carried out again?” This study also examines the factor structure of the Need-Threat model in order to check the validity of the results and answer the question, “Does the Williams instrument measure what it intended?” The findings of the first study might be an artifact of how the study's methodology. Therefore, a second study was also conducted to see if the cyberostracism occurred in a different, more interactive, Internet context.

STUDY ONE

Overview and Methodology

Given that this research involves replication of an existing research model, the method used in it closely mirrors the procedures used by Williams and colleagues in their original Cyberball studies. Students are asked to mental visualize the environment surrounding an electronic game of catch they are playing called cyberball. During the game, portions of the participants are not tossed the ball and the effect of this ostracism is surveyed. The resulting data was analyzed using structural equation modeling (SEM) with MPLUS and SPSS 12.0 software.

Measurement Instruments

The items used in this study can be found in Appendix A (Williams, et al., 2000b; Zadro, et al., 2004). These two cited papers are particularly useful within the ostracism literature stream due to their detailed explanation of their items and methodology. In structural equation modeling determining whether to model reflective (effect) or formative (causal) indicators is an important issue to address. “Reflective indicators are viewed as affected by the same underlying concept (i.e., the LV). Yet a common and a serious mistake often committed by researchers is to inadvertently apply formative indicators (also known as cause measures) in an SEM analysis” (Chin, 1998, p. ix). Upon examination, the instrument derived from these studies contains

measures reflective of their respective latent variables (Chin, 1998; Podsakoff, et al., 2003) and was modeled as such.

Participants

The subject pool for this study consisted of 140 college undergraduate students enrolled in a lower division management information systems course at a medium sized northwestern U.S. university. Split between ostracism and inclusion conditions, 67% of the subjects were male and they averaged 20.37 years of age. These students received course credit of approximately 1% of their final grade for their participation.

Design

Williams and colleagues' studies examined ostracism along with other psychological variables (e.g. group inclusion, self-esteem etc). However, the current study is not interested in extrapolating the effects of ostracism beyond changes in fundamental psychological and affect caused by a lack of participation in an electronic ball toss game. As such, it does not unwaveringly follow the original Cyberball design (cf. Williams, et al., 2000b). The study, described in his paper *Cyberostracism: Effects of Being Ignored over the Internet*, assigned participants to a 3 (group membership: in-group, out-group, or mixed group) X 2 (ostracism manipulation: inclusion or ostracism) between subjects factorial design (Williams, et al., 2000b, p. 755). In our present study, participants were randomly assigned to solely an ostracism or inclusion condition. We presented no other manipulation in order to isolate the effects of the ostracism treatment.

Procedure

Subjects sat in a large computer lab classroom with the Cyberball program installed at each workstation. The researcher explained that the study was part of ongoing research into

human-computer interaction and their task was to help understand computer-enabled mental visualization. As in other studies (e.g., Williams, et al., 2000b; Zadro, et al., 2004), participants were informed that they would be playing a computer-based virtual ball toss game. After logging into the campus network, they would be randomly assigned to teams of three students scattered across the classroom. To eliminate the effects of students knowing each other, each player would be assigned an alias (i.e. the player was Kip and the teammates were Trevor and Cassie) with a related picture displayed during the game. In reality, each subject was the sole human in the triad with the other two players being computer-generated avatars.

Cyberball was explained as a simple game of catch where each player tosses an electronic ball to one of their two teammates by using a mouse to click on their faces displayed on their computer screen (actual pictures of Kip Williams, Cassie Govan, and Trevor Case). During the game, the players were to picture what their teammates might be like behind those aliases and what the game of catch would seem like in real life. We further stressed that the emphasis of the study was mental visualization and not proficiency at the game itself. Participants were to ask themselves questions such as “What type of person are your teammates?” “Where would you be playing catch?” and “What would the weather be like?” These directions mirror the ones used in previous Cyberball experiments.

Independent Variable

Ostracism was manipulated within Cyberball. Once the player initiated the Cyberball game, one of the simulated players started the game by throwing the ball to the human participant. Upon “catching” the ball, the player could then choose who they would like to receive the next throw. The subject indicated whom they would like to toss the ball to by clicking on their teammate’s picture. Their avatar would then throw the ball. Players in the

ostracism treatment received the ball twice early on in the game after which they were completely excluded and never again received the ball. Those participants in the inclusion treatment were fully included and randomly received the ball approximately 1/3 of the time. The Cyberball games in both treatments included 30 throws and lasted approximately 5 minutes. There was no time pressure and the participants were given as much time to decide who to throw the ball to as they needed.

Dependent Variables

Ostracism measures: Upon completion of the game, subjects completed an internet-based questionnaire using items drawn from previous cyberostracism studies. The questionnaire consisted of 12 items assessing the psychological factors cyberostracism theoretically affects. As previously described, these factors include Belonging (e.g., “I felt like an outsider”), Self-Esteem (e.g., “I felt good about myself”), Control (e.g., “I felt like I had control over the course of the interaction”), and Meaningful Existence (e.g., “I felt nonexistent”). Each item was rated on a 5-point Likert scale anchored at 1-not at all and 5-very much. To keep in line with Williams’ emphasis on immediate ostracism reactions, explicit directions were given to answer each item based on how the participant felt “right now”. In addition, three more items measured perceived ostracism by asking how subjects rated their group inclusion. Two items used the same 5-point Likert scale (i.e., “I was ignored,” and “I was excluded”). The ostracism manipulation check was “Assuming that 33% of the time you would receive the ball if everyone received it equally, what percent of the throws did you receive?”

Other measures: Participant mood was also measured in order to examine ostracism’s connection to participant affect after an ostracizing event. In line with previous research, a set of questions measured mood by directing the subjects to indicate their feelings immediately after

the game. These items were anchored with at one and seven using respectively: bad-good, sad-happy, and tense-relaxed.

At the conclusion of the study, the participants were fully debriefed on the goals of the study, computer-mediated communication, and that they had participated in a simulation. All subjects were additionally given the email address and phone number of the researcher so that they could ask in-depth questions as necessary.

Results of Cyberball Replication

Manipulation check: To ascertain the potency of the ostracism manipulation, participants were asked to estimate the percentage of throws they received during the game. Since players in both conditions received at least two throws, these reports should have been all positive percentages. An ANOVA was run to determine if participants in the ostracized condition reported significantly lower percentages of tosses than did their counterparts in the inclusion condition. This analysis revealed that the participants correctly perceived their status. Those who were included perceived getting higher percentages of the throws ($M = 34.5\%$, $SD = 8.99\%$) than participants in the ostracism condition ($M = 7.16\%$, $SD = 4.21\%$), $F(1, 139) = 560.37$, $p < .000$.

Testing the Normality Assumption

Table 3.1 presents the statistical tests of normality. The Kolmogorov-Smirnov (K-S) test shows a departure from normality. However, these results may have been an artifact of the relatively large sample size ($n = 140$). The K-S test is sensitive to sample size; potentially driving minor differences to appear significant. To check for this, the data plots were examined

for evidence of exponential functions and none was found. Therefore, these scores were not a major concern.

Table 3.1 Normality Tests

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
BEL	.112	140	.000	.942	140	.000
CNTRL	.187	140	.000	.956	140	.000
MEXT	.131	140	.000	.932	140	.000
MOOD	.093	140	.005	.949	140	.000
SEST	.115	140	.000	.962	140	.001
OST	.193	140	.000	.798	140	.000

Skew and Kurtosis: Scores for each measure were divided by their respective standard errors with resulting values exceeding 2 taken to be suggestive of substantial skew or kurtosis. Using this heuristic, Control (2.23) and Mood (-2.44) measures showed skew; Belonging (-2.97) and Meaning (-2.91) showed kurtosis. This was confirmed by calculating 95% confidence intervals for the skew statistics for control (.052) and Mood (-.50) which as expected did not include zero. Furthermore, the analysis showed the control measures to be positively skewed while mood was negatively so. The control scores were also leptokurtic (too narrow and peaked); the mood items were platykurtic (too wide and flat). However, computation of the 95% confidence intervals around the skew and kurtosis statistics for the other measures did not indicate normality problems.

Table 3.2 Skew and Kurtosis

	N	Skewness		Kurtosis	
	Statistic	Statistic	Std. Error	Statistic	Std. Error
BEL	140	.052	.205	-1.207	.407
CNTRL	140	.457	.205	.042	.407
MEXT	140	-.137	.205	-1.183	.407
MOOD	140	-.500	.205	-.344	.407
SEST	140	-.230	.205	-.786	.407
Valid N (listwise)	140				

Heteroscedacity: Next, the Levene test examined variance homogeneity. In this test, the null hypothesis is that the variances are homogeneous. Should the statistic prove to be not significant at the .01 level then the variances are assumed homogeneous. No data shown in Table 3.3 are significant at this level and so heteroscedacity is not an issue.

Table 3.3 Variance Homogeneity

	Levene Statistic	df1	df2	Sig.
BEL	1.569	8	131	.140
CNTRL	1.447	8	131	.183
MOOD	1.923	8	131	.062
MEXT	1.335	8	131	.232
SEST	2.271	8	131	.026

Reported levels of the four needs: As noted in Tables 4 and 5, compared with those who were included, participants who were ostracized reported lower feelings of belonging ($M: 2.07, SD: .77$ vs. $M: 3.90, SD: .68$), $F(1, 137) 230.75, p < .01$; control ($M: 2.07, SD: .61$ vs. $M: 2.65, SD: .70$), $F(1, 137) 27.44, p < .01$; self-esteem ($M: 2.36, SD: .86$ vs. $M: 3.84, SD: .69$), $F(1, 137) 122.57, p < .01$; and meaningful existence ($M: 2.11, SD: .86$ vs. $M: 3.63, SD: .77$), $F(1, 137) 99.20, p < .01$. In addition to the distinct differences in the four needs captured by the Need-Threat model, mood was also examined and found to exhibit similar results ($M: 4.41, SD: 1.63$ vs. $M: 5.37, SD: 1.29$), $F(1, 137) 14.11, p < .01$.

Table 3.4 ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
BEL	Between Groups	123.279	1	123.279	230.754	.000
	Within Groups	73.191	137	.534		
	Total	196.470	138			
CNTRL	Between Groups	11.605	1	11.605	27.435	.000
	Within Groups	57.948	137	.423		
	Total	69.552	138			
MEXT	Between Groups	79.998	1	79.998	99.203	.000
	Within Groups	110.478	137	.806		
	Total	190.476	138			
SEST	Between Groups	76.159	1	76.159	122.572	.000
	Within Groups	85.123	137	.621		
	Total	161.282	138			
MOOD	Between Groups	31.280	1	31.280	14.111	.000
	Within Groups	303.690	137	2.217		
	Total	334.970	138			

Table 3.5 Psychological Resource Means and Standard Deviations

Included		BEL	CNTRL	MEXT	MOOD	SEST
Ostracized	Mean	2.0087	2.0693	2.1082	4.4113	2.3550
	Std. Deviation	.76848	.61019	.99184	1.63200	.86067
Included	Mean	3.9032	2.6505	3.6344	5.3656	3.8441
	Std. Deviation	.68123	.69719	.76516	1.28847	.68743
Total	Mean	2.8537	2.3285	2.7890	4.8369	3.0192
	Std. Deviation	1.19319	.70993	1.17485	1.55799	1.08107

Taken in-Toto, these results give initial support to the findings of the cyberball research stream. Participants who did not receive the cyberball understood that they were being ignored by their teammates. This made them feel like they did not belong and had no control over the situation to make any change to this status. Moreover, ostracized individuals were more likely to question how meaningful their existence was, have lower self-esteem, and a poorer mood.

Factor Structure

Having found support for Williams' findings in the initial replication, a second analysis on this same data set examined the underlying factor structure. Mplus version 5 was employed to evaluate all models described herein. Mplus tests models by generating multiple fit indices to see if the parameters in the model-implied covariance matrix are statistically probable given the actual ones found in the data.

Multiple fit indices were used to reach overall conclusion about model fit since no one indicator is perfectly exact (Bentler, 2007). The first of these goodness-of-fit statistics is the chi-square (χ^2) likelihood test. This test compares the specified model to a saturated model with zero degrees of freedom. A significant χ^2 test implies that the specified model does not fit better than the saturated model. Therefore, a good fit is shown by a non-significant χ^2 value (Bentler, 1990). However, the chi-square test is known to be very sensitive to sample size with large samples being overly easy to reject (Raykov and Marcoulides, 2000). A second indicator, the comparative fit index (CFI), is a useful compliment to the χ^2 . While also a χ^2 -distributed fit statistic, CFI is not downwardly biased in small samples. CFI values closest to 1.0 represent better-fitting models (Bentler, 1990). Next, the root mean square error of approximation (RMSEA) is another useful measure of model fit. Finally, the standardized root mean residual (SRMR) is used to round out the analysis. SRMR is not as sensitive to misspecified factor loadings as other fit indices and is valuable when used with at least one other such as the CFI. Hu and Bentler (1999) suggest that to minimize Type I and Type II errors one should use a combination fit indexes to include to the SRMR (good fit < .08) or the RMSEA (good fit < .06). This research employs these more conservative cutoffs as show in Table 3.6.

Table 3.6 Recommended Fit Indices used for this study

<i>Fit indices</i>	<i>Critical Values (source)</i>
CFI	>.95 (Hu and Bentler 1999)
RMSEA	< .06 (Hu and Bentler 1999)
SRMR	< .08 (Hu and Bentler 1999)

Using these metrics, an EFA examined if the data matched the theoretically predicted 6-factor (ostracism, belonging, control, self-esteem, meaningful existence, and mood) solution. Maximum likelihood robust estimation was used along with Quartmin rotation (oblique) to account for potential linkages between the psychological constructs. (Note: during initial EFA, the control items prevented the structural model from converging and were subsequently not included in the final factor analysis). Global fit results shown in Table 3.7 compare the remaining five models. The chi-square value for robust maximum likelihood not appropriate for chi-square difference tests, the table includes this statistic for illustration uses only.

Table 3.7 Model Fit

Global Fit Indices								
Factors	X ²			CFI	RMSEA			SRMR
	Value	Df	P		Est.	90% CI	Prob <= .05	
1	629.811	91	0.0000	0.675	0.226	0.210-0.243	0.000	0.123
2	205.725	64	0.0000	0.917	0.126	0.107-0.145	0.000	0.054
3	107.288	52	0.0000	0.967	0.087	0.064-0.111	0.005	0.035
4	71928	41	0.0020	.982	.073	.044-0.101	0.088	0.027
5-	No convergence							

While a five-factor model was theoretically predicted, the data did not support it. As shown in Table 3.7, the 1- and 2-factor models produced unacceptable CFI and RMSEA values and only a fair SRMR. The fit measures produced by Mplus generally indicate that the 3-factor

model was consistent with the data though. Contraindicating this, is the 3-factor model's significant χ^2 value (χ^2 (df 52) = 107.288, $p = .000$) which is likely due to the sample size ($n=140$). The significant χ^2 is offset by the quality of both its absolute and relative values which indicate that the 3-factor model provided a good fit (CFI = .967; SRMR = .035). The RMSEA value (.087) approaches the high end cutoff .08. Conversely, neither the 1-factor nor the 2-factor models reached the recommended benchmarks for CFI (.90), RMSEA (.06), or SRMR (.08). While the 2-factor model did come under the minimal SRMR level of .08, its other poor fit indicators outweighed this. Since the chi-square difference test is not usable with robust estimation, the pattern matrices of the 3- and 4-factor solutions were examined (Tables 3.8 and 3.9 respectively).

Table 3.8 3-Factor Model Loads

	Factor 1	Factor 2	Factor 3
OST1	1.025	-0.063	-0.022
OST2	0.979	0.039	-0.051
BEL1	-0.717	-0.063	-0.206
BEL2	-0.38	-0.042	-0.209
BEL3	0.186	0.192	0.49
SEST1	-0.076	-0.422	-0.283
SEST2	-0.508	-0.088	-0.287
SEST3	-0.073	-0.204	-0.592
MEXT1	-0.251	0.04	-0.136
MEXT2	-0.215	-0.161	-0.627
MEXT3	0.033	0.096	-0.891
MOOD1	0.076	-1	-0.013
MOOD2	-0.044	-0.911	0.024
MOOD3	-0.051	-0.836	0.014

The results shown in Table 3.8 suggest that there are 3-factors accounting for most of the variability in the data. One would be ostracism (Ost1, Ost2). The second would be mood (Mood1, Mood2, and Mood3). The final factor though appears to be a mixture of self-esteem (Sest3) and meaningful existence (Mext2 and Mext3), with Bel3 also loading on this factor. In each case there is a strong load on the primary factor ($>.6$) and minimal cross loads ($<.4$).

Table 3.9 shows the item loadings for the 4-factor model. As in the 3-factor analysis, the OST1 item loads a > 1.0 , which might be indicative of a serious problem in the statistical analysis; however, in this situation, it is more likely attributable to the strong interconnection between the psychological constructs. Williams' items seek to tease apart inherently meshed feelings. In the case of item one, its aberrant level (i.e., 1.025 and 1.012 respectively) is an artifact of this. This item loads so closely to 1.0 that its minor deviancy can safely be overlooked. Finally, the 4-factor model showed an improved fit over the 3-factor model. The presence of a fourth factor; however, appears to be almost wholly an artifact of the SEST2 item loading so dramatically on it (.928) as no other items significantly load on factor four. The 5-factor model did not converge suggesting that this many factors were not supportable.

Table 3.9 4-Factor Model Loads

	Factor 1	Factor 2	Factor 3	Factor 4
OST1	1.012	-0.046	-0.003	0.007
OST2	0.916	0.048	0.003	-0.027
BEL1	-0.605	-0.061	0.15	0.202
BEL2	-0.175	-0.008	0.054	0.438
BEL3	0.184	0.205	-0.437	-0.063
SEST1	0.043	-0.402	0.129	0.325
SEST2	-0.026	0.009	0.002	0.958
SEST3	-0.095	-0.223	0.536	0.034
MEXT1	-0.129	0.057	0.039	0.26
MEXT2	-0.177	-0.166	0.615	0.071
MEXT3	0.042	0.089	0.922	0.001
MOOD1	0.096	-0.981	-0.003	0.068
MOOD2	-0.078	-0.912	-0.008	-0.041
MOOD3	-0.072	-0.834	0.031	-0.055

Table 3.10 Ostracism Correlation Matrix

	BEL1	BEL2	BEL3	CNTRL1	CNTRL2	CNTRL3	SEST1	SEST2	SEST3	MEXT1	MEXT2	MEXT3	Mood1	Mood2	Mood3
BEL1	1														
BEL2	0.355	1													
BEL3	0.791	0.395	1												
CNTRL1	0.629	0.283	0.648	1											
CNTRL2	0.480	0.516	0.497	0.512	1										
CNTRL3	0.406	0.373	0.411	0.428	0.507	1									
SEST1	0.418	0.246	0.476	0.452	0.481	0.518	1								
SEST2	0.513	0.546	0.546	0.486	0.589	0.552	0.502	1							
SEST3	0.404	0.241	0.458	0.448	0.379	0.252	0.312	0.385	1						
MEXT1	0.414	0.394	0.468	0.347	0.530	0.491	0.400	0.592	0.222	1					
MEXT2	0.631	0.337	0.680	0.570	0.455	0.425	0.407	0.520	0.504	0.487	1				
MEXT3	0.632	0.392	0.712	0.591	0.484	0.450	0.399	0.558	0.496	0.506	0.838	1			
Mood1	0.437	0.249	0.456	0.522	0.411	0.376	0.595	0.460	0.257	0.365	0.371	0.391	1		
Mood2	0.406	0.218	0.410	0.463	0.371	0.353	0.573	0.417	0.239	0.309	0.324	0.362	0.882	1	
Mood3	0.367	0.195	0.340	0.494	0.319	0.302	0.524	0.395	0.251	0.278	0.263	0.313	0.793	0.782	1

Summary: The factor structure that Williams’ Need-Threat model theoretically suggests could not be replicated and no model could be fitted which contained his control items. Furthermore, while the 4-factor model provided a good fit, the improvement over the 3-factor appears to be driven solely by the influence of one item. Finally, the 5-factor model is so badly misspecified that the Mplus software was unable to converge on any solution. To verify these findings were not due to the sample size, the sample was replicated multiple times (n=1120) and the analysis repeated. There was no change to these results. This analysis lends credence that there may be significant problems with the factor structure of the Need-Threat model.

Discussion

This study sought to replicate the results of Williams’ original Cyberball experiments and in doing so provided mixed results. When simply asking the same questions used by Williams and colleagues, the results replicate nearly perfectly. This gives face validity to the cyberostracism research stream. As was expected, participants equated not receiving the ball during a simulated game of catch to group ostracism. Further, when the four fundamental needs theorized by the Need-Threat model were examined, each exhibited the hypothesized decreases. Ostracized people felt they were not a part of the group. When the other players failed to throw

them the ball, individuals had no control over the situation and so felt they had lost a measure of control over life. This had significant impact and put them in a bad mood, forced them to question the meaning of their existence, and have lowered self-esteem. Each reaction was perfectly in line with prior research. However, an examination of the factor structure raises significant concerns about construct validity.

The factor structure of Williams' Need-Threat model did not replicate in our study. When an exploratory factor analysis was run, the measurement model would not converge on any model including Williams' control items or attempting to extract five factors. Even more interesting was that while the 4-factor showed good fit, one item solely seems to drive the fourth factor. These findings continue even in the expansion of the sample size by 800%. This raises questions that future research should address about the factor structure of the Need-Threat model and is the driver behind our second study.

STUDY TWO

Overview

This study examined cyberostracism in the context of an Internet chat room. The experiment was conducted using undergraduate students interacting with a simulator to control for degree of ostracism encountered. As part of a scenario task, the subjects were given a list of controversial social programs and asked to fund the one that agreed with their personal values. The subjects were nominally assigned to triadic groups to discuss how they would jointly like to carry out the funding task. In reality, each participant was the sole human in the group and was actually responding to a scripted discussion. Essay 3 fully describes the details of the larger study. Data was again analyzed using structural equation modeling.

Research Design and Procedure

Two previous pilots have been accomplished. The first pilot study, centering on an idea generation task, was conducted in October 2006. A chat session simulator was created to support online chatting about solutions to parking problems while varying graphic and textual interfaces. In a second pilot done in March 2007, the simulator was refined to support the group convergence task described below and used herein. This second simulator was successful at both stimulating ostracism perceptions and creating a realistic non-ostracism (inclusion) experience to serve as a control condition. Our present study used the refined second simulator to manipulate ostracism. Its experiment was a 3 (inclusion: high vs. low vs. none) x 2 (evaluative tone: supportive vs. critical) factorial design.

Participants

The subject pool for this study consisted of 270 college undergraduate students enrolled in a lower division management information systems course at a medium sized northwestern U.S. university. 68.7% of the subjects were male and they averaged 20.57 years of age. These students received course credit of approximately 1% of their final grade, for their participation.

Task

Participants were briefed on the Legislative Dilemma, a resource allocation task that has been used frequently in studies of individual and group decision-making. In this variation of the task, participants were instructed to allocate \$1.8 million among six hypothetical competing funding bills currently sitting before the state legislature. Each of the bills needed to have \$1 million and were representative of current and controversial social issues.

Once assigned to their computer-mediated teams, the participants logged onto the network and began inputting their views via the keyboard. They interacted with two virtual team

members and as such, the participant was the sole human member of the team. Their virtual teammates ignored, praised, or criticized the subjects' suggested funding priorities. At the conclusion of each 20-minute session, the participants answered a survey examining their group connectedness (belonging, control, self-esteem, and meaningful existence), affect (mood) and perceived ostracism. They were debriefed that they were part of a human-computer team and thanked for their participation.

Simulated CMC Group Environments

As previously noted, this experiment employed a simulator, developed and used over two pilot studies, in order to decrease variability in the discussion streams and control the ostracism manipulation. Drawing on the work of Garfield and colleagues, Valacich et al. (2006), note that a group simulator is an electronic environment that “looks and acts like a groupware system, but instead of sharing ideas among participants, the simulator presents participants with comments that appear to be from other participants but which are, in fact, drawn from a database of preset ideas”. Using a simulator allowed the research to study the individual functioning within the experimental control of a computer-mediated group. Realism was enhanced through populating the simulator with comments from earlier pilot sessions done by demographically similar samples. Typographical errors and grammar mistakes were deliberately preserved to produce the best simulation of normal human conversations.

Independent Variable

Once the player initiated the chat room, they encountered a scripted conversation between them and two simulated players. In all cells, the conversation began with an introductory “get to know one another” phase identified during piloting sessions. Next, the conversation was steered to a discussion of the social programs' pros and cons. The inclusion

treatment was manipulated by the two players acknowledging the subject's inputs e.g., "What do you think <player screen name>?" The players received comments on 33% (high condition), 10% (low condition), or 0% (complete ostracism) of their inputs. Evaluative tone was manipulated by either agreeing with the participants input (e.g. "Great point <player screen name>. I never thought about it that way!") or disagreeing with it, (e.g., "I can't buy that <player screen name>"). Regardless of cell condition, the two simulated players maintained the same conversation stream between them.

Dependent Variables

Upon conclusion of the game, subjects completed the same internet questionnaires described in study one. The questionnaire consisted of 12 items assessing the psychological factors deemed to be affected by cyberostracism (i.e., Belonging, Self-Esteem, Control, and Meaningful Existence). In line with study one, participant mood was also measured in order to examine ostracism's influence on participant affect after the ostracizing event.

Results

Manipulation checks: Data purification followed several steps to remove possible contamination due to participants detecting the simulation or the reason for the experiment. First, participants were asked, "Including yourself, how many people were in your discussion group?" Data from subjects supplying any response other than a "3" was culled from the data set. Next participants were further asked "Please let us know if there is anything important we forgot to ask or other information you'd like to pass on to better describe your experience". Finally, related to this, the chat comment streams were captured and examined for any suspicious comments. Data was removed from participants indicating detection of the simulation or the

purpose of the study. Of the 344 participants, 270 passed all three tests providing a 78.49% usable response rate. This was in line with attrition rates of prior pilots.

Finally, to ascertain the potency of the ostracism manipulation, participants answered the following question, “To what extent did you feel that you were being noticed or included by the other participants?” An ANOVA was used to determine if participants in the ostracized condition reported significantly lower perceived ostracism than those in the inclusion condition. This revealed that the participants correctly perceived their status in the chat sessions. Participants who were included perceived higher acceptance rates ($M = 2.67$, $SD = 1.95$) than those in the ostracism condition ($M = 2.17$, $SD = 1.72$), $F(1, 269) = 4.87$, $p < .028$.

Need-Threat Model Replication

Reported levels of the four needs As shown in Tables 3.11 and 3.12, compared with those who were included, participants who were ostracized reported lower feelings of belongingness ($M: 2.65$, $SD: 1.49$ vs. $M: 3.25$, $SD: 1.50$), $F(1, 269) 10.388$, $p < .01$; control ($M: 3.11$, $SD: 1.54$ vs. $M: 3.57$, $SD: 1.56$), $F(1, 269) 5.551$, $p < .019$; self-esteem ($M: 3.34$, $SD: 1.38$ vs. $M: 3.95$, $SD: 1.48$), $F(1, 269) 11.69$, $p < .01$; and meaningful existence ($M: 2.98$, $SD: 1.74$ vs. $M: 3.72$, $SD: 1.79$), $F(1, 269) 11.197$, $p < .01$. In addition to distinct differences in the four needs measured by the Need-Threat model, mood was also examined and found similar results ($M: 4.13$, $SD: 1.59$ vs. $M: 4.65$, $SD: 1.58$), $F(1, 269) 6.856$, $p < .01$.

Table 3.11 Chat Simulation ANOVA

		Sum of Squares	df	Mean Square	F	Sig.
BEL	Between Groups	23.349	1	23.349	10.388	.001
	Within Groups	604.634	269	2.248		
	Total	627.984	270			
CNTRL	Between Groups	13.360	1	13.360	5.551	.019
	Within Groups	647.396	269	2.407		
	Total	660.755	270			
MEXT	Between Groups	34.609	1	34.609	11.197	.001
	Within Groups	831.431	269	3.091		
	Total	866.039	270			
MOOD	Between Groups	17.270	1	17.270	6.856	.009
	Within Groups	677.604	269	2.519		
	Total	694.874	270			
SEST	Between Groups	23.571	1	23.571	11.690	.001
	Within Groups	542.382	269	2.016		
	Total	565.953	270			

Table 3.12 Psychological Resource Means and Standard Deviations

		SEST	BEL	CNTRL	MEXT	MOOD
Ostracized	Mean	3.337	2.647	3.112	2.980	4.131
	Std. Deviation	1.384	1.495	1.545	1.738	1.589
included	Mean	3.947	3.254	3.571	3.719	4.653
	Std. Deviation	1.479	1.506	1.562	1.791	1.583
Total	Mean	3.565	2.873	3.283	3.256	4.326
	Std. Deviation	1.448	1.525	1.564	1.791	1.604

Summary: These results nicely align with those from the Cyberball study. This suggests several things. First, the chat simulator was successful. Despite extensive data refinement criteria that exclude any participant who directly or even remotely detected the simulation, approximately 80% of participants believed they were chatting with real people. Second, the ostracism manipulation was successful in a chat environment. When the inclusion rate (i.e., percentage of the conversation directed to them) was matched up to the Cyberball game (i.e.,

percentage of throws to them) the results were the nearly identical. As with the Cyberball game study, the results of study 2 support the findings of the Need-Threat model of ostracism.

Participants not included by their teammates felt that they were being ignored by them. As in study 1, this made them feel like an outsider with no control by which to change the situation.

Ultimately, even ostracized individuals in an Internet chat session were more likely to question how meaningful their existence was, have lower self-esteem, and report worse moods.

Factor Structure

Once again having found support for Williams’ findings, the underlying factor structure was next examined using Mplus version 5. An identical approach was taken to analyze the data in study 2 as was done in study 1. One notable exception was that in this case, the analysis did not include the ostracism items and the control construct was included due to the related items holding together in the factor analysis. Therefore, an EFA was conducted to examine if the data matched the 5-factor (belonging, control, self-esteem, meaningful existence, and mood) solution that was theoretically predicted. Maximum likelihood robust estimation and Quartmin rotation (oblique) was again used to account for potential linkages between the psychological constructs. As in study one, a 5-factor model would not converge (Table 3.13).

Table 3.13 EFA Fit Indices—Chat Simulation

Global Fit Indices								
Factors	X ²			CFI	RMSEA			SRMR
	Value	Df	P		Est.	90% CI	Prob <= .05	
1	979.914	90	0.0000	0.673	0.191	0.181-0.202	0.000	0.100
2	361.589	76	0.0000	0.895	0.106	0.118-0.130	0.000	0.054
3	194.334	63	0.0000	0.952	0.088	0.074-0.102	0.000	0.029
4	99.284	51	0.0001	.982	.059	0.042-0.76	0.182	0.022
5-	No convergence							

The fit indices shown in Table 3.13 very closely match those in study 1. While a 5-factor model was theoretically predicted, the data again did not support it. Both 1- and 2-factor models produced unacceptable CFI and RMSEA values and a decent SRMR. The 3-factor model approaches a good fit (CFI=.952; SRMR = .029) however, the RMSEA value is slightly above the Hu and Bentler (1999) cutoff. Ultimately, the fit measures produced by Mplus show a 4-factor model to be consistent with the data including a very good CFI (.0982) and SRMR (.059) and an acceptable RMSEA (.059). In all models the X2 is significant, primarily attributed to the sample size (n=270).

Table 3.14 4- Factor Model Loads

	Factor 1	Factor 2	Factor 3	Factor 4
BEL1	0.874	0.000	-0.014	0.009
BEL2	0.084	0.682	-0.086	-0.111
BEL3	0.850	0.022	0.066	-0.013
CNTRL1	0.481	0.048	0.126	0.218
CNTRL2	0.119	0.696	-0.052	0.023
CNTRL3	-0.062	0.636	0.074	0.072
SEST1	0.061	0.332	0.009	0.422
SEST2	0.026	0.738	0.050	0.062
SEST3	0.169	0.062	0.359	0.014
MEXT1	-0.095	0.639	0.184	0.008
MEXT2	-0.007	-0.017	0.956	-0.001
MEXT3	0.097	0.072	0.771	0.005
MOOD1	0.013	0.018	0.022	0.922
MOOD2	-0.007	-0.024	0.012	0.941
MOOD3	0.013	0.001	-0.043	0.852

The loads from the factor analysis (Table 3.14) for the chat simulation provide mixed results. Unlike the situation in the Cyberball simulation, here the data suggest that 4-factors account for most of the variability in the data. One factor would be belonging (Bel1, Bel3). The second would be mood (Mood1, Mood2, and Mood3). The third factor appears meaningful existence (MEXT 2 and Mext3) with a weak load by Sest3 (self-esteem). While different in

strength (e.g. Sest3 loads at .359 vs. .536), the data can be interpreted similarly in both studies. Finally, there appears to be a fourth theoretically ambiguous factor that is affecting items nominally from four separate constructs. Table 3.15 shows the correlations for the factors in the 4-factor model. Two of the factors are very highly correlated giving further evidence of the complexity of measuring the latent constructs with the Williams items.

Table 3.15 4- Factor Correlations

	Factor 1	Factor 2	Factor 3	Factor 4
Factor 1	1			
Factor 2	0.664	1		
Factor 3	0.778	0.639	1	
Factor 4	0.449	0.499	0.385	1

An inspection of the item correlation matrix (Table 3.16) reveals the expected high correlations evidenced in the factor loads.

Table 3.16 Inter-item Correlation Matrix

	BEL1	BEL2	BEL3	CNTRL1	CNTRL2	CNTRL3	SEST1	SEST2	SEST3	MEXT1	MEXT2	MEXT3	Mood1	Mood2	Mood3
BEL1	1														
BEL2	0.355	1													
BEL3	0.791	0.395	1												
CNTRL1	0.629	0.283	0.648	1											
CNTRL2	0.480	0.516	0.497	0.512	1										
CNTRL3	0.406	0.373	0.411	0.428	0.507	1									
SEST1	0.418	0.246	0.476	0.452	0.481	0.518	1								
SEST2	0.513	0.546	0.546	0.486	0.589	0.552	0.502	1							
SEST3	0.404	0.241	0.458	0.448	0.379	0.252	0.312	0.385	1						
MEXT1	0.414	0.394	0.468	0.347	0.530	0.491	0.400	0.592	0.222	1					
MEXT2	0.631	0.337	0.680	0.570	0.455	0.425	0.407	0.520	0.504	0.487	1				
MEXT3	0.632	0.392	0.712	0.591	0.484	0.450	0.399	0.558	0.496	0.506	0.838	1			
Mood1	0.437	0.249	0.456	0.522	0.411	0.376	0.595	0.460	0.257	0.365	0.371	0.391	1		
Mood2	0.406	0.218	0.410	0.463	0.371	0.353	0.573	0.417	0.239	0.309	0.324	0.362	0.882	1	
Mood3	0.367	0.195	0.340	0.494	0.319	0.302	0.524	0.395	0.251	0.278	0.263	0.313	0.793	0.782	1

Discussion

Data from our chat simulation experiment was unable to replicate the factor structure of Williams' Need-Threat model. The factor analysis produced a good fitting 4-factor model; however, only three of these factors were theoretically pure (factor 1-belonging, factor 2-meaningful existence, and factor 4-mood); factor 3 is ambiguous and appears to reflect a blend of

multiple psychological effects. As with the Cyberball experiment, the 5-factor model from the chat simulation data was so badly misspecified that a solution could not be converged upon.

This study's goal was to examine if the difficulties seen in replicating the Williams' Cyberball experiments as discussed in study 1 would repeat in a different ostracism context. It set up a situation where participants would interact in a chat session with two simulated teammates in order to discuss how to best fund controversial programs. Over the course of this simulation, the two teammates would ignore their human partner. Thus, it would be possible to look at a related forum for cyberostracism and understand the nature of the Williams' instrument in capturing its effects.

This study was a success in that once again Williams' results replicate when simply asking the same questions employed by he and his colleagues. The simulation itself was a total success participants perceived their simulated teammates to be ostracizing them causing the attendant decreases in positive affect. As in study 1, the ignored participants felt ostracized with little control to change the situation. This negative situation hurt psychologically as reported in measures of worse mood, less meaningful existence, and lowered self-esteem. Each reaction was perfectly in line with both the Cyberball experiment of study 1 and the extant prior research. The attempt to replicate the factor structure however was less successful.

Study 2 repeated the failure of study 1 to replicate the factor structure of Williams' Need-Threat model. The results were not identical, but very similar. When an exploratory factor analysis was run using Mplus, a 5-factor model could not converge. There were three clean factors (i.e., belonging, meaningful existence, and mood) and one ambiguous factor that tapped all of these influences. When considering various aspects of this study, not only was it difficult to show that Williams items measure cleanly the constructs he desires, the results do not seem to

back the assertion that these are separate factors at all. Study 2's results back those of study 1 in questioning the reliability of the Williams instrument.

GENERAL DISCUSSION

Humans are social animals who find pleasure in belonging to groups and in the companionship of their fellow man. Past research on ostracism has shown it to be a powerful force. The need to seek out each other's companionship and maintain meaningful relationships seems to be a strong drive that lasts over time (Baumeister and Leary, 1995). This has drawn many current researchers to examine ostracism and its related effects. One of them, Kip Williams, theorized that ostracism threatens four fundamental human needs to include belongingness, control, self-esteem, and meaningfulness. In his studies, Williams demonstrated that the impact of ostracism is so powerful that it can even be felt over the Internet. From this finding, a significant stream of research has spawned; however, none has been identified that examines the psychometrics of his basic 12-item instrument. This essay sought to investigate the Williams' model of ostracism effects. To do so, it conducted a pair of simulations in an experimental research setting, the results of which are used analyze the items Williams employed in measuring his constructs as well as provide insights on the same. The results from each study showed the same mixed support.

The ability of people to interpret ostracism over the internet and via a simulation was affirmed. In study 1, an electronic game of catch was conducted in which participants were not thrown the ball and forced to watch their unknown teammates toss the ball back and forth. Subjects whose teammates did not throw them the ball felt ignored even though they never saw or spoke with them. All interaction was solely via the computer and within a video game. Yet,

the same type of result happened in the context of a chat room. In the situation of study 2, the subjects “knew” there were people because they were chatting with them. Again, even though it was solely over computer media, people who were less included in the conversations felt that they were being deliberately ignored.

A second support for the Williams experiments can be found in the reported effects caused by ostracism. Across both studies and contexts, participants were negatively affected by what they perceived to be exclusion from their group. When the four fundamental needs theorized by Williams to be affected were analyzed, the results were exactly in line with this hypotheses and the extant literature. Ostracized people felt they were not a part of the group despite the fact that they had no face-to-face contact and, in fact, were playing with a computer. When teammates failed to either toss them the ball or speak to them, people were distressed. They reported feelings of no situational control and that they were in bad moods. Further, their ostracism drove them to question the meaning of their existence and report lowered self-esteem. On the surface, this seems to indicate that the Need-Threat model’s instrumentation is on the mark; however, that is not necessarily the case.

Williams posits that being ignored harms a set of psychological resources. While the self-reports of changes in psychological resources cannot be denied, the actual underlying factors that are being measured are less certain. EFAs are used to identify items that do not load sufficiently on a latent factor (Straub, et al., 2004). One heuristic is that acceptable items load greater than 0.6 on a single factor without cross loading on another factor greater than 0.4 (Boudreau, et al., 2001). In applying this rubric, two separate factor analyses could not replicate Williams’ posited factor structure. There does not appear to be separate factors in many regards.

In both experiments, the total number of factors was less than those that his instrument purports to measure.

It may be possible that we are looking for too fine a level of granularity. In each study, one factor was derived that accounted for the variance in items from four different constructs. This is possibly suggestive of the existence of a second order construct causing the influence across the items. For example, in the Cyberball replication, the three factors might be belonging/ostracism, mood, and meaningfulness/esteem/ belonging. In this situation, where factors 1 and 3 correlate so highly ($r=.7$), there is significant shared variance (~54%) and so it maybe questionable value in measuring them separately.

In sum, our study largely failed to replicate Williams et al.'s (2001) results linking ostracism to appropriately measured changes in belonging, control, self-esteem, and meaningful existence. This failure to replicate, however, may not be due to underlying theoretical problems with the Need-Threat model, but rather to limitations in the psychometrics of his instrumentation. Williams and colleagues focused their analysis on very specific psychological resources that are difficult to tease apart. The inevitable limitations on using items which have not had a full psychometric analysis of their structure, compounded by the interesting ability of the items to provide feedback in line with researcher expectations (e.g. ostracized people did report lower self-esteem), makes it difficult to replicate their results. A more psychometrically sound approach might be to evaluate such ostracism propositions using multi-item scales each assessing different psychological constructs. This has been done on occasion (e.g. Williams and colleagues (2000b) with the self-esteem (using Rosenberg's Self-Esteem Scale) but this the exception (cf Zadro, et al., 2006) in the ostracism research stream.

Limitations

As with any study, there are limitations that affect the its results and conclusions (Dennis and Valacich, 2001). The first issue is that student subjects were used in a laboratory experiment which has been raised as a threat to generalizability (Lynch, 1982; Lynch, 1999). The context of this study however is believed to overcome it. Students are a realistic sample of people who interact via computer-mediated communications. As such, their reactions are of specific interest to the study of cyberostracism. Moreover, while some might see this group as too homogenous, some academics believe that such subject homogeneity might provide an even stronger test of the theory (Mook, 1983). A second related limitation of the study is its experimental nature. Experiments trade external validity for an enhanced degree of control and precision. Dennis and Valacich (2001) though, see the nature of any one experiment as not to show generalizable results, but rather to serve as a part of a larger set of manipulations from which scholars may generalize. A final limitation is that a simulator manipulated the ostracism. While this is paradoxically a strength of this research in that that allowed for precise control of the ostracism event, it limits the amount of time for which the experiment could take place. A tradeoff between simulation detection and intensity of treatment was made. It is conceivable that in longer ostracism events, the results of our study might be affected.

Future research

The current research showed that people could be ostracized in both a game of ball toss and in simulated chat sessions. When their teammates ignored them, people were psychologically distressed as predicted by the Need-Threat model; however, the instrumentation behind the ostracism effects may be flawed. Future researchers should conduct a full

psychometric analysis of Williams' items across multiple contexts. Such an effort will allow a deeper understanding of the issues affecting Williams' items and, in refining them, provide a robust measure that can help understand ostracism in computer-mediated environments. As noted, Williams' items do not appear to be psychometrically sound which casts doubt on the appropriateness of identifying belonging, meaningful existence, and control as the primary underlying psychological resources harmed by ostracism. Future psychologists should investigate related factors to see if there are second order factors at play. Such an understanding, related to the factor analysis, would help researchers to focus their investigations at the appropriate level and not at too fine a level of psychological granularity.

Conclusion

The goal of this research was to investigate the Williams' (1997) model of ostracism effects. It showed that a repeat of his Cyberball study did indeed induce ostracism and its attendant negative effects. Further, it examined the factor structure of the Need-Threat model. In doing so, we found problems with the validity of the results. Finally, a second simulation examining cyberostracism occurring in the more interactive Internet context of a simulated chat session backed the previously noted problems with the factor structure of his model. For ostracism academics, this essay provides a reason to relook at past studies to question construct validity and perhaps to more closely identify the true psychological latent factors that are affected. Specifically, do the items Williams presents measure the constructs that he proposes?

Computer-mediated communication and its attendant effects is a growing research stream that has the potential to contribute to the intelligent design of information systems and the leadership of employees interacting via them. A proper understanding of the psychological

impacts when such communications go awry provides a valuable tool for managers at all levels hoping to lead teams in the internet age. Williams' Need-Threat model is very insightful for researchers and practitioners of information systems and psychology alike--provided we appropriately measure the effects.

CHAPTER 4: ESSAY--OSTRACISM'S ROLE IN VIRUTAL DECISIONS

INTRODUCTION

Silence often expresses 'more powerfully than speech the verdict and judgment of society.
~ Benjamin Disraeli, 1st Earl of Beaconsfield~

With the advent of Web 2.0, social technologies, such as chat tools, wiki's, instant messaging, and blogs are opening new realms of collaboration. These easy to use tools foster increased information sharing and ease of collaboration that has not been previously possible and are growing in popularity. Some press reports show that by 2004 over 53 million adults were regularly using instant messaging and that 24% of them did so more frequently than email (Shiu and Lenhart, 2004). IM users can no longer be written off as solely teenagers, instant messaging continues to penetrate the work environment where many workers feel it improves teamwork and saves time (Shiu and Lenhart, 2004). In fact, as early as 2003, collaboration technologies (e.g. chat, etc.) had become mainstream even in the U.S. military. During Operation IRAQI FREEDOM such tools emerged as a means of real time command and control where 2,500 users coordinated activities through convening in 400 chat rooms (Heacox, et al., 2004). Further research (Kirkman, et al., 2004) has also shown that the business sector is growing in its use of virtual collaboration technologies to support its critical business processes such as new product design (Lipnack and Stamps, 1999), computer problem resolution (Gerber, 2005), and generating entirely new business models (Lipnack and Stamps, 2000). Staples and Webster (2007) note that Gartner Group says, "Virtual work is becoming as common as face-to-face work (Morello, 2005)...and by 2008 virtual workgroups consisting of internal and contract workers will comprise 60% of offshore work arrangements (Bell, 2005)" (p. 60). Organizations are buying

into these technologies because virtual teaming leverages organizational global expertise enabling them to stay connected to external markets, broadly integrate personnel in decision-making, increase employee flexibility, lower costs and tap expertise regardless of geographic location (Majchrzak, et al., 2004).

Given the growing use of such social communication technologies in both private life and business, understanding how people react in these computer-mediated environments is critical to the effective use of these technologies. For example, Cramton (2002) contends that the communication technologies used by distributed teams makes it harder for people to discern the intent of their partner's message. This is due in part to reduced social context cues in such communications which may lower levels of interpersonal trust (Cascio, 2000; Rousseau, et al., 1998). This makes virtual teams more prone to interpersonal conflict than collocated teams (Shin, 2005) because the lack of nonverbal cues causes people to experience more misunderstandings than their collocated counterparts (Seetharaman, et al., 2004). Finally, interacting via technology can even change communication patterns. For example distributed telephone conversations tend to be more formal than those done FTF (Doherty-Sneddon, et al., 1997). As a whole, research in the area of virtual teams has consistently illustrated that technology-mediated communication affects its participants and that it is highly desirable to design collaborative tools to overcome any potentially negative influences.

One under-researched area of virtual teams is how people react when they perceive that their group is ignoring them. Broadly speaking, such exclusion is commonplace (Leary, et al., 2003b; Williams, 2007a; Williams and Sommer, 1997) and can occur through simply "ignoring" another person's communications and contributions, or through deliberate message "blocking". Perceptions of group ostracism may be magnified by the reduced social cues in distributed

communication which have been found to alter the communication process and negatively impact virtual team relationships (Wilson, et al., 2006). Moreover, research has shown that even text-based communication is enough to elicit such reactions. For example, Taylor and Harper (2003) found that simple breaks in anticipated text messaging were interpreted to “breach underlying agreements between friends and left the individual feeling excluded from social networks” (Smith and Williams, 2004 p. 292). Situations like these exemplars are apt to be more common among virtual teams which, due to their distributed nature, are more subject to dysfunctional conflict, increased social isolation, decreased levels of trust and cooperative behavior (Belanger, et al., 2002; Cascio, 2000; Thompson and Coovert, 2006).

This research introduces, and examines, the concept of computer-mediated ostracism to the study of virtual teams. Its objective is to further the understanding of online silence as it affects team member psychology and virtual team decision-making by integrating Williams’ Need-Threat model and the extant team satisfaction research. Specifically, this study seeks to understand the effect of perceived ostracism within virtual teams interacting via text-based communication. Many current researchers have examined ostracism and its related effects (e.g., Baumeister and Leary, 1995; Leary, 2005; Zadro, et al., 2006). Yet, research into the effects of perceived exclusion in an electronic environment is a relatively new research stream. According to Williams’ Need-Threat model (1997; 2001), ostracism negatively affects people’s feelings of belonging, meaningfulness, self-esteem, and control. Our research specifically seeks to investigate the how individuals, interacting within a virtual team interpret online silence and perceive group exclusion. In doing so, it examines perceived ostracism effects on satisfaction with other group members, the processes used, and the decision reached during a participative decision-making task carried out in a distributed environment. This study may enable

researchers to improve their ability to understand the effects of ostracism on virtual teams participating in decision-making. Further, it is anticipated that our research will aid designers of group systems to build interfaces with specific characteristics that address feelings of exclusion. This essay is organized as follows. First, the ostracism literature is reviewed to understand the various types of ostracism as well as its effects. Next, we present a research model describing the effects of perceived exclusion on psychological distress and team outcomes. It then reports on the results of an empirical study of virtual team decision-making conducted to test the model. The model was validated using structural equation modeling and the results indicate support for it. Implications for future research and practice are reviewed.

LITERATURE REVIEW AND THEORETICAL DEVELOPMENT

In the increasingly complex business environment, effective teamwork is a key part of many organizations' success (Kirkman, et al., 2002). When the expertise needed to meet a task is geographically distributed, firms use information and communication technologies (ICT) to connect their employees into work groups called virtual teams (Townsend, et al., 1998). Firms, drawn by the new opportunities to build and manage such structures; are turning to a greater extent to collaboration technologies to join members across space and time to accomplish important jobs (Jarvenpaa and Leidner, 1999; Kirkman, et al., 2004; Lipnack and Stamps, 2000).

Virtual Teams

While created for varied reasons and contexts, virtual teams share many characteristics. As with collocated teams, virtual represent groups of individuals joined for a common purpose who rely on each other's efforts to accomplish their task (Lipnack and Stamps, 2000; McGrath, 1984). This work environment is complicated by the need to share documents and accomplish

tasks via ICTs which adds complexity to how their membership interacts (Lipnack and Stamps, 2000). Team members are suddenly affected by differences in their respective work environments, social structures, and organizational cultures (Walther and Bunz, 2005). Research (Lipnack and Stamps, 1999; Townsend, et al., 1998) has illustrated that virtual teams can be rich knowledge bases used for product development, process improvement, and solving complex customer problems (Kirkman, et al., 2004). To be flexible, relationships in these teams tend to be highly dynamic, with membership changing to meet the emergent needs of the situation (Townsend, et al., 1998) often under time pressure to perform (Saunders and Ahuja, 2006). Finally, virtual teams have past, a present, and a future where actions done in the past have ramifications for team members interacting in the present (McGrath, 1984; Saunders and Ahuja, 2006).

While they share many characteristics, virtual teams differ on several dimensions. Shin (2005) provides one useful framework for understanding these differences. Conceptually, teams differ on their spatial, temporal, cultural, and organizational dispersion dimensions. First, the spatial dispersion dimension depicts the extent to which the membership is physically separated. Second, teams also differ on a temporal dimension (i.e., separation across time zones). Third, teams may consist of members from different nations (cultural dispersion). Finally, virtual teams can differ on the extent to which members are drawn from different organizational units. These four dimensions, temporal, cultural, and organizational dispersion are respective continuums, which together capture the degree of “virtualness” of teams interacting via ICTs. Yet, the need to differentiate “virtual teams” from collocated ones is not universally accepted. Staples and Webster (2007) note that some researchers (e.g., Griffith, et al., 2003) do not see a tremendous difference between collocated and virtual teams. From their perspective, all teams can be

characterized by some degree of virtuality. Virtual teams just rely more heavily on computer-mediated communication, which may cause members to feel isolated from their teammates.

Obstacles for Virtual Team

The well-publicized benefits virtual teams can bring may come at a cost. Despite computer-mediated support, “The major disadvantages of virtual teams are the lack of physical interaction—with its associated verbal and nonverbal cues—and the synergies that often accompany face-to-face communication” (Cascio, 2000, p.84). Thompson and Coover (2006) broadly classify the hurdles that virtual teams must overcome into three categories: 1) failure to develop effective interpersonal relationships, 2) communication mishaps, and 3) a lack of awareness of team members’ endeavors.

Relationship Issues: The distributed nature of virtual teams has the potential to foster conflict, increase social isolation and undermine trust, commitment to the team, group cohesion, and satisfaction (Belanger, et al., 2002; Short, et al., 1976; Thompson and Coover, 2006). Such issues are rooted in ineffective interpersonal relationships, caused in part by the reduced social context cues (e.g., facial expressions, voice inflection, physical appearance etc.) found in technology-mediated communication (Sproull and Kiesler, 1986; Straus, 1997). The dearth of informative cues in CMC has been claimed to increase uncertainty and ambiguity in virtual team communications (Cramton, 2001; Fiol and O'Connor, 2005; Griffith and Neale, 2001) because team members are hindered in expressing themselves, interacting with others and receiving feedback from them. This cue-filtering process, labeled “Cues-Filtered-Out” by Culnan & Markus, 1987 alters the “fundamental communication process, potentially constraining relational development in distributed groups” (Wilson, et al., 2006).

Individuals on distributed teams are also thought to be susceptible to “fundamental attribution errors” (i.e., underestimating the impact of the situation in favor of dispositional factors) (Thompson & Coovert, 2006). When problems arise, people may tend to blame their dispersed team members rather than their environment. To some extent, this is because communication technologies makes it more difficult for people to discern the intent of their remote partners (Cramton, 2002). When this is confounded by a lack of nonverbal cues and cultural differences, virtual team members have the potential to experience more misunderstandings than collocated teams (Seetharaman, et al., 2004) and greater to conflict (Shin, 2005).

Communication issues: Clear and concise communication is critical to the success of all types of groups, but especially so for distributed teams. Yet, in virtual teams, the very channels that by which members connect can constrain their communications. Media effects are a rich research stream and multiple theories have been offered to examine the changes brought about by computer-mediated communication such as Media Richness Theory (Daft and Lengel, 1986; Daft, et al., 1987), Media Synchronicity Theory (Dennis, et al., Forthcoming; Dennis and Valacich, 1999), and Channel Expansion Theory (Carlson and Zmud, 1999). In many ways, while these theories have different views, inherently they each acknowledge the attenuation of social context cues in some way. Such decreases can affect conversations creating difficulties in following and understanding discussions (Straus and McGrath, 1994). Additionally, the use of multicultural teams further complicates communication by causing people to interpret messages in a foreign language and thereby opening themselves up to even greater misunderstandings. Finally, virtual teams are slower to correct these communication misunderstandings (Thompson

and Coovert, 2006) and so the negative impacts of any one communication mishap can be magnified.

Awareness issues: Maintaining an ongoing awareness of events in the work environment and each other's endeavors is important for achieving the coordination required for collaborative action (Thompson and Coovert, 2006). To work effectively, distributed workers need a "collaborative awareness" of their teammates' situations. This overarching category of team awareness generally encompasses "social awareness, action awareness, workspace awareness, and situation awareness" (Carroll, et al., 2006). Possessing an appropriate level of such awareness allows the entire virtual team to understand the strengths, weaknesses, and resources held by each of its geographically separated members. This awareness is akin to a transactive memory system where the individual memories of the members are interconnected giving the entire team access to a larger pool of collective knowledge (Wegner, 1987; Wegner, 1995). Without such knowledge, coordinated work suffers. In virtual teams though, such collaborative awareness is difficult to maintain since individuals cannot physically see each other work and so lack common experiences and first-hand observations of each other's habits, situations, and environments (Thompson and Coovert, 2006). The sheer volume of such day-to-day information makes it difficult for distributed teams understand the contextual factors around team member situations.

Summary

Organizations are increasingly turning to distributed teams to tap diverse expertise of individuals separated by time and place. These virtual teams use information and communication technologies to tap resources, coordinate efforts, and accomplish their tasks. While they share many of the same characteristics, virtual teams differ on their spatial, temporal,

cultural, and organizational dispersion dimensions. Broadly, virtual teams must overcome three issues to be effective. First, their distributed nature potentially fosters conflict, feelings of isolation, and undermines trust. Second, virtual team communications are subject to the limitations of their media. The reduced levels of social context cues members receive may negatively affect message understanding. Finally, virtual teams have a hard time maintaining the current awareness, or transactive memory, necessary to engage in effectively coordinated teamwork.

Perceived Ostracism and Affect

Given the focus on understanding how virtual team decision-making is influenced by perceived ostracism, it is first necessary to revisit prior cognitive and social psychology research to see how it might compliment extant IS knowledge. The ostracism literature is covered in depth in the prior two essays. This paper will review the highlights of the phenomenon with a focus on ostracism perceptions.

An outflow of virtual team's dependence on ICTs is the need to address the communication gaps that members of virtual teams periodically encounter (e.g., media disturbances, lack of messages targeted to them, etc.). The concept of perceived ostracism centers on the need to understand what such silence means to people on technology-mediated teams. Silence is multidimensional and its meaning is contextual. Yet, by definition, silence gives few clues by which to understand it. Consequently, in distributed teams silence is easily misunderstood. In the next section, we review the theoretical underpinnings of how individuals react to perceptions group exclusion.

Perceived ostracism (aka rejection or exclusion) refers to the feelings of exclusion aroused when a person discerns that others are avoiding them. In line with this definition, individuals are prone to interpret silence to be an act against them. Some psychologists note such negative attribution is sourced in mankind's evolved hypersensitivity to social rejection (Williams and Zadro, 2001). This broad-based propensity to perceive ostracism, is particularly relevant in the context of distributed teams who must understand the silence they routinely encounter (Cramton, 1997). Williams (2000b) coined the term cyberostracism to describe just such perceptions of technology-mediated rejection. ICTs have become new environments with unique sets of cues indicative of rejection. When expected technology-mediated communication does not occur, distributed individuals react just like being ignored in person (Williams, 2007a).

Williams' Need-Threat Ostracism Model: According to Williams and colleagues, rejection causes profound psychological distress. They posit that ostracism threatens four fundamental human needs to include belongingness, control, self-esteem, and meaningfulness. Ostracism reactions evolve over time. Initially, people react as if hurt (Eisenberger, et al., 2003; Zadro, et al., 2004) and all four psychological resources suffer as a result. After a while, they try to cope with rejection by strengthening group ties and shows of bravado (Williams, 2001). Ultimately, continued ostracism wears people out (van Beest and Williams, 2006; Williams, 2001) and they become despondent in a manner similar to learned helplessness.

Two of these psychological needs are of particular interest to virtual team decision-making. The first of these, belongingness, can be understood to be a psychological feeling of connection and emotional involvement with others (Williams, 2001). Ostracism embodies a "perceived loss of, or decrease in the relational bond" (Sommer, et al., 2001, p.229). In virtual teams, levels of belongingness are based on cues filtered by technology. This, combined with

the innate potential to misconstrue silence as ostracism, makes warped perceptions of belongingness a potentially pervasive force in distributed teamwork. A second important psychological need/resource is the individual's inherent craving to control their environment. Ostracism creates a sensed inability to impact others' behavior (Sommer, et al., 2001) through stopping their group interactions (Williams, 2001) and thereby thwarting a fundamental urge (Friedland, et al., 1992). In a decision-making context, virtual team members have stakes in the outcome of significant decisions. In such situations, perceived ostracism may diminish feelings of control when individuals sense silence from their team, which is undertaking meaningful deliberations about which they have no input. In managing virtual teams over the long term, this situation has organizational implications as team members may potentially withdraw from future contributions in line with the concept of learned helplessness. What is more, there are emotional concerns to be considered. It is highly likely that an individual who senses they are being rejected may likely get mad about it, especially in the context of a group decision about which they feel strongly.

Anger: Anger is another multifaceted emotion that has been a rich research stream for cognitive and social psychology. Yet a universal definition for it has proven to be elusive. Researchers agree that specific criteria for defining anger exist, but differ on exactly what they are (Russell and Fehr, 1994). It is possible that definitions of anger differ so greatly because the emotion is so common (Berkowitz and Harmon-Jones, 2004). This has led some researchers to adopt broad categories of feelings into the concept of anger. For example, Shaver et al. (1987) generally saw anger as encompassing feelings of irritation, annoyance, exasperation, disgust, and hate. Other academics' views are more specific. Some define anger as the emotion triggered when one feels something wrong (i.e., an offense) has occurred (Lazarus, 1991a). This

perspective associates anger with feelings of injustice or unfairness (Izard, 1991; Lazarus, 1991a; Scherer, 1984a; Smith & Ellsworth, 1985). Even the intensity of anger is debated with everything from irritation to rage being included under its umbrella (Spielberger, et al., 1983; Spielberger, et al., 1995). Given the diverse definitions supported for anger, it is conceivable that a definition is contextually determined (Russell and Fehr, 1994). Our research adopts the perspective used by Berkowitz and Harmon-Jones (2004) in their study of the determinants of anger. In line with Averill (1982) and Spielberger, Reheiser, & Sydeman (1995), anger is “a syndrome of relatively specific feelings, cognitions, and physiological reactions linked associatively with an urge to injure some target” (p. 108). We also do not attempt to differentiate between degrees of anger, but rather simply identify the commonly recognized emotional pattern.

Prior research into the effects of anger has shown it affects decision-making. Therefore, understanding anger is important to virtual team interactions because it is one of the emotions most likely to arise during group interactions (Smith, 1993). Anger has been alternately suggested to cause individuals to make more optimistic judgments (Lerner and Keltner, 2000) and to consider fewer factors when making them (Lerner, et al., 1998). Its effect on team decision-making is potentially long lasting. Angered individuals remain aroused long after the event has concluded; a situation which might influence their future decisions (Zillmann, 1983) even though the person is unaware of it (Lerner, et al., 1998).

Satisfaction

In an era of increased participative decision-making by employees, it is important to understand what makes a decision successful. Satisfaction is defined as “an affective arousal

with a positive valence on the part of an individual toward some object” (Briggs, et al., 2006, p.587). Understanding satisfaction in virtual teams is particularly interesting because they have become a tool of choice for organizations facing complex change and environmental uncertainty (Kayworth and Leidner, 2001; Kirkman, et al., 2002; Kirkman, et al., 2004). Since businesses are correspondingly using technology to facilitate more decisions on important organizational tasks (Lipnack and Stamps, 2000), our study focuses on virtual decision-making in an environment characterized by computer-mediated communication, uncertainty, competing goals, and perceptions of ostracism.

Our vision of satisfaction draws upon the concepts and constructs put forth in the Reinig (2003) Goal-Attainment Model of meeting satisfaction and applies it to the situation of virtual team decision-making. His model is a close adaptation of prior research by Briggs and de Vreede (1997). Its prior adaption to the context of meeting satisfaction makes GAM useful for this research into decision-making. Moreover, the GAM offers two dimensions of satisfaction consistent with other studies of meeting satisfaction (e.g., Briggs and de Vreede, 1997; de Vreede, et al., 2000; Jessup, et al., 1996 etc.). These studies conceive of overall satisfaction being comprised of satisfaction with both the group’s decision and the methods used to reach it. Reinig hypothesized these two components as unique to account for situations where a person can be satisfied with ultimate outcome, but not necessarily, the process used to reach it. The opposite would be equally plausible (Reinig, 2002). This conceptual separation affords the model the flexibility to predict satisfaction across diverse situations (Briggs, et al., 2006) such as distributed teamwork.

The present research addresses three types of virtual team satisfaction. First, it studies changes in virtual team *process* satisfaction and *decision* satisfaction. It also looks at *group*

satisfaction as a useful outcome variable because, as previously noted, virtual teams are much more prone to interpersonal conflict than collocated teams (Shin, 2005) due to their decreased nonverbal cues and cultural differences (Seetharaman, et al., 2004). What's more, satisfaction is a useful construct in that team member relationships have been shown to affect group performance (Chidambaram, 1996). Lastly, virtual team performance has been suggested to be highly associated with group satisfaction (Karayaz and Keating, 2007) even further highlighting satisfaction's importance to leaders of organizations using such structures.

RESEARCH MODEL AND HYPOTHESIS DEVELOPMENT

In this section, we address the link between gaps in technology-mediated communication and perceived ostracism to understand the perception's effect on virtual team decision-making. Our research model specifically describes how individuals, interacting within a virtual team interpret online silence (i.e., a lack of feedback). Research into nonverbal cues (i.e., a lack of communication) has not been widely researched (Walther, et al., 2005). So, drawing on the ostracism work of Williams (2001), we extend this prior research to examine how people react when they feel excluded from a distributed group accomplishing a joint decision-making task. Moreover, we examine perceived ostracism's effect on members' satisfaction with their teammates, the processes used, and the decision outcome reached. Extension of the Williams' Need-Threat model into a decision-making task requires that certain theoretical assumptions and boundaries be established. The following are two of these assumptions and boundaries.

Media Synchronicity Theory (Dennis, et al., 1999) identifies two types of communication that may play important roles in virtual team interactions: conveyance and convergence processes. Conveyance processes are defined as "the exchange of information, followed by

deliberation on its meaning” (Dennis and Valacich, 1999, p. 5). Once partners exchange information, each person individually processes it and seeks to understand the message’s meaning. Conversely, the process of “convergence” requires “the development of shared meaning for information” (Dennis and Valacich, 1999, p. 5). Its goal differs significantly from conveyance processes in that convergent processes require that all parties (i.e., the team as a whole) must agree on a single joint meaning for the information. For the purposes of this study, a convergence task was selected and a computer-based chat program (high synchronicity) employed. It is assumed that while individuals in typical business environments communicate differently on different types of tasks (DeLuca and Valacich, 2006), a convergence task matched with a highly synchronous information system is an appropriate test of ostracism perceptions and effects.

Our conception of perceived ostracism recognizes that feeling rejected may not be linked to any deliberate act of group exclusion. This is in line with prior research into online ostracism, “We call ... cyberostracism, by which we mean any intended *or perceived* (emphasis added) ostracism in communication modes other than face-to-face”(Williams, et al., 2000b, p. 750). Cyberostracism is germane to virtual teams because they depend solely on communication-supplied cues to interpret interactions with their teammates. Cyberostracism captures the ostracizing influence of breaks in these anticipated communications (Williams, 2007a). What’s more, ostracism sensitivity is theorized to have evolutionary root which drives people to negatively interpret even the smallest signs as exclusionary (Williams and Zadro, 2001). For these reasons, we take the perspective that to geographically and temporally separated individuals, “perception is reality” and perceived ostracism creates the same effect on an

unknowing target whether the rejection is based in objective reality or not. Figure 4.1 depicts our proposed research model for virtual team ostracism.

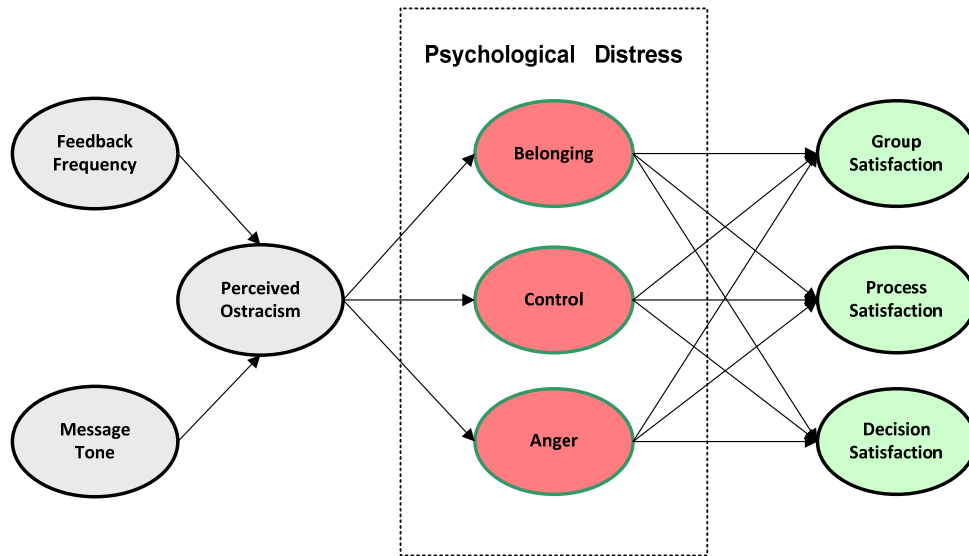


Figure 4.1 Research Model

Support for the connection between ostracism, and psychological distress is well established by nearly 15 years of research in different situations producing consistent results across thousands of people (Williams, 2007b). When applied to the context of virtual teams, it suggests that geographically separated individuals may experience causally ambiguous communication gaps that create feelings of exclusion. Further, this hints that feelings of satisfaction in CMC-supported teams may be negatively impacted when individuals perceive silence from their virtual group when it is working decisions about which they should have a voice. The research hypotheses are now presented.

Communication effects

Feedback Frequency: Feedback frequency is defined as the number of messages received within a given time (i.e., an interval between communications). Individuals serving in distributed teams find themselves separated by time and space and rely solely on technology-mediated communications to maintain contact with their group. This reliance has been found to cultivate feelings of isolation and heightened disagreement in virtual teams (Belanger, et al., 2002; Cascio, 2000; Thompson and Coovert, 2006). Likewise, prior research has also shown that even temporary cessation of anticipated technology-mediated communications (e.g., text messaging etc) may be interpreted as a break of social agreements leaving people feeling excluded (Taylor and Harper, 2003). This connection has been supported by experiments (e.g., Williams, et al., 2000b etc.) using an electronic ball toss manipulation that demonstrated that greater amounts of exclusion were more distressing than less. Therefore, we posit that the lower the level of feedback frequency between an individual and his virtual teammates, the higher the level of perceived ostracism from the group.

H1: The frequency of feedback received by a virtual team member is negatively related to the individual's perceptions of ostracism from the group.

Message Tone: The message tone construct is intended to capture the evaluative (i.e., critical or supportive) nature of some communications received during distributed team interaction. We examine the effect of evaluative tone because it has been noted as an important property of individual members within the context of McGrath's (1984) group interaction process (members-relationships-task-environment) framework (Connolly, et al., 1990). In addition, messages "that convey hostility, profanity, and blunt criticism are found in interactions conducted via any mediated channel" (O' Sullivan and Flanagan, 2003, p. 75) and so it is plausible that virtual team members often encounter negative messages during their

communications. Conversely, it is idiomatic that good leadership can bolster morale through positive and supportive communications. In the context of perceived ostracism, messages that denigrate or criticize may be interpreted as rejection by the recipient. Since constructs of ostracism, rejection, and exclusions are nearly identical, the innate hypersensitivity to ostracism is theorized to create a climate where negatively messages are interpreted as exclusionary. Conversely, positive messages are likely to decrease ostracism perceptions. This leads us to hypothesize,

H2: Messages tone will be negatively related to ostracism perceptions (e.g., a negative message will increase ostracism perceptions).

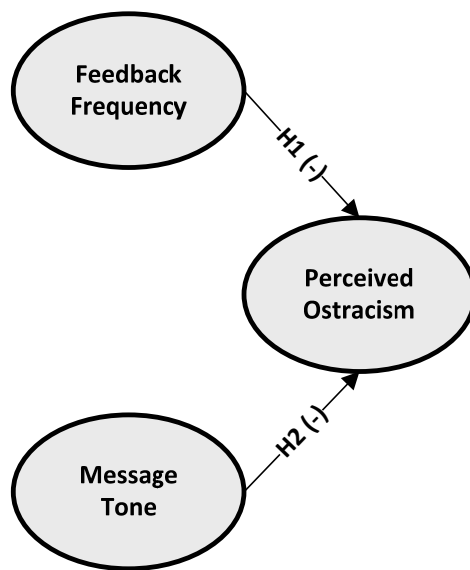


Figure 4.2 Communication Effects

Perceived Ostracism Effects

We offer three hypotheses drawn from the extant research in social exclusion in general and the Williams' (1997; 2001; 2007) Need-Threat ostracism model in particular.

Belonging: This construct refers to the fundamental need for frequent interaction in a continuing relationship of affective concern (Baumeister and Leary, 1995) and addresses a psychological feeling of connection and emotional involvement (Williams, 2001). Prior research suggests that people are highly motivated belong to social groups (Baumeister and Leary, 1995; Leary, et al., 2006) and that social exclusion negatively impacts this need (Gardner, et al., 2005; Pickett and Gardner, 2005; Smith and Williams, 2004; Williams, 2007a). Therefore, we theorize that,

H3a: An individual's perception of ostracism negatively affects their perceptions of belonging to the team.

Control: This construct refers for the ability to affect and influence personal or even others' behaviors and outcomes (Sommer, et al., 2001). Williams (2007) asserts that it is a fundamental need to possess a 'sufficient amount of personal control over one's social environment' (p. 443). The control construct is closely related to concept of self-efficacy (Bandura, 1977) and is linked to internal perceptions. People need to be in control "even if it is an illusion" (Williams, 2007a). In addition, experimental evidence (e.g., Baumeister, et al., 2005; Twenge, et al., 2002) suggests indicated that control behavior is negatively impacted by social exclusion. Accordingly, we offer that,

H3b: An individual's perception of ostracism negatively affects their perceptions of control over their social environment.

Anger: in the context of this study, anger is the feelings and thoughts associated with an urge to injure some target. Is its often the emotion that precedes aggressive behavior to remove an obstacle of personal significance (Frijda, 1986). Whether mild (irritation) or extreme (rage), anger is what occurs when what "ought to happen" (Frijda, 1986, p. 199) is thwarted or a

perceived misdeed (Averill, 1982) is encountered (Berkowitz and Harmon-Jones, 2004). The relationship between perceived rejection and aggression is strongly supported across experimental, correlational, and longitudinal research (Leary, et al., 2006). In studies using chat sessions, people often responded to ostracism with angry sarcastic comments deemed “virtual bravado” (Williams, et al., 2002). While not always externalized, the feelings of anger are still present even if not expressed (Williams, 2001). Therefore, we hypothesize that,

H3c: An individual’s perception of ostracism positively affects their anger level.

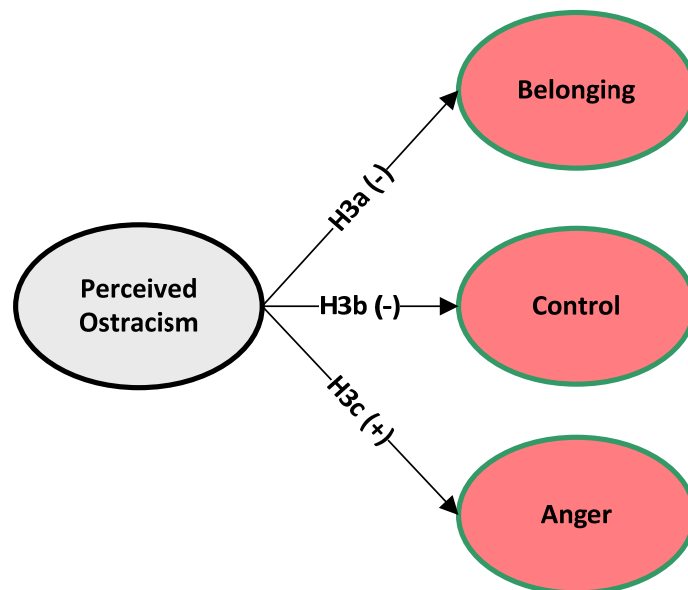


Figure 4.3 Perceived Ostracism Effects

Psychological Distress Effects

As previously noted, satisfaction is “an affective arousal with a positive valence on the part of an individual toward some object” (Briggs, et al., 2006, p.587). The ostracism and social exclusion literature has not directly addressed satisfaction or any closely related construct;

however, ostracism researchers such as Williams and colleagues see the need for belonging and control as innate to all people. In addition, the concepts of goal theory (Locke and Latham, 1990) and goal attainment Reinig (2003) are also useful in theorizing about the effect of belonging and control on satisfaction. We posit that maintaining adequate levels of belonging and control are fundamental goals based in the evolutionary background of all people. Indeed, need fulfillment in the form of goal attainment (see Locke and Latham, 1990; Locke and Latham, 2002) underlies the Goal Attainment Model of meeting satisfaction (Reinig, 2003)

Group satisfaction: Group satisfaction is the favorable feeling felt toward the team in which an individual interacts. Such positive arousal is closely aligned with contentment in that both feelings are driven by the fulfillment of perceived needs. Applying that lens, a positive valence (contentment) occurs when individuals attain personally significant goals or meet important needs. When goal attainment (i.e., achievement and maintenance of belonging and control resources) is thwarted, it is theorized that this condition will drive individuals to have a negative evaluation of the group causing the failure.

Process satisfaction: This construct refers to the favorable feelings felt toward a method used by a virtual team while accomplishing its group task. Drawing on GAM's logic, when the goals of adequate levels of belonging and control are thwarted, satisfaction with the processes used by the group is adversely affected. Additionally, we draw on concepts of procedural justice (Lind and Tyler, 1988; Thibaut and Walker, 1975) to better comprehend how process satisfaction is affected by psychological distress. Simply put, procedural justice addresses the extent to which an individual perceives a decision process to be fair. For a process to be procedurally fair in business settings, individuals must have input into a decision (engagement), have explanations for why their inputs were not accepted (explanation), and perceive that decision makers know

what the decision entails before, during, after it is made (clarity of expectations) (Kim and Mauborgne, 1997). Procedural justice's impact on attitudes and behaviors has consistently found support in contexts from education, to interpersonal, to the business sector (Kim and Mauborgne, 1998). In the situation of a virtual team making a group decision, the decision makers are the team members themselves. A person who feels they no longer belong to their group, and has no control over changing this situation, is likely to perceive that their team is making important decisions without them. This suggests that the individual will be likely to perceive the group's processes as unjust. Consequently, we assert that individual levels of belonging and control will be directly related to satisfaction with the processes used to reach a decision.

Decision satisfaction: This construct addresses the favorable feelings felt toward a decision outcome reached by a virtual team in accomplishing a group task. As with process satisfaction, when the psychological goals of adequate belonging and control are thwarted, satisfaction with the decision reached by a group decreases. What's more, the ability to have input into the decision is key to its acceptance because "as long as there is an opportunity to express one's views (voice) before a decision is made, procedural fairness is enhanced" (Thibaut and Walker, 1975, p. 952). As noted by Lind and Tyler (1988) the voice effect has been well established by a rich research stream. Therefore, we offer that an individual who feels that they no longer belong to the group, and has no control to change the situation, will perceive that they have been denied instrumental voice, and view the group's decision as unjust. For these reasons, we contend that levels of belonging and control will be directly related to decision satisfaction.

Anger: Past research implies that angry individuals tend to blame people rather than their situations when bad things occur (Gallagher and Clore, 1985). Moreover, angry individuals process less information in making judgments (Lerner, et al., 1998). This suggests that angry

people may be less likely to expend the cognitive effort necessary to overcome ostracism perceptions, which will influence all aspects of virtual team satisfaction. Therefore, it is believed that angry individuals will be less satisfied with the group, their decision, and the processes they employ. We therefore expect the following are likely to be true,

H4a-c: Individual levels of belonging will be positively associated with levels of group satisfaction, process satisfaction, and decision satisfaction.

H5a-c: Individual levels of control will be positively associated with levels of group satisfaction, process satisfaction, and decision satisfaction.

H6a-c: Individual levels of anger will be negatively associated with levels of group satisfaction, process satisfaction, and decision satisfaction.

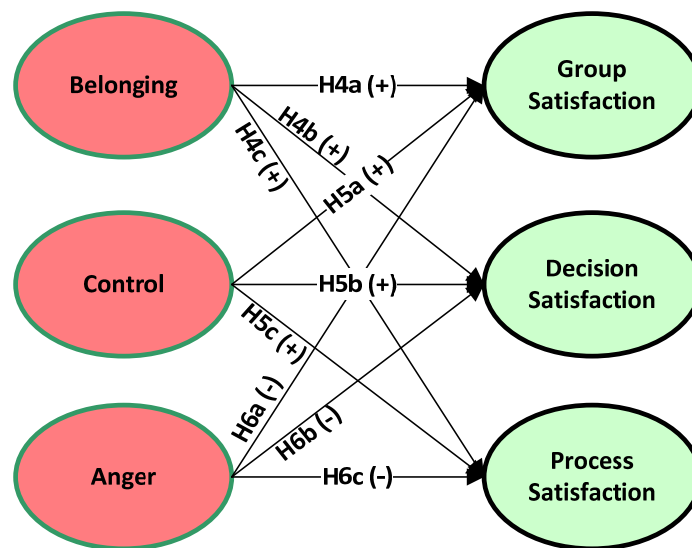


Figure 4.4 Distress Effects on Satisfaction

METHODOLOGY

This study examined cyberostracism in the context of an Internet chat room. The experiment was conducted using undergraduate students interacting with a simulator to control the pace and content of group discussions. As part of a scenario task, the subjects were part of a virtual team that was given a list of controversial social programs and asked to fund the one that

agreed with their personal values. The subjects were nominally assigned to triadic groups to discuss how they would jointly like to carry out the funding task. In reality, each participant was the sole human in the group and was actually responding to a scripted discussion. The data was analyzed using structural equation modeling (SEM) with MPLUS 5.0 and SPSS 12.0 software.

Measurement Instruments and Pilot Studies

This research employed a simulated chat environment developed and refined over three pilot studies with participants undertaking idea generation and a group convergence tasks. The pilots revealed that the simulator was capable of presenting a realistic computer-mediated communication environment and manipulating ostracism perceptions. Further, it showed issues with the items used to measure key psychological distress constructs employed in prior research. Due to this, an exploratory factor analysis was conducted to determine a reliable instrument.

The development of a more psychometrically sound set of instruments to measure our constructs followed the following process: literature research, item generation, factor analysis, reliability analysis, and validity analysis. A separate and independent (not included in the present study) sample was collected for use during this process. As the first step, the decision/outcome satisfaction literature and the ostracism literature employing Williams' Need-Threat model were examined and their items gathered. This list became the basis for generating a larger potentially representative set of items to measure their respective constructs. To address content validity, three individuals generated more than 15 items to measure each construct. These were tested on a sample (n=170) and the instrument purified through exploratory factor analysis and used in this study.

Measurement Instruments: Appendix B lists the items used in this study and the sources of the main constructs underlying them including Ostracism (Smith and Williams, 2004), Belonging, Control, Self-esteem, and Meaningful existence (Zadro, et al., 2004), Group satisfaction (Gladstein, 1984), Process satisfaction (Reinig, 2003), and Evaluative tone (Connolly, et al., 1990). In structural equation modeling a key issue to determine is whether to model using reflective (effect) or formative (causal) indicators. “Reflective indicators are viewed as affected by the same underlying concept (i.e., the LV). Yet a common and a serious mistake often committed by researchers is to inadvertently apply formative indicators (also known as cause measures) in an SEM analysis” (Chin, 1998, p. ix). Upon examination, the instrument derived from these studies contains measures reflective of their respective latent variables (Chin, 1998; Podsakoff, et al., 2003) and was modeled as such.

Task

Participants were briefed on the Legislative Dilemma, a resource allocation task that has been used frequently in studies of individual and group decision-making. In this variation of the task, participants were instructed to allocate \$1.8 million among six hypothetical competing funding bills currently sitting before the state legislature. Each of the bills needed to have \$1 million and were representative of current and controversial social issues. The task instructions and a copy of the proposal descriptions that were supplied to the participants received are found at Appendix C.

Once assigned to their computer-mediated teams, the participants logged onto the network and begin inputting their views via the keyboard. They interacted with two virtual team members and as such, the participant was the sole human member of the team. Their virtual

teammates ignored, praised, or criticized the subjects' suggested funding priorities. At the end of each 12-minute session, the participants answered a survey examining their perceived ostracism, group connectedness (belonging and control constructs), affect (anger construct), and degree of satisfaction (group, process, and decision satisfaction constructs). At the conclusion of the study, they were thanked for their participation and debriefed that they were part of a human-computer team. The debriefing statement is attached at Appendix D.

Simulated CMC Group Environments: As previously noted, this experiment employed a simulator developed and used over two pilot studies, in order to decrease variability in the discussion streams and control the manipulations. Drawing on the work of Garfield and colleagues (2001), Valacich et al. (2006), note that a group simulator is an electronic environment that “looks and acts like a groupware system, but instead of sharing ideas among participants, the simulator presents participants with comments that appear to be from other participants but which are, in fact, drawn from a database of preset ideas (p.327)”. Using a simulator allowed our research to study the individual functioning within the experimental control of a computer-mediated group. Realism was enhanced through populating the simulator with comments drawn from earlier pilot sessions by demographically similar samples using teams comprised of all humans. These teams were given the identical task as used in this study and their conversations were captured for analysis. Typographical errors and grammar mistakes were deliberately preserved to reproduce an accurate simulation of normal human conversations.

Variance Manipulations

Once the player initiated the chat room, they encountered a scripted conversation between them and two simulated players. In all study cells, the conversation began with a brief

introductory “get to know one another” phase widely noted in teams during piloting sessions. Next, the conversation was steered to a discussion of the social programs' pros and cons. The inclusion treatment was manipulated by the two players acknowledging the player’s inputs (e.g., “What do you think <player screen name>?”). The players received comments on 33% (high condition), 10% (low condition), or 0% (complete ostracism) of their inputs. Evaluative tone was manipulated by either agreeing with the participants input (e.g. “Great point <player screen name>. I never thought about it that way!”) or disagreeing with it, (e.g., “That’s a poor idea <player screen name>.”). Regardless of cell condition, during the introductory phase, the player was greeted and the two simulated players maintained the same conversation stream between them. All other aspects of the chat session (timing, content, interface, etc.) were controlled in order to isolate the treatment effects.

Participants

The subject pool for this study consisted of 262 college undergraduate students enrolled in a lower division management information systems course at a medium sized northwestern U.S. university. 65.4% of the subjects were male and they averaged 20.57 years of age. These students received course credit of approximately 1% of their final grade, for their participation in this study.

Measurement Model

Mplus Version 5.00 was used to analyze the data. Mplus was selected because of its ability to model continuous latent variables, categorical latent variables, or a combination of continuous and categorical latent variables within the same model making it useful in the current research (Muthén and Muthén, 1988-2007). The analysis is presented in two phases. Initially

the measurement model's validity and reliability is assessed. This is followed by an evaluation of the relationships of interest previously hypothesized. Confirmatory factor analysis via SEM was selected because of its usefulness in judging instrumentation adapted from measures used in prior research. We followed the recommendation of Chin (1998) and examined our study's item means and loadings, structural paths, and the r-squares.

Table 4.1 shows relationships between the latent variables and their indicators through presenting the overall factor loads, reliabilities, and fit statistics for our measurement model. Once model fit was established, Cronbach alpha and composite reliability scores were used to assess the factors' reliability. Subsequently, construct validity analysis was conducted, consisting of examining the model for convergent and discriminant validity. Convergent validity tested the internal consistency within an individual construct by analyzing the factor loadings and the average variance extracted (AVE) of each construct. Conversely, discriminant validity analysis examined whether the constructs were statistically different by comparing each constructs' AVE with the squared correlation of the remaining constructs. The result of this analysis is as follows.

Table 4.1 Model Loads, Reliabilities and Fit Statistics

Construct	Items	Standardized Loadings	Composite Reliabilities	Construct	Items	Standardized Loadings	Composite Reliabilities
Perceived Ostracism	OST1	0.777	0.911	Group Satisfaction	GSAT1	0.883	0.894
	OST2	0.878			GSAT2	0.937	
	OST3	0.884			GSAT3	0.747	
	OST4	0.849					
Belonging	BEL1	0.728	0.858	Process Satisfaction	PSAT1	0.846	0.898
	BEL2	0.879			PSAT2	0.841	
	BEL3	0.84			PSAT3	0.725	
Control	CNTRL1	0.764	0.815	Decision Satisfaction	PSAT4	0.889	0.922
	CNTRL2	0.818			DSAT1	0.889	
	CNTRL3	0.731			DSAT2	0.938	
Anger	ANGR1	0.852	0.865		DSAT3	0.852	
	ANGR2	0.669					
	ANGR3	0.939					
Fit Statistics							
Chi-Square / df		381.801 / 209		SRMR		0.041	
CFI		0.966		RMSEA		.053 (.044 .062)	
<p>- The comparative fit Index (CFI), the root-mean-square error of approximation (RMSEA), and the standardized root mean square residual (SRMR) are used to evaluate the fit of the measurement model and the structural models presented in our analysis. The criteria used to evaluate model fit will be that CFI values should be .95 or higher, SRMR values, must be .08 or lower, and RMSEA must be .06 or lower (Hu & Bentler, 1999).</p> <p>Composite reliabilities should be above 0.70 (Hair et al. 1998)</p> <p>- Factor loadings exceeded the threshold for convergent validity (Chin 1998, Hair et al. 1998)</p>							

Reliability: Table 4.2 presents construct Cronbach alpha levels and shows that all constructs exceeded Nunnally and Bernstein’s (1994) recommended level of .7. The Cronbach’s alphas ranged from .815 to .922. The full item correlation matrix is in Appendix E.

Table 4.2 Construct Cronbach Alpha Values

Construct	Cronbach Alpha
Perceived Ostracism	0.909
Belonging	0.856
Control	0.815
Anger	0.852
Group Satisfaction	0.886
Process Satisfaction	0.895
Decision Satisfaction	0.922
Note, Cronbach alpha should be above 0.70 (Nunnally & Bernstein, 1994).	

These Cronbach alpha values were supplemented by calculations of construct composite reliability (Fornell and Larcker, 1981). Although composite reliability and coefficient alpha are not the same, both provide similar information and make good compliments for each other (Werts, et al., 1974). Hair et al (1998) provided a formula for computing construct reliability.

$$\text{Construct Reliability} = \frac{(\sum \text{ standardized loadings})^2}{(\sum \text{ standardized loadings})^2 + \sum \text{ indicator measurement error}}$$

In Table 4.1, all composite reliability scores were also greater than their recommended threshold of .70. Taken together, the Cronbach alpha and consistency values suggest the model is reliable.

Construct Validity: next, construct validity was examined through determining discriminant and convergent validity. We applied three standards for measuring convergent validity that have evolved out of prior research. First, every item should load significantly on its intended construct. Next, all of the composite reliabilities ought to exceed .70. Finally, each constructs should have an average variance extracted greater than .50.

Our model's factor loadings all exceed .707 which is indicative of convergent validity (Chin, 1998; Hair, et al., 1998). In addition, construct AVE values were computed to examine the amount of variance due to measurement error within each construct. The following formula was used to calculate variance extracted estimates (Hair, et al., 1998):

$$\text{Variance Extracted} = \frac{\sum \text{ squared standardized loadings}}{\sum \text{ squared standardized loadings} + \sum \text{ indicator measurement error}}$$

Once again convergent validity was supported as each construct's values exceed the .50 threshold recommended by Fornell and Larcker (1981). These analyses therefore indicated the model showed convergent validity. Discriminant validity was examined through looking at the latent variables correlations and then AVE analysis. As shown in Table 4.3, two of the variables

(GSAT and BEL) are highly correlated (.798). While problematic, it is understandable since satisfaction with a group is hypothesized to be theoretically related to feelings of belonging to it.

Table 4.3 Latent Variable Correlations

	OST	BEL	CNTRL	ANGR	PSAT	GSAT	DSAT
OST	1.000						
BEL	-0.657	1.000					
CNTRL	-0.597	0.686	1.000				
ANGR	0.458	-0.432	-0.490	1.000			
PSAT	-0.515	0.548	0.487	-0.524	1.000		
GSAT	-0.709	0.798	0.703	-0.582	0.680	1	
DSAT	-0.378	0.452	0.399	-0.416	0.638	0.587	1

The results of the AVE analysis presented in Table 4.4 shows that for each construct, the average variances extracted exceeded the square of the correlation between it and other constructs in the model. Due to this, it is reasonable that believe that discriminant validity is generally not an issue (Fornell and Larcker, 1981).

Table 4.4 Squared Correlations and AVE Values

	OST	BEL	CNTRL	ANGR	GSAT	PSAT	DSAT
Perceived Ostracism (OST)	0.743						
Belonging (BEL)	0.326	0.674					
Control (CNTRL)	0.251	0.397	0.612				
Anger (ANGR)	0.142	0.133	0.183	0.697			
Group Satisfaction (GSAT)	0.407	0.556	0.453	0.284	0.808		
Process Satisfaction (PSAT)	0.213	0.211	0.177	0.218	0.368	0.689	
Decision Satisfaction (DSAT)	0.119	0.169	0.162	0.160	0.313	0.347	0.843

Bold numbers on the are bold along the diagonal are average variance extracted (AVE) figures.
 Convergent validity inducted by each construct's exceeding .50 (Fornell & Larcker, 1981)

In summary, the measurement model provides an overall good fit: $\chi^2(209) = 381$, CFI = .966, SRMR = .041, RMSEA = .53(.44-.062). The analysis of the measurement instruments found

them to be reliable and provide acceptable convergent and discriminant validity. Moreover, with convergent and discriminant validity supported, the model can be said to show construct validity.

Common Method Variance

Common method variance is a limitation of experimental research where the subjects assess both predictor and criterion variables. While such situations are not unique to our study, we acknowledge that our results may potentially be biased by CMV. For example, our subjects were exposed to an experimental treatment, asked to answer to what extent they were ignored by their group (predictor) and subsequently requested to assess their internal levels of anger (criterion). Thus, CMV addresses the possibility of our data being influenced by bias in subject responses collected from the same source (Podsakoff, et al., 2003). We believe that CMV is not a major concern in this study for several reasons. First, our confirmatory factor analysis indicated that all of our items loaded very highly on their intended factors. Such a CFA is a “sophisticated test” of CMV (Podsakoff, et al., 2003, p.889). Moreover, marker variable partial correlational analysis was deemed useful for identifying and correcting CMV (Richardson, et al., 2003) and so was conducted as well.

The test for CMV followed Lindell and Whitney’s (2001) guidance on determining the presence of common method variance. Their technique requires selecting a marker variable that is theoretically unrelated to one or more of the study’s factors. The smallest observed correlation between this marker variable and the other factors can be assumed to be due to CMV because it has no theoretical linkage to account for the observed variation. Ideally the marker variable should be identified a priori, but in the absence of such a situation it can be identified in a post hoc situation such as in our study (Lindell and Brandt, 2000). Therefore, we used two marker

variables to be conservative. Our first marker variable is a conscientiousness (CO) item drawn from Big 5 psychological battery (John and Srivastava, 1999). This was collected and assumed to be theoretically unrelated to ostracism ($r = .012$). In addition, when selecting the marker post hoc “the smallest correlation among the manifest variables provides a reasonable proxy for CMV” (Lindell and Whitney, 2001, p. 115). Our study used decision satisfaction (DSAT) as the marker variable due to it having the smallest positive ($r = .399$) correlation in the matrix.

Using their method, the original zero-order correlations were purified by subtracting the marker variable’s correlation value (reflecting CMV) from the correlation value between each pair of variables. In all cases, the correlation between the endogenous variables of interest and the exogenous ostracism variable remained statistically significant after the partial correlation. This indicates that common method bias, while possibly present, is not responsible for the results (Lindell and Whitney, 2001). It is noted that the magnitude of the decision satisfaction marker’s correlation was much larger than that of the conscientiousness marker and this drove the observed dramatic change in CMV-corrected values when using it as a marker.

Table 4.5 Common Method Bias Analysis

Construct Correlations with Perceived Ostracism Controlling for Marker Variable			
	Uncorrected	CMV-adjusted	
		CO	DSAT
BEL	-0.657	-0.653	-0.429
CNTRL	-0.597	-0.592	-0.329
DSAT	0.458	0.451	0.098
GSAT	-0.515	-0.509	-0.193
PSAT	-0.709	-0.705	-0.516
All CMV-adj correlations statistically significant at $p < .05$			

HYPOTHESES TESTING

Having examined the measurement model, we next turned to the significance and strength of the hypothesized relationships previously predicted. An initial review of our data showed our manipulations were successful. The means for the manipulation check of evaluative tone were in the expected direction, with the tone reported by participants in the critical condition ($M: 4.05; SD: 1.29$) being significantly lower (i.e., more critical) than those of participants in the supportive condition ($M: 5.01; SD: 1.37, F(1, 261) = 94.08, p = .000$). Additionally, the direction of the manipulation check for frequency of communications from the team was generally as theorized.

Participants in the zero feedback condition reported significantly lower percentages of the conversation being directed to them ($M: 14.9; SD: 1.41$) than either participants in the low ($M: 20.0; SD: 1.55, p = .017$) or the high feedback ($M: 21.62; SD: 1.22, p = .000$) conditions ($F(2, 260) = 6.62, p = .002$). However, there was no significant difference between those in the low and high conditions (mean difference 1.62; $p = .413$). Post hoc analysis of the frequency data showed signs of heteroscedasticity ($F_{Levene} = 21.72$ with 2 and 260 degrees of freedom ($p = .00$)). We therefore also used the nonparametric Kruskal-Wallis test to run an ANOVA on transformed data. The results are in Table 4.6 and show that the frequency manipulation was successful and the perceptions followed the intended treatment patterns ($\chi^2_{K-W} = 7.16, df = 2, p = .028$).

Table 4.6 Kruskal-Wallis Test

	FREQ	N	Mean Rank
PerFREQ	0	83	115.80
	1	69	135.75
	2	111	141.78
	Total	262	

SEM was next used to test our hypotheses. Our model includes single-item self-report measures (i.e., evaluative tone and discussion frequency). We recognize that using single item measures is generally avoided because of an inability to test its internal reliability (Wanous, et al., 1997). Robins et al. (2001) concur with this view, also asserting that single item measures are not readily able to ensure content validity for multidimensional constructs. However, they further note though that single item measures have been found to be beneficial in some contexts (see Burisch, 1984); “single-item measures can provide an acceptable balance between practical needs and psychometric concerns” (Robins, et al., 2001, p. 152).

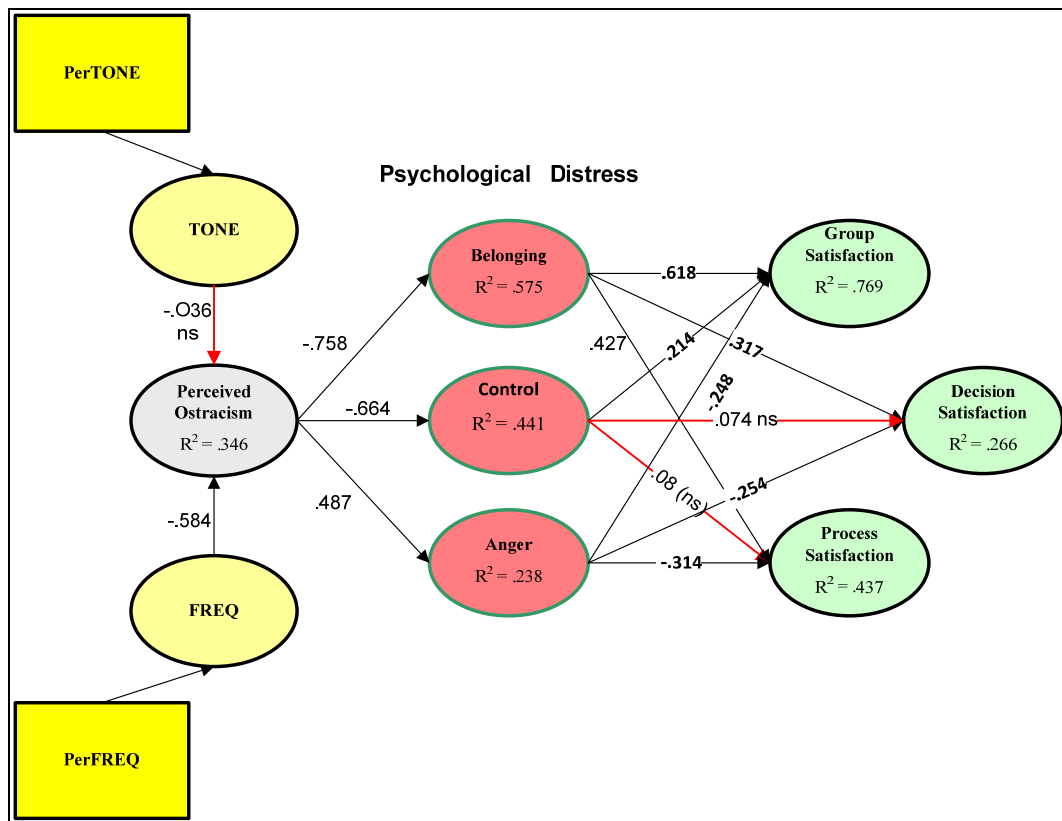


Figure 4.5 Structural model

To take a conservative approach in adding these two measures to our structural model, we followed Anderson and Gerbing’s recommendation for dealing with single-item measures by

fixing the error variance to correct for reliability. Both single measure items error variances were set to .10. The structural model and results are shown in Figure 4.5 and Table 4.7 respectively.

Table 4.7 Structural Model Fit

Structural Model Fit Statistics			
Chi-Square / df	470.949 / 257	SRMR	0.059
CFI	0.953	RMSEA	.056 (.048 .064)
All paths paths except Tone-OST, CNTRL-DSAT and CNTRL-PSAT are significant at $p < .001$			

The model fits well with all of Hu and Bentler's (1999) thresholds: $\chi^2 (257) = 471$, CFI = .953, SRMR = .059, RMSEA = .56(.48-.064). The results (Table 4.8) support hypothesis 1 that communication frequency had a strong effect on perceptions of ostracism with a path weight of -.584. When a person believed their teammates were not communicating, they felt ostracized from their group. However, the effects of evaluative tone were not statistically significant ($r = -.036$, $p = .514$) and so H2 is not supported. In line with prior research on ostracism, people who perceived they were ostracized reported psychological distress. This manifested itself as posited in hypotheses 3a-c. Individuals who felt excluded reported lower levels of belongingness ($R^2 = .575$), felt out of control with their situation ($R^2 = .471$), and were angry about it ($R^2 = .239$). Furthermore, belonging (H4a-c) and anger (H6a-c) showed the hypothesized effect on group, process, and decision satisfaction levels. Interestingly, while participants' lowered control levels affected their satisfaction with group, it did not significantly affect their view of the decision, or the process used to reach it. Due to this, H5a is supported but H5b and H5c are not.

Table 4.8 Study Results

Hypothesis	Supported
<i>H1: The frequency of feedback is negatively related to the individual's perceptions of ostracism</i>	YES
<i>H2: Messages tone will be negatively related to ostracism perceptions</i>	NO
<i>H3a: An individual's perception of ostracism negatively affects their perceptions of belonging to the team</i>	YES
<i>H3b: An individual's perception of ostracism negatively affects their perceptions of control over their social environment.</i>	YES
<i>H3c: An individual's perception of ostracism positively affects their anger level.</i>	YES
<i>H4a: Individual levels of belonging will be positively associated with levels of group satisfaction</i>	YES
<i>H4b: Individual levels of belonging will be positively associated with levels of process satisfaction</i>	YES
<i>H4c: Individual levels of belonging will be positively associated with levels of decision satisfaction</i>	YES
<i>H5a: Individual levels of control will be positively associated with levels of group satisfaction</i>	YES
<i>H5b: Individual levels of control will be positively associated with levels of process satisfaction</i>	NO
<i>H5c: Individual levels of control will be positively associated with levels of decision satisfaction</i>	NO
<i>H6a: Individual levels of anger will be positively associated with levels of group satisfaction</i>	YES
<i>H6b: Individual levels of anger will be positively associated with levels of process satisfaction</i>	YES
<i>H6c: Individual levels of anger will be positively associated with levels of decision satisfaction</i>	YES

The results of the structural model also suggest that the most influential perceived ostracism antecedent is feedback frequency (path weight of $-.584$). Perceived rejection in the form of no message cues at all was much more ostracizing than negative comments from one's virtual teammates. We studied the effect of perceived ostracism in the context of virtual team decision-making. Within this, we particularly focused on the deleterious effects of ostracism on individuals' satisfaction with the team, their processes, and decisions made by them. The results show that belongingness is more important to group satisfaction (path weight $.618$) than feelings of situational control (path weight $.214$) or how angry an individual becomes when ostracized (path weight $-.248$). When considering satisfaction with the methods and processes employed by

a virtual team reaching a group decision, the influence of belongingness (path weight .427) outweighs the effect of how angry a team member becomes (path weight -.314) and members' feelings of control over the situation have no statistical effect (path weight .08 (ns.)). This same pattern again replicated in satisfaction with the group's ultimate decision. Belongingness (path weight .317) is once more of primary concern, followed closely by degree of anger (path weight .254) and no statistical effect by degree of control (path weight .074 (ns)) was noted.

DISCUSSION

In our study, we asked subjects to make a group decision on funding social programs while only communicating via a chat tool. The programs they debated were selected based on their ability to stimulate discussion due to their controversial nature, which increased the treatment's salience to the participants. This was evidence by people becoming notably aroused when a topic they felt strongly about was discussed. During the experiment, subjects were included or excluded during the discussions. When they were included, their teammates responded by praising or criticizing their inputs. For example, a subject's comment of "I think we should fund death row appeals" might be responded to with "That is a really bad idea Max!" A simulator was created, piloted, and used in this empirical study to ensure experimental control. It was successful with approximately 80% of the subjects across studies failing to detect that they were actually chatting with a computer.

The results of this study suggest that information systems, by the nature of the cues they allow, have a significant effect on both the psychological state of virtual team members and the decisions they make. This in turn has implications for leading globally distributed teams. In line with prior research in social ostracism, we found that virtual team members who felt ostracized

from their groups would follow a pattern of expressing negative feelings of belonging, a lack of control, and anger. Further, our results supported the notion that psychological distress subsequently causes decreased feelings of satisfaction with the team, its processes, and their joint decision. We gained insights into the causes of ostracism perceptions during our study. As hypothesized, those who received exclusionary cues in the form of decreased frequency perceived themselves to be ostracized from the group. Perceived ostracism in the form of decreased feedback frequency in computer-mediated communications psychologically harmed individuals. They felt ignored and excluded by their teammates and it showed in all outcome variables. Conversely, there was no ostracizing effect found for interacting with teammates who criticize.

Several of our hypothesized relationships were not supported. Message tone was not found to have an effect on participant's perceptions of being ostracized by the group. We believe there are two potential reasons for this lack of effect. The first reason is likely related to the simulator. Early piloting showed the detection increased quickly once the chat sessions went past 10-12 minutes. It is possible that the time the participants interacted with their simulated teammates was insufficiently long for them to feel rejected based upon a few critical comments. Additionally, participants may have not read the comments immediately as they were presented on the screen (e.g., lost in forming their own thoughts) and this diluted the effect of receiving an immediate negative response to views they shared. In either the situation of the shortened time or diluted rejection, study participants may have perceived their group to be critical, but not intensely enough for it to be rated as ostracism. The second reason is that ostracism is essentially a feeling of being ignored (Williams, 2001). A reexamination of the literature indicates that in some instances, even negative messages are enough to prevent ostracism (i.e. "if you are

criticizing me ... then you are noticing me”). This was corroborated by our manipulation check and a post hoc ANOVA where we found that message tone, did affect levels of belonging, control, and anger. Therefore, it seems reasonable to say that, while criticism was perceived by the subjects and it negatively affected them, the criticism was not ostracizing in any way.

With the noted exception, our use of a simulated chat environment was generally a success. This simulator was the result of two years of piloting and adaptation. Initially we questioned whether anything short of a full-blown artificial intelligence system would be adequate. The simulator needed to both interact with study participants in a realistic manner and ostracize them as well. We recognize that some researchers will take issue with our use of simulator. Yet, comments from the study participants indicated that they not only bought into the simulation, but also were very engaged with it. What follows are a few of the comments excerpted from our study:

-I think that because I had the word 'lady' in my screen name i was ignored and not valued by my group. I was trying to mediate the entire conversation without throwing in outlandish suggestions and reasons and was completely ignored. I know I could have been much more effective in a cooperative group. Thanks!

-Thank you for finally doing a study that was meaningful.

-I felt discriminated against people i didnt even know who made me feel incompetent and made me feel restricted.

-It would've been nice to have an area where I can complain about my group members. Not really irritating, just discouraging.

Overall, the use of the simulator allowed us to study the individual within the group. To obtain 786 subjects would have been beyond our resources. Using this tool, we able to examine 262 people interacting within triadic groups while only drawing on 364 subjects. Unfortunately, it had the attendant effect of forcing us to limit the length of the study sessions to prevent

detection. Therefore, while the use of a simulator afforded us the benefit of control, it caused some attrition in our study.

Our study looked at perceived ostracism within the context of computer-mediated communication and found it alive and well. For teams that are interacting to accomplish a group task, the degree to which a team explicitly acknowledges its members' communications will have a strong effect on their satisfaction with the team, its processes, and decisions. The implications for such a negative force are significant in an era of globalization with attendant increases in both the use of virtual teams and the empowerment of participative decision-making. It is believed that this research provides an initial step in understanding a heretofore-unrecognized situation for the leaders of such teams and the designers of the technology that mediates virtual team communications.

Contributions

This research has theoretical and practical implications. First, it contributes to the rich virtual team literature in the information systems field through introducing the concept of perceived ostracism. Virtual teams use technology to interact across space and time. This research has shown that there are psychologically distressing influences that can affect their team members. Second, it showed how the force of decreased feedback via information systems can invoke feelings of ostracism, create psychological distress, and negatively impact virtual team satisfaction levels. In the light of an age where such teams are increasingly used for important organizational work, this has significant implications for the decisions these teams make. Our research has also practical implications for designers of interfaces for CMCS system and managers of virtual teams. We have shown frequency of interactions matter and these can be

affected by the system used for interaction. Designers should attempt to introduce system properties that allow for more cues in order to adequately separate misperceptions of ostracism from those that are actually taking place. Finally, this research has implications for leaders of virtual teams. Many leaders in such structures only periodically interact with their dispersed subordinates. Yet, they expect them to carry out directives, often in a participatively determined manner. Leaders should be aware that they might want to interact with their teams in a deliberate manner to prevent ostracism perceptions. Doing so may help them to not only feel like a closer member of the team, but also make them more amenable to group decisions.

Limitations

All research is flawed, and admittedly, no study is without limitations (Dennis and Valacich, 2001). As with other research, there existed factors that might have influenced the findings presented in this paper. These limitations can be broadly categorized as the nature of the sample, the nature of the analysis, and the context of the study. We believe that each of these have been addressed, but acknowledge their potential impacts nonetheless. First, there are issues surrounding the use of college student subject in our sample. Student subjects have been frequently offered as unrealistically homogenous and therefore a poor choice from which to generalize to the business environment. In addition, these students were asked to team on a group decision-making task which may not been salient to them. However, this demographic is highly proficient in computer-mediated communication and, as is often the case in life outside of the university, our subjects were given a task that was intended to challenge their core values (e.g. state funding of abortion). Moreover, the used of student subjects is not unique to our research. Powell et al (2004) asserted that 90% of published articles utilize student teams as

research subjects. Consequently, it is believed that our sample pool was not unduly influenced these results. Nevertheless, future research using a more mature subject pool or workers in a field study should lend further credence to the validity of our results. A second potential limitation is that this research was based on responses from individuals who were required to assess the predictors (e.g., perceived ostracism and psychological distress) as well as our criterion variables (e.g., satisfaction measures). The cross-sectional nature of this experiment makes this situation ripe for the influence of common method variance. While it is conceivable that our results were influenced by CMV, we followed Lindell and Whitney's (2001) guidance on determining the presence of common method variance. Since our results were unchanged after partialing out the influence of a marker variable, we believe that it is not a major concern. Future research using a different a priori marker variable might be useful to determine if our post hoc choice of DSAT as one of our marker variables influenced the CMV analysis in any way. Further, our analysis also required the use of single item measures as proxies in our structural equation model. The use of such measure is debated in behavior research. The use of the single item measure may have affected how we captured evaluative tone and feedback frequency that are potentially multifaceted constructs. Multi-item scales are generally more reliable to use in such situations even if the variance of the single-item measures are fixed as we did. While the ability to use single continuous measures allowed us to incorporate our treatments as exogenous variables in a structural model, it is possible that the decreased fidelity of single item measure could have influenced our results. Finally, this study's context (i.e., the use of a simulator to discuss value-challenging issues) is unique in the ostracism literature. Previous studies have manipulated ostracism through vignettes and explicit social exclusion (e.g., being odd man out in a three-way conversation). In our study, subjects interacted with a simulator to control the flow

of feedback and provide identical comment streams to each person in a treatment cell in order to maintain strict experimental controls. Furthermore, to lower the risk of detection, the simulation length was kept at 12 minutes. While we acknowledge that this may have influenced the participants and created less variance in their discussions, we went to great lengths to remove any person who showed signs of detecting either the purpose or the simulation of the study from our data set. Comments from within the chat stream and those left to the researchers show that the participants truly felt they were interacting with humans.

Future Research

Reality is merely an illusion,

~ Albert Einstein~

This study suggests several avenues for future research may be fruitful. First, research is needed in the characteristics of the media to see how it affects ostracism perceptions. It is possible that teams interacting via different media will experience the same forces as were tested in this research yet react in different manners. Next, this research should be extended to different tasks to see how the context of the situation alters the influence of perceiving exclusion in distributed teams. In addition, ostracism is posited to be a primal force that people a highly sensitized to noticing rejection. Given the complexities of the business environment, it would be fruitful to investigate cyberostracism in a field study of distributed teams to comprehend any differences in how people perceive ostracism during the course of their daily jobs. Finally, research is needed in to the individual characteristics that lead people to be more or less susceptible to the forces of cyberostracism in order to identify the characteristics of potential virtual team members who have an increased chance of success in that environment.

CHAPTER 5: SUMMARY AND FUTURE RESEARCH

This chapter summarizes the research of the three essays presented in this dissertation and discusses future directions for ongoing research into the related core concepts described in chapter one. The impact of technology-mediated communications on the perceptions of ostracism in the minds of virtual team members is a rich vein for researchers in the fields of information systems, management, and social psychology to tap. As these essays illustrate, understanding the cues-silence-ostracism triad has applications for theory and practice.

Summary

The goal of this dissertation was set the stage for ongoing research into the effects of online silence and its resultant perceptions of ostracism within virtual teams. In doing so, it draws heavily on the work of Williams and colleagues in the field of psychology. Williams' vision of ostracism stands apart from other scholars in its scope and granularity. His assertion that "all" people have evolved an intense sensitivity to rejection positions Williams' Need-Threat ostracism model to be applicable in every context. Moreover, his identification of four specific psychological needs harmed by ostracism makes his model useful for leading people at all levels in the business sector. Synergy happens when this cognitive understanding of what happens to people who *are* ostracized is combined with Dennis, Fuller, Valacich's conceptualization of technology-mediated communication processes and media capabilities depicted in Media Synchronicity Theory. It is a small step to theorize how information systems and technology-mediated communications can foster *perceptions* of ostracism through their mediating effect on messaging cues and communication processes. This fertile ground for psychological distress is a potentially tremendous force affecting participative decision-making in the self-directed virtual teams of today and the future.

The topics addressed in these essays center around three intertwined concepts; 1) distributed or “virtual” teamwork, 2) psychological distress rooted in the symbiotic connection between silence and ostracism, and 3) perceptions can yield effects similar to objective reality. The connection between virtual teams, technology-mediated communications, and perceptions of ostracism is a fascinating triangulation that drove the research presented in this dissertation and explicated through the three essays created for it.

Essay One is a conceptual extension of ostracism theory to the environment of virtual teams. It presents a proposed Cyberostracism Effects Theory, which describes four dimensions of technology-mediated interactions that have the potential to create feelings of rejection in virtual team environments: message characteristics, interpersonal characteristics, individual characteristics, and media characteristics. Specific contributions to knowledge are made through clarifying how even unintentional breaks in communications within distributed teams may engender strong negative feelings, through highlighting the mechanisms by which a lack of online feedback may be perceived as ostracism, and through describing how perceived ostracism may affect virtual team members.

Essay Two reviews a pair of studies conducted to investigate the reliability of the instrumentation used by researchers of Williams’ model of ostracism effects. The first study replicates of the original cyberball experiment and found that there were problems with the highly correlated factor structure behind the instrumentation. The second study extrapolates these concepts and instrumentation to being ignored in a chat room. Results generally supported the finding that people interpret silence as ostracism over the Internet. Even though silence was solely over computer media, people who were less included in a conversation felt that they were deliberately ignored and were adversely affected by this. On the surface, this seems to indicate

that the Need-Threat model's instrumentation is on the mark; however, factor analysis suggests that while the entire instrument accurately depicts the broad effects of ostracism, its individual items have validity issues.

Essay Three presents an empirical test of computer-mediated ostracism in virtual team decision-making. Specifically, this essay clarifies the effect of perceived ostracism within virtual teams interacting via text-based communication. The results of this study suggest that information systems, and the cues they mediate, significantly affect the psychological state of people on virtual teams and their satisfaction with the group, process, and decision made in an ostracizing environment. Individuals who noticed decreased message frequency felt ignored and excluded by their teammates and it influenced all outcome variables. Conversely, if people received messages, even if they were critical, they did not feel ostracized. This leads to the implication that people felt that "if you are criticizing me, at least you know I'm here". At least that's something...

"...my words like silent raindrops fell... and echoed ... In the wells ... of silence..."

~ Simon and Garfunkel, Sounds of Silence~

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APPENDIX A CYBERBALL QUESTIONNAIRE

CYBERBALL ITEMS AND SOURCES			
The following 5-point Likert-type scale was used on all items (Strongly Disagree/ Strongly Agree unless otherwise noted):			
Measure	Code	Item	Source
Ostracism	OST1	I was included	Smith and Williams, 2004
Ostracism (Reverse coded)	OST2	I was included	Smith and Williams, 2004
Ostracism	OST3	Assuming that 33% of the time you would receive the ball if everyone received it equally, what percent of the throws did you receive?	
Belonging (reverse coded)	BEL1	I felt poorly accepted by the other participants	Zadro et al, 2004
Belonging	BEL2	I felt as though I had made a "connection" or bonded with one or more of the participants	Zadro et al, 2004
Belonging (reverse coded)	BEL3	I felt like an outsider	Zadro et al, 2004
Control (reverse coded)	CNTL1	I felt frustrated during the exercise	Zadro et al, 2004
Control	CNTL2	I felt in control during the exercise	Zadro et al, 2004
Control	CNTL3	I felt that I was able to participate as often as I wanted during the exercise	Zadro et al, 2004
Self-esteem	SEST1	During the exercise, I felt good about myself	Zadro et al, 2004
Self-esteem	SEST2	I felt that the other participants perceived me as a worthy and likeable person	Zadro et al, 2004
Self-esteem (reverse coded)	SEST3	I felt somewhat inadequate during the exercise	Zadro et al, 2004
Meaningful Existence	MEXT1	I felt that my performance had some effect on the outcome of the exercise	Zadro et al, 2004
Meaningful Existence (reverse coded)	MEXT2	I felt non-existent during the exercise	Zadro et al, 2004
Meaningful Existence (reverse coded)	MEXT3	I felt as though my existence was meaningless during the exercise	Zadro et al, 2004
Mood	MOOD1	At this very moment, do you feel bad-good (7-pt Likert)	Williams et al., 2000
Mood	MOOD2	...sad-happy? (7-pt Likert)	Williams et al., 2000
Mood	MOOD3	...tense-relaxed? (7-pt Likert)	Williams et al., 2000

APPENDIX B MEASUREMENT MODEL ITEMS

CONSTRUCT	ITEM	SOURCE (Adapted from)
Perceived Ostracism	I was excluded from the group discussion	New
	My contributions to the group were largely ignored	New
	My ideas were disregarded	New
	My group gave me the silent treatment	New
Belonging	I felt a sense of belonging to my group.	New
	I felt connected to my group.	New
	I see myself as part of this group.	New
Control	It was easy for me to make contributions to the task our group was assigned.	Zadro et al. 2004
	Being an active participant in this group was easy.	Zadro et al. 2004
	I felt that I was able to participate as often as I wanted during the exercise	New
Anger	I felt angry during the exercise	Zadro et al. 2004
	My feelings were hurt during the exercise	Zadro et al. 2004
	I was upset during this task.	New
Process Satisfaction	How would you describe the efficiency of your group's problem solving process?	Reinig 2003
	How would you describe the coordination of your group's problem solving process?	Reinig 2003
	How understandable was your group's problem solving process?	Reinig 2003
	How satisfying was your group's problem solving process?	Reinig 2003
Group Satisfaction	I felt I had a good team for this task.	New
	I enjoyed working with this team.	New
	This group is one of the best anywhere.	New
Decision Satisfaction	I think my team's decision was appropriate.	Reinig 2003
	I believe in the decision my team reached.	Reinig 2003
	To what extent are you confident that the group solution is correct?	Reinig 2003

APPENDIX C LEGISLATIVE DILEMMA INSTRUCTIONS

BACKGROUND

The Washington legislature has almost completed its budgeting for the next year. All that remains is \$1.8 million for special programs. Six programs are vigorously competing for these funds. As an influential member of the legislature, you must **decide which programs to fund**.

Each of the six programs needs \$1 million in funding to reach its goals. Funding amounts lower than \$1 million may be helpful, but may be so inadequate as to be of no value. The Governor has publicly said that he wants one of the proposals fully funded and believes any funding **less than \$500,000 for a program would be ineffective**. Based on these statements, the Governor may not sign allocations of less than \$500,000 and will require **at least one program to be fully funded**.

You are to select programs which you consider deserving of public money. Although many factors may influence the decisions regarding which programs to fund or not to fund, the most **critical factor is the degree to which a program agrees with your *personal values***.

DIRECTIONS

You must evaluate the competing requests for funding and make judgments about their relative merit. Many programs have merit, but limited resources require that you select the programs which you prefer to fund. Your job is to select those programs that should receive support. Your goal in selecting these programs is to **choose those programs that agree with your *personal values***.

Drug, Sex Education, & Contraceptive Programs (6-12)

Requested funding: \$1,000,000

This program is designed to invest in the future by developing a drug and sex education curriculum for grades 6-12. It will include making contraceptives available to grades 6-12 without parental consent. Proponents of this project believe that society could greatly reduce the enormous social costs of drug abuse (crime, prisons, lost worker productivity, etc.) and unwanted pregnancies by educating young children and by continuing the educational process. Smaller and more limited programs in the past have not produced the anticipated results. Opponents argue that this is not the mission for primary and secondary education and that these personal and moral concerns belong to the choice of each family.

Appeal Funding for Death Row Inmates

Requested funding: \$1,000,000

This program is designed to provide legal appeal funds for death row inmates whose cases have special circumstances. These circumstances include the finding of new evidence since their conviction or civil liberty problems with their case. Proponents argue that the state must exhaust all important issues of justice before killing a person. Opponents argue that such judicial process errors are very rare and not an important social concern.

Toxic Waste Cleanup

Requested funding: \$1,000,000

This program is designed to cleanup an environmental hazard that threatens the local water supply of an Indianapolis suburb. The company charged with creating the problem and the state have had a five year legal battle over who should pay and the lawsuit is unlikely to be

resolved in the next 4 years. A state funded cleanup would qualify for matching federal money (\$1 state = \$1 federal). Proponents of this project argue that the water supply for a large area could become contaminated if this project is not funded soon and fear this is driving away potential business investment in the state. An underfunded cleanup is unlikely to eliminate the problem. Opponents argue that the seriousness of the threat is overestimated and that the company should be held responsible.

Abortion Subsidies for Low Income

Requested funding: \$1,000,000

This program is designed to pay for an abortion if a woman cannot afford it. Proponents of the project argue that the cycle of poverty and its enormous social costs (welfare, childcare, medical) are perpetuated when poor women cannot choose to end an unwanted pregnancy. As a concession, proponents are willing to include a 24 hour waiting period. Inadequate funding for the project is unlikely to attain the project's objectives. Opponents argue that their tax dollars should not be used for this purpose.

Housing for the Homeless Center

Requested funding: \$1,000,00

This program is designed to renovate a vacant downtown warehouse to provide shelter for the city's homeless. Proponents of this project argue that over 40 people died last year from exposure and inadequate food. A local company has agreed to use part of the warehouse to employ some of the center's residents (1 year trial period), thus, they argue the homeless center would be partially self-sustaining. The resident's work would enable them to stay in the center

and reduce the city's welfare expenses. The project requires significant renovations to the warehouse and work area for the project to proceed as planned. Opponents argue that the project will not work and will become a burden on tax payers.

Job Training for Displaced Workers

Requested funding: \$1,000,000

This program is designed to provide job training for workers who have been laid off from a plant closing. The program would provide tuition and childcare for workers to attend technical schools. Proponents argue that such training is essential for the survival of many small towns. Opponents view the program as another form of welfare and believe that our economy already has ample ways for workers to find other jobs.

Record how you think the money should be allocated in the column below:

Proposed Project (descriptions on next page)	Recommend ed level of Funding
1. Drug, sex education, and contraceptive programs for grades 6-12	_____
2. Toxic waste cleanup	_____
3. Housing for the homeless	_____
4. Abortion subsidies for low income	_____
5. Appeal funding for death row inmates	_____
6. Job training for displaced workers	_____
Total Funds Allocated (Max 1.8 M)	_____

APPENDIX D STUDY DEBRIEF STATEMENT

This study is concerned how people react to perceived ostracism in teams solely interacting via information and communication technologies (ICT). Previous studies have found that under some conditions people feel excluded when their email, text messaging, etc is not responded to. This effect has been termed “cyberostracism” (Williams, et al., 2000c). Our study’s primary goal was to understand its impact on teams working toward a common understanding.

How was this tested?

In this study, you were asked to perform two computer-mediated tasks--discuss & advocate social programs aligned with your values, and allocate funding based upon that discussion. All participants performed these same tasks during 12-minute chat sessions and reported their experiences in a post-discussion survey. One group discussed the funding task with no feedback from their teammates, whereas the other group received feedback in the form of acknowledgement of their online presence on the team, (e.g. “Did you see the game, *AMELIA*” or “Hey *AMELIA*, I never thought about the issue that way”, etc.). A simulator was employed to control the team’s communications--each participant logged into a chat session with two virtual teammates. The communications they encountered were taken from an earlier pilot study from a comparable subject pool of college students. Grammatical mistakes and misspellings, as well as the flow of the comments, were maintained to maintain conversational reality.

Research questions and expectations:

We expect to find that online silence prompts feelings of exclusion from the virtual team. When we examine the effect of ostracism, we expect it to negatively impact participants' perceptions of their teammates, the group's processes, and its decision outcomes.

We are also interested in the influence interface characteristics on computer-mediated teams. We suspect that people feel better about their team when they are given specific (a comment directed with their name) vis-à-vis general (non-identified instant messages) feedback--and this process increases the likelihood that they will be more satisfied with their teammates and their decisions. Specifically, we expected people to feel more included and satisfied when their chat sessions openly recognized them.

Why is this important to study?

Virtual teams are becoming increasingly important to global businesses. Yet, prior research shows that this organizational form has negative aspects. Employees must collaborate on projects across multiple time zones and within different cultures. Understanding how people react to the decreased cues ICTs provide will help to improve team performance and moral. This study concentrated on understanding the impact of such silence, which affects many teams that cannot meet face-to-face.

What if I want to know more?

1) I would like to talk with you to discuss your experiences. You can reach me at my office (126 Todd Hall) or via phone at 509-335-1297.

2) If you are interested in learning more about the problems people encounter in silence, you may want to consult: Williams, K. D. (2002). *Ostracism: The Power of Silence*. New York: Guilford Press. If you would like to receive a report of this research when it is completed (or a summary of the findings), please contact Greg Schechtman (runnnergreg@wsu.edu).

This study has been reviewed and approved by the WSU Institutional Review Board for human subject participation. If you have questions about the study please contact me, Greg Schechtman, at 335-1297. If you have questions about your rights as a participant please contact the WSU IRB at 509-335-7183.

Please do not disclose research procedures and hypotheses to anyone who might participate in this study as this could affect the results of the study. Thank you for your participation!

APPENDIX E ITEM CORRELATION MATRIX

	OST1	OST2	OST3	OST4	BEL1
OST1	1				
OST2	0.701	1			
OST3	0.651	0.782	1		
OST4	0.63	0.747	0.768	1	
BEL1	-0.438	-0.358	-0.454	-0.384	1
BEL2	-0.522	-0.441	-0.484	-0.447	0.694
BEL3	-0.591	-0.504	-0.525	-0.456	0.584
CNTRL1	-0.415	-0.37	-0.41	-0.409	0.425
CNTRL2	-0.444	-0.397	-0.431	-0.41	0.395
CNTRL3	-0.431	-0.321	-0.356	-0.399	0.288
ANGR1	0.395	0.357	0.359	0.407	-0.336
ANGR2	0.267	0.272	0.257	0.299	-0.134
ANGR3	0.339	0.335	0.356	0.373	-0.296
PSAT1	-0.383	-0.352	-0.364	-0.234	0.246
PSAT2	-0.438	-0.411	-0.378	-0.315	0.292
PSAT3	-0.286	-0.306	-0.33	-0.274	0.175
PSAT4	-0.451	-0.453	-0.438	-0.335	0.354
GSAT1	-0.561	-0.485	-0.516	-0.49	0.438
GSAT2	-0.595	-0.55	-0.599	-0.577	0.457
GSAT3	-0.528	-0.459	-0.508	-0.455	0.448
DSAT1	-0.246	-0.304	-0.347	-0.259	0.218
DSAT2	-0.267	-0.303	-0.342	-0.219	0.218
DSAT3	-0.275	-0.306	-0.364	-0.212	0.19

	BEL2	BEL3	CNTRL1	CNTRL2	CNTRL3
BEL2	1				
BEL3	0.719	1			
CNTRL1	0.469	0.485	1		
CNTRL2	0.455	0.512	0.614	1	
CNTRL3	0.412	0.44	0.579	0.594	1
ANGR1	-0.373	-0.377	-0.321	-0.395	-0.324
ANGR2	-0.194	-0.148	-0.274	-0.29	-0.292

ANGR3	-0.347	-0.321	-0.297	-0.372	-0.347
PSAT1	0.333	0.375	0.289	0.264	0.28
PSAT2	0.39	0.429	0.361	0.385	0.268
PSAT3	0.304	0.323	0.264	0.247	0.255
PSAT4	0.482	0.503	0.349	0.377	0.335
GSAT1	0.618	0.584	0.46	0.544	0.405
GSAT2	0.644	0.667	0.467	0.575	0.457
GSAT3	0.59	0.642	0.378	0.472	0.418
DSAT1	0.358	0.35	0.299	0.298	0.248
DSAT2	0.414	0.373	0.261	0.325	0.235
DSAT3	0.33	0.361	0.26	0.307	0.25
	ANGR1	ANGR2	ANGR3	PSAT1	PSAT2
ANGR1	1				
ANGR2	0.53	1			
ANGR3	0.8	0.643	1		
PSAT1	-0.399	-0.248	-0.38	1	
PSAT2	-0.466	-0.32	-0.426	0.765	1
PSAT3	-0.289	-0.2	-0.311	0.603	0.594
PSAT4	-0.441	-0.281	-0.441	0.74	0.718
GSAT1	-0.511	-0.353	-0.488	0.466	0.564
GSAT2	-0.497	-0.354	-0.493	0.487	0.547
GSAT3	-0.422	-0.242	-0.353	0.345	0.399
DSAT1	-0.343	-0.259	-0.348	0.42	0.43
DSAT2	-0.326	-0.253	-0.352	0.466	0.45
DSAT3	-0.359	-0.189	-0.347	0.467	0.437
	PSAT3	PSAT4	GSAT1	GSAT2	GSAT3
PSAT3	1				
PSAT4	0.671	1			
GSAT1	0.437	0.585	1		
GSAT2	0.44	0.585	0.835	1	
GSAT3	0.295	0.484	0.635	0.696	1
DSAT1	0.423	0.537	0.478	0.481	0.371
DSAT2	0.426	0.596	0.5	0.512	0.417
DSAT3	0.433	0.532	0.45	0.45	0.39
	DSAT1	DSAT2	DSAT3		

DSAT1	1				
DSAT2	0.835	1			
DSAT3	0.759	0.798	1		