DEPAUL UNIVERSITY
UNIVERSITY LIBRARIES

DePaul University

Via Sapientiae

College of Liberal Arts & Social Sciences Theses and Dissertations

College of Liberal Arts and Social Sciences

11-2011

Residence hall sense of community in physical and technology-based spaces: Implications for alcohol-related attitudes and behaviors

Benjamin C. Graham
DePaul University, bengraham@hotmail.com

Follow this and additional works at: https://via.library.depaul.edu/etd

Recommended Citation

RESIDENCE HALL SENSE OF COMMUNITY IN PHYSICAL AND TECHNOLOGY-

BASED SPACES:

IMPLICATIONS FOR ALCOHOL-RELATED ATTITUDES AND BEHAVIORS

A Dissertation

Presented in

Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

By

BENJAMIN CHARLES GRAHAM

NOVEMBER 2011

Department of Psychology

College of Science and Health

DePaul University

Chicago, Illinois

THESIS COMMITTEE

Christopher B. Keys, Ph.D.

Chairperson

Leonard Jason, Ph.D.

Suzanne Bell, Ph.D.

Eva Patrikakou, Ph.D.

Neil Vincent, Ph.D.

Deb Schmidt-Rogers, M.A. (Collaborative Partner, Dept. of Residential Education)

ACKNOWLEDGEMENTS

VITA

The author was born in Lincoln, Nebraska on January 2, 1972. He received his Bachelor of Science with highest distinction in psychology and English with a math minor from the University of Nebraska-Lincoln in 1994. He received his Masters of Science in Counseling Psychology from the University of Wisconsin-Madison in 1998, after which he was awarded a Rotary Ambassadorial Scholarship to study school-based violence prevention programming based in the Department of Psychology at the University of Melbourne, Australia. Following this experience, he relocated to Chicago, IL, and worked as a Licensed Clinical Professional Counselor and advocate in community mental health contexts until arriving at DePaul University in 2005 to pursue his doctorate in community psychology.

TABLE OF CONTENTS

OVERVIEW

For students residing in campus residence halls during their first years of study, the college community experience can be an important domain for navigating issues of emerging adulthood. This experience includes not only academic and professional growth, but also social development related to lifestyle choices. The use of alcohol by college students is an enduring phenomenon, common on many college campuses and carrying the potential for significant problems. College administrators have long struggled with the quagmire of addressing problems related to college alcohol use.

Sense of community may play an important role in the development of student wellness around issues such as alcohol use. The way that college students generate campus community today is substantially influenced by communication technology-based interaction (CTI) such as text messaging, e-mail, online social networking sites (e.g., Facebook), and other media. What is not known is how new CTI relates to the enduring need for physical exchange (e.g., neighboring) which takes place among students living within campus communities.

This study examines the specific community experience of students residing on-campus in residential halls. Data collection for the study was based on a larger online survey project housed within a residential education department at a large, private, urban Midwestern university. The current study explored the way that physical interaction and CTI contributed to an overall sense of community (SOC). From here, the study paired SOC with the documented role of peer norms for alcohol use to test hypotheses related to the way SOC within a residential hall and the influential role of close friends predict a range of alcohol-related attitudes and behaviors within and outside of the residential hall context.

By examining a student's community experience, the study contributes to our knowledge of how physical and technology-based interaction relate to SOC among members of the same community (viz., residence hall). This offers important theoretical and research implications for understanding overlapping physical and technology-based contexts. In addition, linking SOC within residence halls, differentiated from the experience of peer norms of close peers, to alcohol-related attitudes and behaviors offers important implications for residential hall programming and policies.

CHAPTER I

INTRODUCTION

Introductory Summary

For many college students in the United States, the first years of undergraduate study offer the independence to not only pursue higher education, but also develop and explore adult lifestyle choices. In addition to academic pursuits, college campuses represent an important context for engaging in community life. Students residing in on-campus residence halls during their first years of study are a population where the experience of community on campus is dynamically expressed.

Alcohol use among college undergraduates is a common, longstanding, and widely documented phenomenon (NIAAA, 2002). While it is generally understood that alcohol use by many undergraduates is a normative aspect of campus life at many colleges and universities, it is also true that many problematic issues can occur. Serious consequences related to undergraduate alcohol use include physical assault (Hingson, Heeren, Winter, & Wechsler, 2005), unintentional injury (Saltz, 2004), and attrition (Anderson & Gadaleto, 2001). Rape and sexual assault are the most common sources of violent crime on college campuses, and are directly linked to alcohol use (Cole, 2006). Furthermore, an estimated 2 million college students at least occasionally drive under the influence of alcohol with an additional 3 million riding along with them, accounting for most of the alcohol-related deaths among college populations (Saltz, 2004).

In light of the problems related to college drinking, the National Institute on Alcohol Abuse and Alcoholism has proposed a '3-in-1 Framework' for addressing problems related to college alcohol use that targets three ecological levels: 1) individuals, including at-risk or alcohol-dependent drinkers, 2) the student body as a whole, and 3) the college and the surrounding community (NIAAA, 2002). The first level underscores a strong need to understand

the socioemotional experience of individual students, including the perceived norms of friends'

attitudes and behaviors around alcohol use. The second and third components point to the need

to understand college drinking within the context of the larger campus culture. In a summary

article reflecting on 15 years of research derived from one of the largest projects on college

alcohol use in the U.S., Wechsler & Nelson (2008) conclude that a need exists to address college

alcohol use at the community level, not simply in the individual level or among a specified set of

problem-drinkers. Both the wider community in which a campus is situated and specific

contexts occurring on campus, such as residence hall communities, are ecological domains that

warrant attention.

A student's sense of community at college can serve as a powerful platform for social

and academic experiences. Sense of community refers to the affective feeling of belongingness

towards a group that provides membership, mutual influence, integration and fulfillment of

needs, and a shared emotional connection (McMillan & Chavis, 1986). The construct has been

referred to by several synonymous terms, including psychological sense of community (DeNeui,

2003; Graham, Jason, Ferrari, & Davis, 2009; Lounsbury & DeNeui, 1995; Obst, Smith, &

Zinkiewicz, 2002), perceived sense of community (Bishop, Chertok, & Jason, 1997) and sense of

community (Cicognani et al., 2008; Lounsbury, Loveland, & Gibson, 2003; Olson et al., 2003).

This study used the term sense of community (SOC), adopting the term of the authors of the

assessment instrument used in the present study (Peterson, Speer, & McMillan, 2008).

Over the past several decades, community psychology has generated a body of research

on the experience of SOC (Fisher, Sonn, & Bishop, 2002). More recently, definitions of SOC

stressed the contextual nature of the construct. Since Sarason's (1974) acknowledgement that

SOC varies by situation and over time, many studies have explored context- and culture-specific

definitions of SOC (Bathum & Baumann, 2007; Bishop, Colquhoun, & Johnson, 2006; Hill, 1996; Townley, Kloos, Green, & Franco, 2011). This study focused on the residence hall as a context for the undergraduate experience of SOC, and explored whether and how SOC may relate to decisions around alcohol and drug use.

While overall sense of community in a residence hall or within the larger university is influential in students' experience on campus, it is also true that close friends play an important role in a student's undergraduate experience. Peer support for alcohol use among groups of friends has been established as a predictor of undergraduate alcohol use (Wood, Read, Palfai, & Stevenson, 2001). Continued research into the role of peer support for alcohol use has suggested that same-sex peers may have a stronger relationship to the behaviors undergraduate students choose to partake in than do opposite-sex peers (Thombs et al., 2005). In some cases, peer influence may supersede the influence of the larger social context (Thombs, Ray-Tomasek, Osborn, & Olds, 2005). Given the potential for SOC to relate to a broad range of social and academic experiences, and the established relationship between peer norms and alcohol attitudes/behaviors, it is important to examine the way the two social variables interact as they relate to alcohol.

Students today enter college with unprecedented access to and familiarity with communication technology. This term refers to a broad range of technological avenues for communication, and includes the use of cell phones, text messaging, email, online social networking (e.g., Facebook), instant messaging, blogging, and online gaming (Hampton, 2007). Students entering college are high users of information and communication technologies, which collectively play a critical role in the way they interact with one another, their families, high school friends, and others (Student Affairs Leadership Council, 2009; Subrahmanyam et al.,

2008). A focus of this study is the social interaction facilitated by the technological resources

listed above. Furthermore, the specific examination of technology-based social interaction in the

current study is bounded by the context of student interaction with students *from their own*

residence hall. Throughout the study, this form of social exchange is referred to as

communication technology-based Interaction (CTI). The term CTI references the larger

communication technologies field while focusing on social interaction it involves.

One highly utilized example of CTI is online social networking. Online social

networking sites have grown to become a solid feature of the social fabric of campus life. For

example, The ECAR Study of Undergraduate Students and Information Technology (Smith &

Caruso, 2010), involving 127 U.S. institutions of higher education and over 36,000

undergraduate students, reported a consistently high rate of student use of social networking

between the years of 2007 (94.7%) and 2010 (95.9%), with an increase in the number of daily

student users from 48.7% in 2007 to 59.3% in 2010. One study found the content of

undergraduate social networking to reflect issues of identity formation in early adulthood, citing

the prevalence of such themes as friendship networks, religion, politics, and other identity-

related issues (Pempek, Yermolayeva, & Calvert, 2009). Indeed, the authors argue that social

networking may be a critical arena in which the emerging identity of young adults in college

manifests. Additionally, nation-wide surveys found that, among student users, social networking

sites are used for a range of activities that foster social and community building activities, such

as organizing events and staying in touch with friends (ECAR, 2010). From the nascent body of

research on the topic, the importance of social networking to facilitate community experience on

college campuses is becoming established (boyd & Ellison, 2007; LaRose, Eastin, & Gregg,

2001; Madge, Meek, Wellens, & Hooley, 2009). On the other hand, some administrative and

student voices have suggested that CTI may serve as a detriment to the college experience (Thomee, Eklof, Gustafsson, Nilsson, & Hagberg, 2007).

Amidst the burgeoning role of CTI in how college students communicate, the impact of physical interaction remains relevant. Of particular importance to residence hall life is the notion of neighboring, which attempts to capture the physical means in which people connect in the experience of community (Buckner, 1988). Several studies on the role of online social networking suggest that face-to-face, 'real' social interaction may have a more fundamental role than CTI regarding the way that students experience community (Martinez, Aleman & Wartman, 2009). It is important, therefore, to explore physical interaction as well as CTI in the overall community experience.

Recently, (Stokols, Misra, Runnerstrom, & Hipp, 2009) have expanded the foundational community psychology concepts of Barker's (1968) behavior setting theory and Bronfenbrenner's (Bronfenbrenner & Vasta, 1992) R-R settings (the linking of two physical or 'real' places). They explore the intersection of real (R) (place-based) and virtual (V) (cyber-based) settings. In their recent article in the American Psychologist, Stokols and colleagues (2009) frame these social crossroads as R-V polyfunctional settings, a contemporary context that functions as a hybrid environment. For example, spaces once relegated to the private sphere (e.g., an apartment) can now host a rich interpersonal experience in technology-assisted social space. Furthermore, physical places of community such as parks, coffee shops, and libraries can now house complex social interaction with people who are completely removed from the physical setting. College residence halls represent a particularly interesting setting for exploring polyfunctional R-V settings. Traditional students entering college today do so with not only the continuing need for physical interaction with their peers, but also high levels of technological

literacy (Junco & Mastrodicasa, 2007). Thus, understanding the interplay of physical interaction and CTI may contribute to identifying how sense of community on campus is experienced.

This study explores important features of community experience among college undergraduates. The study first examines the physical and technology-based social interactions that drive a student's experience of SOC. The study then investigates the experience of SOC as a predictor for various attitudes and behaviors related to college alcohol use. The latter examination adds the dimension of peer networks of close friends to better differentiate residence hall SOC from the impact of close friends, and investigates interactions between close friends and larger sense of community. What is gleaned from this study provides a relevant and timely contribution to how we understand community experience and emerging technologies, while addressing the persistent, complex range of experiences related to college alcohol use.

<div align="center">Literature Review</div>

This section reviews the current literature on the constructs relevant to the hypotheses being tested. First, the research on sense of community is reviewed, including studies specific to college undergraduates. Second, the literature on physical interaction and communication technology-based interaction (CTI) is examined as it may relate to SOC. Next, the literature on peer support for alcohol use is examined as it applies to college undergraduates. Research on the range of alcohol-related attitudes and behaviors is then discussed. The section concludes with a rationale for the present study.

Sense of Community

Sense of Community (SOC) is a central construct to the field of community psychology (McMillan & Chavis, 1986). Research on SOC over the past several decades has examined relationships between SOC and community-relevant behavior, such as social participation.

However, only a limited amount of research to date has concurrently explored behavioral interactions as they contribute to SOC and the attitudinal and behavior outcomes which stem from SOC. Several studies have underscored the relationship between SOC and social engagement. A recent study found SOC to be significantly related to an individual's level of civic participation in both community activism and volunteerism (Omoto, Snyder, & Sturmer, 2009). Other research has underscored the importance of a positive SOC in residential environments providing social support for healthy decisions around alcohol and drug use (Graham, et al., 2009; Olson, et al., 2003). Moreover, other research has linked SOC to larger issues of community engagement, such as voting in local elections (M. R. Anderson, 2009) and participation in block organizations (Chavis et al., 2002).

In recent years, SOC has been explored in interest-based communities occurring in both physical and online contexts (Obst, et al., 2002). In this study, participants' SOC did not vary in relation to the degree in which communication with other members was face-to-face or internet based. However, the data from this study was derived from participant reports in 1999, after the internet was well on its way but before the unfolding of the social networking phenomena that included sites such as Friendster, MySpace, Facebook, and the recently launched Google+. Another study relevant to SOC and the role of the internet found that elderly people reported a higher sense of online community with increased internet use, and did not report any decrease in their face-to-face community involvement due to time spent online (Sum, Mathews, Pourghasem, & Hughes, 2009). Finally, use of online community spaces among people with physical disabilities has been positively linked to personal relations and personal growth (Obst & Stafurik, 2010).

A modest body of research exists regarding SOC among college populations. A notable feature of this work has been the exploration of how SOC relates to students' engagement in campus life. Pretty (1990) examined the relationship between SOC and several dimensions of the university residence environment, and found campus involvement, academic achievement, and sense of support to be positively related to SOC. Another study found students who resided on-campus, were members of a fraternity or sorority, or were female reported higher rates of SOC than their counterparts (Lounsbury & DeNeui, 1995). In a longitudinal study of students across a single academic year, their level of participation affected their SOC, in that students who engage in campus activities throughout the year reported higher SOC at the end of the year (DeNeui, 2003).

Regarding academic performance, one study of college students found that those reporting higher SOC indicated lower rates of student burnout (McCarthy, Pretty, & Catano, 1990). SOC has also been employed to predict specific achievement goal orientations related to academic success among college students (Yasuda, 2009). Among youth, longitudinal research has further suggested that positive SOC may predict improved academic outcomes (Solomon, Watson, Battistich, & Schaps, 1996).

SOC has been discussed as both an antecedent (Chavis & Wandersman, 1990) and an outcome (Hughey, Speer, & Peterson, 1999) of social participation. How SOC is conceptualized can vary in its sequential placement depending on the model being tested and the context in which the constructs operate. Three examples illustrate the way SOC can exist as an outcome. First, a variable can logically precede SOC in chronology. Obst and White (2007) surveyed individuals at a single time point on their SOC and the degree of choice they felt they had in joining the specific community, and found support for higher SOC among groups whose

members reported a higher degree of choice. Second, variables that chronologically precede

SOC have been tested as predictors, such as adult self reports of having grown up with siblings

(Davidson, Cotter, & Stovall, 1991). Lastly, longitudinal studies have tested causal models, such

as the study which surveyed first-year students at the beginning and end of the school year, and

found social participation during the academic year enhanced SOC at year's end (DeNeui, 2003).

Other models have explored SOC as a predictor. Theoretical models have been tested

suggesting that positive SOC among college students may assist in preventing student burnout

(McCarthy, et al., 1990) and increased SOC can serve as a catalyst for block group participation

(Chavis & Wandersman, 1990).   A longitudinal study of SOC in elementary school found SOC

significantly predicted both empathy and the appreciation of one's school (Solomon, et al.,

1996).

Sarason's seminal work on SOC, <u>The Psychological Sense of Community: Prospects for</u>

<u>a Community Psychology</u> (1974) and the early efforts of others (Glynn, 1981) include

explanations of what constitutes SOC. Within the current literature, McMillan and Chavis

(1986) have offered the most widely cited, four-factor theoretical structure comprised of 1) group

membership, 2) needs fulfillment, 3) influence, and 4) emotional connection. This framework

provides theoretical grounding for the Sense of Community Index (Perkins et al., 1990). While

other SOC frameworks have been proposed and researched (Bishop et al., 1997; Lounsbury &

DeNeui, 1995), the Sense of Community Index (or some derivative of it) has been the most

widely used measure of SOC cited in the literature.

The four-factor model has been the subject of some debate. Several studies have

attempted to establish SOC subcategories using confirmatory factor analysis (Long & Perkins,

2003; Obst & White, 2004) Conclusions of how to proceed from these studies have ranged from

abandoning the four-factor model (Long & Perkins, 2003), collapsing needs fulfillment and

group membership to create a three-factor model (Proescholdbell, Roosa, & Nemeroff, 2006),

and treating SOC as a unidimensional construct (Chipuer & Pretty,1999).

Amidst the these varied and at times contradictory explorations of what factors, if any,

comprise SOC, Peterson, Speer, and McMillan (2007) have offered a new measure of SOC that

is theoretically and psychometrically grounded in the four-factor model. The authors used

confirmatory factor analysis to test for first- and second-order models of the Brief Sense of

Community Scale, an 8-item SOC measure that includes 4 two-item subscales. Good fit was

found for the four-factor McMillan and Chavis (1986) model, with the factors also representing

one underlying SOC construct. Furthermore, the study measured the instrument's construct

validity and found the scale to be correlated as hypothesized with the variables of community

participation, empowerment, and mental health scores. Thus, Peterson et al.'s Brief Sense of

Community Scale (2008) offers strong theoretical and psychometric grounding as a measure of

overall SOC. Most relevant to the wider analyses explored here, the unified SOC construct has

been found to be a relevant predictor of undergraduate experience (Peterson, et al., 2008).

<u>Communication Technology-based Interaction</u>

Recent research has underscored the overall high level of competency among emerging

adults entering college today in their use of communication technologies (Junco &

Mastrodicasa, 2007). Relevant here is the way that students partake in communication

technology-based interaction (CTI). For example, a recent study of 39 institutions of higher

education involving over 10,000 students found that, among college students, 85% use text

messaging and 87% online social networking on a weekly basis or more (ECAR, 2009).

A burgeoning new area relevant to campus life has been the online creation of social networking groups 'on' campus (that is, consisting of students at the same university). Student affairs departments have underscored the importance of these informal online groups for a host of issues related to the campus experience, from recruitment efforts to university crisis response protocols (Student Affairs Leadership Council, 2009). Online social networking serves as an important frontier for how we understand community experience, and the avenues of how individuals connect with others within their social milieu. Amidst the rapidly expanding literature on the role of CTI on campus health, new ways of thinking about online social interaction have emerged. In their extensive qualitative study of undergraduate students' use of Facebook and integration into campus culture, Martinez, Aleman and Wartman (2009) suggest that, for purposes of communication among undergraduates, distinctions between the 'real' and 'virtual' contexts of some R-V mesosystems (Stokols, et al., 2009) may not be so clear. Rather, the technology-based space provided by online social networking may exist simply as an important new communicative structure in how a seamless community experience exists.

Potential negative effects of the use of CTI have been examined. Thomée, Eklöf, Gustafsson, Nilsson, and Hagberg, (2007) studied the experiences of 1,127 Swedish college students and found that, for women, mobile phone use, text messaging, and online chatting were each positively related to prolonged stress. E-mailing and online chatting were also associated with depression. For men, the study found that cell phone use (calling and text messaging) was positively related to sleep disturbance. However, the causal relationships between these findings are not clear. For example, overuse of online communication such as email may contribute to social isolation on campus, or it may be that students experiencing depression may utilize e-mail to address feelings of isolation.

Other studies have demonstrated positive effects of CTI among college students. Contrary to finding evidence for a linkage of increased CTI and negative mental health problems, (Morgan & Cotten, 2003) found increased CTI via e-mail, chatrooms, and instant messaging to be associated with fewer symptoms of depression. Notably, this pattern was reversed for the utilization of communication technology when not related to social interaction, such as online shopping and non-interactive gaming; increased use was associated with increased symptoms of depression for these activities. In addition, a study of instant messaging use found that students who frequently communicated with fellow students using instant-messaging also reported a higher sense of campus community (Thomas, 2010). Similarly, students who use Facebook frequently report lower levels of loneliness than students who use the social networking site less frequently (Lou, 2010).

The way in which college students use emerging communication technologies is rapidly changing. Amidst the nascent literature on CTI among students, there exists contrasting evidence on the possible impacts on college students. In light of this, researchers have called for further study into the relationship between CTI, community experience, and student wellness (Timm & Junco, 2008).

Face-to-Face Interaction.

Despite the many new opportunities for CTI, the significance of face-to-face interaction with others remains. Routine physical interaction between people living in close proximity, or neighboring, has been the subject of substantial study (Buckner, 1988). In contrast to SOC, which emphasizes the affective sense of connection with others, neighboring consists of specific behaviors related to social interaction and the behavioral supportive actions between people living in close proximity to one another (Unger & Wandersman, 1985). There is research to

support the notion that neighboring behavior positively contributes to sense of community. Farrell, Aubry, and Coulombe (2004) surveyed over 300 community residents and found that increased neighboring behavior did not promote well-being, but did predict an increased SOC which in turn promoted well-being. Thus, it can be argued that the behavioral nature of neighboring may generate the affective experience of SOC, which in turn may have predictive utility regarding wellness issues such as attitudes and behaviors related to alcohol.

Peer Support for Alcohol Use.

In addition to SOC, smaller groups of close friends may influence a student's attitudes and behaviors around alcohol use. While no studies to date have explored the broader social construct of SOC and alcohol use, a substantial body of research has established the link between peer support and student alcohol consumption.

It is useful to differentiate both SOC and peer support from the related strategy of social norms marketing. Like SOC on campus, social norms marketing is a broad, population-based phenomenon. Social norms marketing (Berkowitz, 2003) is an intervention strategy popular on some college campuses during the past decade. The approach is based on the notion that most students overestimate the amount of alcohol that other students at their school consume and, as a corollary, are more likely to drink larger amounts as a result of this misperception. Typically, social norms-based interventions include the collection of actual data on student use and dissemination of this information to the student body via social marketing campaigns and other methods. However, research on social norms-based interventions has been mixed, with some research directly challenging its effectiveness (DeJong et al., 2009; Thombs, et al., 2005). A clearer story emerges from the research on the norms of close peers as they relate to student attitudes and behaviors around alcohol.

A wide body of literature exists for the role of peer norms on various undergraduate behaviors, and in particular on alcohol use (Borsari, 2001; Bosari, 2007; Wood, et al., 2001). Compared to general identification with a particular demographic group of students on campus, proximal (i.e., close) friends have been found to be better predictors in the attitudes and behaviors of students regarding alcohol use (LaBrie, Hummer, Neighbors, & Larimer, 2010). Peer norms among close friends can be divided into injunctive and descriptive norms. Injunctive norms refer to the target group's level of acceptance for drinking-related behaviors. Descriptive norms refer to how often people in the target group use alcohol. Both norms have been demonstrated to impact an individual's drinking behavior (Thombs, 2005). The limited number of studies that combine both descriptive and injunctive norms have found some differences in the role of each. Neighbors et al. (2008) reported that perceived descriptive norms for a typical student (at the university where the study was conducted) were related to individual students' alcohol use, but injunctive norms of a typical student were not. A longitudinal study of students referred for alcohol violations found that perceptions of descriptive, but not injunctive norms predicted alcohol use (Carey, Henson, Carey, & Maisto, 2010). However, injunctive norms have been found to mediate the impact of personal autonomy on alcohol use, with students reporting lower rates of alcohol use except when peer injunctive norms are high, that is, highly approving of alcohol use (Chawla, Neighbors, Logan, Lewis, & Fossos, 2009).

Injunctive and descriptive peer norms are closely linked conceptually. Not surprisingly, this link can create high correlations between the two. As an example, one study found a brief intervention aimed at addressing injunctive norms to have an effect on both injunctive and descriptive norms (Prince & Carey, 2010).

Research on peer support for alcohol use among college students has underscored the additional influence of gender-specific support and norms among close friends (Lewis, 2007; Thombs, 2005). At many universities, males have been shown to drink both larger quantities of alcohol and more frequently compared to females (O'Malley & Johnston, 2002). Moreover, gender-matched norms have been demonstrated to have a stronger predictive power than peer norms that are not gender specific (Korcuska & Thombs, 2003).

Huang et al. (2009) found that students who abstain entirely from alcohol use reported lower peer support for alcohol use than did students who drink alcohol. This finding parallels a separate, conceptually linked body of literature on peer support among persons in recovery; in general, peer support for abstinence supports sobriety where peer support for alcohol use predicts relapse (Groh, Jason, & Keys, 2009).

Alcohol-related Attitudes and Behaviors among College Students

While relatively common, alcohol use on college campuses can contribute to serious public health problems, including physical assault (Hingson, et al., 2005), unintentional injury (Saltz, 2004), attrition (Anderson & Gadaleto, 2001), rape and sexual assault (Cole, 2006), and drunk driving (Saltz, 2004). The U.S. Department of Health and Human Services (2007) cites the highest prevalence of alcohol dependence to be among young adults aged 18-20 years, many of whom are college students.

Within the substantial body of research on college alcohol use, current trends have pointed to the need for an ecological approach (NIAAA, 2002; Wechsler & Nelson, 2008). However, few studies have explored the specific role of a student's connection to his/her residential community (Toomey, Lenk, & Wagenaar, 2007). Of the current studies rates of alcohol use have been compared between students who do/do not live in a Greek residential

setting (Wechsler, Kuo, Lee, & Dowdall, 2000) or who do/do not live on campus (O'Hare, 1990).

No research has examined alcohol-related attitudes and behaviors specific to the residential

community. Moreover, research has not included the combination of the role of peer norms and

sense of community within halls. Research indicating that sense of community can positively

predict student wellness issues (McCarthy, et al., 1990; Solomon, et al., 1996), combined with

the peer norms literature on alcohol use, support the need for a combined approach in predicting

alcohol-related attitudes and behaviors that includes examining possible interaction effects.

<center>Rationale</center>

This study explored the role that SOC plays within undergraduate residential halls in the

experiences of emerging adults in their years in college, with particular focus on their attitudes

and behaviors regarding alcohol use in and outside of their halls. The study adds complexity by

examining how physical and communication technology based interaction with residence hall

members relate to SOC, and by differentiating the broad experience of residence hall SOC from

the influence of specific peer networks of close friends of the same sex. While a substantial

body of research exists linking SOC to social participation, no studies to date have addressed the

role of SOC in predicting attitudes and behaviors related to college alcohol use. It was therefore

useful to examine whether or not SOC influenced a range of attitudes and behaviors related to

alcohol use, factoring in the geographic space in which community is defined (i.e., those living

in a particular residential hall).

The study first addressed the role of physical and communication technology based

interactions in contributing to SOC within one's residence hall. Obst, Smith, & Zinkiewicz's

(2002) work on exploring SOC among online communities raises important questions about how

online communication structures contribute to community experience. With the increased use of

online social networking, text messaging, video chatting, and other communication media in recent years, the emerging literature on the value of such media to facilitate social interaction, particularly when combined with physical interaction, warranted further exploration.

SOC has been discussed as "both an individual-level intrapsychic and a group-level social climate construct" (Long & Perkins, 2003). A strength of the current study is that it provided a richer understanding of the social fabric of students' residence hall experiences by examining what contributes to SOC, differentiating SOC from the influence of close peer networks. In regards to peer support, both injunctive and descriptive peer norms were considered, paralleling prior research which has at times found differences in the predictive power of the two. As the current study examined the community experience of students living in residence halls, it was both conceptually useful and empirically relevant to include the role of close, same-sex peers.

From here, the study explored the meaning of student connection with others in their hall as it related to attitudes and behaviors around alcohol, both in general and specific to residence hall functioning. Problematic alcohol use by college students has proven a near ineradicable quandary for university administrators and others concerned with student wellness. However, various public health approaches have shown some success in reducing negative outcomes. It is important to explore a range of alcohol-related attitudes and behaviors as they relate to the overall college experience. This study offers a new frame for considering community experience among college undergraduates, in that it explores not only general alcohol use, but also a set of attitudes and behaviors specific to the residential hall experience. While SOC in a residential hall may not buffer against general use, a strong SOC within a hall may indicate a greater

willingness to take part in residential hall programming when alcohol is not involved, greater support of hall policies on alcohol, and decreased use of alcohol in the halls themselves.

The study's aim was to generate new theoretical implications for the way physical interaction and CTI relate to SOC, while contributing knowledge to the roles that injunctive and descriptive peer norms play.   Findings from the project may help understand what avenues can best serve university administration in addressing problematic student alcohol use, assisting residence hall administrators, researchers and others working to promote student health on campus, as well as students themselves.

<center>Statement of Hypotheses</center>

The hypotheses explored in this study were as follows:

Hypothesis 1. Interaction between students in the residence halls is positively related to sense of community.

> Hypothesis 1a. Face-to-face interaction is positively related to sense of community.
>
> Hypothesis 1b. Communication Technology-based interaction is positively and distinctively related to sense of community.

Hypothesis 2. Compared to sense of community in the residence hall, peer norms for drinking are more strongly related to general alcohol use.

> Hypothesis 2a. Compared to sense of community in the residence hall, injunctive peer approval norms for drinking are more strongly related to general alcohol use.
>
> Hypothesis 2b. Compared to sense of community in the residence hall, descriptive peer norms around drinking are more strongly related to general alcohol use.

Hypothesis 3. Sense of community and peer norms are independently related to attitudes toward alcohol-free residence hall social programming, with peer norms for alcohol use moderating the

relationship between sense of community in the residence halls and attitudes toward alcohol-free residence hall social programming.

Hypothesis 3a. SOC is related to attitudes toward alcohol-free residence hall social programming, such that SOC is positively related to interest in attending programs.

Hypothesis 3b. Peer norms (injunctive) are related to attitudes toward alcohol-free residence hall social programming , such that norms are inversely related to interest in attending programs.

Hypothesis 3c. Peer norms (descriptive) are related to attitudes toward alcohol-free residence hall social programming , such that norms are inversely related to interest in attending programs.

Hypothesis 3d. Sense of community is positively related to attitudes toward alcohol-free residence hall social programming when injunctive peer norms are disapproving of drinking (viz., low approval norms), and not related to attitudes toward alcohol-free residence hall social programming when injunctive peer norms are approving of drinking (viz., high approval norms).

Hypothesis 3e. Sense of community is positively related to attitudes toward alcohol-free residence hall social programming when descriptive peer norms around drinking are low (viz. disapproving of drinking) and not related to attitudes toward alcohol-free residence hall social programming when descriptive peer norms around drinking are high (viz. approving of drinking).

Hypothesis 4. SOC and peer norms are independently related to attitudes toward alcohol-specific residence hall policies, with peer norms for alcohol use moderating the relationship

between sense of community in the residence halls and attitudes toward alcohol-specific
residence hall policies.

Hypothesis 4a. SOC is related to attitudes toward alcohol-specific residence hall policies,
such that SOC is related to support of policies that discourage alcohol use.

Hypothesis 4b. Peer norms (injunctive) are related to attitudes toward alcohol-specific
residence hall policies such that norms are related to opposition of policies that
discourage alcohol use.

Hypothesis 4c. Peer norms (descriptive) are related to attitudes toward alcohol-specific
residence hall policies such that norms are related to opposition of policies that
discourage alcohol use.

Hypothesis 4d. SOC is positively related to attitudes toward alcohol-specific residence
hall policies when injunctive peer norms are disapproving of drinking (viz., low approval
norms), and not related to attitudes toward alcohol-specific residence hall policies when
injunctive peer norms are approving of drinking (viz., high approval norms).

Hypothesis 4e. SOC is positively related to attitudes toward alcohol-specific residence
hall policies when descriptive peer norms around drinking are low and not related to
attitudes toward alcohol-specific residence hall policies when descriptive peer norms
around drinking are high.

norms).

Hypothesis 5. Peer norms for alcohol use moderate the relationship between residence hall sense
of community and alcohol use in the residence hall.

Hypothesis 5a. Sense of community is inversely related to alcohol use in the residence
hall when injunctive peer norms are disapproving of drinking (viz., low approval norms),

and not related to alcohol use in the residence hall when injunctive peer norms are

approving of drinking (viz., high approval norms).

Hypothesis 5b. Sense of community is negatively related to alcohol use in the residence

hall when descriptive peer norms around drinking are low and not related to alcohol use

in the residence hall when descriptive peer norms around drinking are high.

CHAPTER II

METHOD

Research Participants

Participants for this study were derived from a larger survey project conducted by the department of residential education at the university in which the study is based. The complete survey instrument can be found in Appendix A. Following data cleaning, the final data set consisted of 1003 college undergraduates residing in on-campus residence halls at a large, urban, private university in the U.S. Midwest. The response rate for the survey represented 41% of the total number of students residing in the residence halls at the time of the survey ($N = 2,451$). Residence halls ranged in size from 94 to 333 students, and representation from each of the residence halls ranged from 25.53% (24 of 94) to 72.56% (156 of 215) of each hall's population. Demographic information of gender, race/ethnicity, academic year, work status, and estimated GPA were collected and are reported in Table 2.1.

Table 2.1. Sample Demographics

Gender (*n* = 998)	Female	67% (671)
	Male	32% (322)
	Transgender	>1% (3)[1]
	Other	>1%(2)[1]
Race/Ethnicity (*n* = 985)	European-American (White/Caucasian)	70% (691)
	Latino/a	8% (75)
	Multiracial	8% (79)
	Other	2% (18)
	African-American (Black)	5% (50)
	Asian-American/Pacific Islander	7% (68)
	American Indian/Alaskan Native	0.4% (4)[1]
Academic Year (*n* = 990)	Year 1 (Freshman)	72% (717)
	Sophomore	20% (195)
	Junior	6% (57)[2]
	Senior	2% (21)[2]
Work Status (*n* = 986)	Not working	66% (648)
	Working part-time, on campus	16% (154)
	Working part-time, off campus	17% (172)
	Working full-time	1% (12)[1]
Estimated GPA (*n* = 979)		Mean=3.44 (SD=.43)[3]

Note: *n*'s for each variable vary slightly based on missing data for each variable.
[1] Not included in analyses due to low *n*.
[2] Juniors and seniors were combined into a single "Upperclassmen" category (*n* = 78)
[3] A=4.0, F = 0.0.

Of the total undergraduate student population of the university, approximately 16% reside

in the halls. In order to be included in the study, students were required to be living in a

residence hall and enrolled in the university at the time of the study (a two-week period during

February 2010). Taking part in the survey required online access via computer (available to all

students), an iPhone/iTouch, or a Blackberry.

<u>Measures</u>

The primary data source for this study was an online survey conducted as part of an initiative through the department of residential education at the university in which the project took place. A version of the survey had been used twice in previous years. The survey instrument used here included both original items from this survey and additional measures to assess the variables of interest in the present study. As part of the survey development, drafts of the survey were piloted for content and online data management. Content reviewers of the survey included 5 undergraduates living in the residence halls, 3 resident hall directors, 2 faculty members, the director of a residential education department at the university, and 3 doctoral students in community psychology familiar with survey design. In addition, four undergraduates living in the halls and one residence director completed the entire survey in order to pilot the online survey interface for each item and to test the system for exporting the data from the web platform into SPSS 17.0.0.

The survey was constructed using *Qualtrics.com*, an online survey resource. Technological support staff was consulted during the item design process. Best practice online survey construction was reviewed and applied. For example, text boxes on open-ended items were created to incorporate prior research suggesting that adequately-sized text boxes can enhance the quality of responses, especially for late responders (Smyth, Dillman, Christian, & McBride, 2009). Survey layout and item format were selected and tested to ensure compatibility across computer, iPhone/iTouch, and Blackberry web interfaces. Furthermore, the web address that transferred participants to a new raffle webpage upon completion of the survey was tested to ensure that the survey data was completely anonymous and unlinked to the raffle data.

Sense of community. SOC was measured using the 8-item Brief Sense of Community Scale (Peterson, et al., 2008). Given the substantial discourse in the field regarding contemporary measurement of SOC (Stevens, 2011), the most common measures were reviewed in light of our need for a brief measure of SOC as a unified construct. The Brief Sense of Community Scale was selected from other sense of community measures found in the literature because of its relatively strong theoretical, empirical, and psychometric base, as well as its brevity in light of the larger student survey. Note that our hypotheses focused on the unified construct of SOC; this focus eschews legitimate arguments in the literature that the Brief Sense of Community Scale's four 2-item subscales consist of too few items to be statistically meaningful (Stevens, 2011). Wording of the 8 items was altered to reference 'hall/university apt community (UAC)' instead of the original 'neighborhood' term. The term 'UAC' or university apartment communities refers to housing provided by the residential education department and constituting smaller, apartment-sized housing structures that are grouped under one name. Also, to avoid neutral responses, the 5-point Likert range was replaced by a 6-point range of: strongly disagree (1), disagree (2), mildly disagree (3), mildly agree (4), agree (5), and strongly agree (6). The authors of the original, 5-point scale report an overall Cronbach's alpha of .92. Internal consistency for the present sample was an identical .92. Removing the lowest correlated item (in relation to the other items) did not meaningfully change the internal consistency of the remaining 7 items.

Peer support. Items on peer support for drinking assessed both injunctive and descriptive peer norms. Injunctive norms were assessed using an adapted version of four items from Baer's (1994). The four items are prefaced by the stem "How would your close friends of your gender (i.e., male friends for men, female friends for women) respond if they knew…". The four items

consisted of "you drank alcohol every weekend", "you drank alcohol daily", "you drove a car after drinking", "you drank enough alcohol to pass out". Language was adapted to reflect research suggesting the stronger influence of same-sex close friends on drinking (Korcuska & Thombs, 2003; Thombs, et al., 2005). Specifically, "friends" was changed to "friends of your gender (i.e., male friends for men, female friends for women)". Second, the range of responses was changed from 7 to 6 response options to avoid neutral responses. The six response categories ranged from: strongly disapprove (1), disapprove (2), mildly disapprove (3), mildly approve (4), approve (5), to strongly approve (6). Recent application of the four items found internal consistency to be .71 (Cail & LaBrie, 2010). Internal consistency for the modified items for the present sample yielded a satisfactory aggregate statistic of .78. The four items were therefore totaled into a single injunctive peer norms score.

Descriptive items were derived from an adapted set of three questions from the Drinking Norms Rating Form (Baer, Stacy, & Larimer, 1991; Neighbors et al., 2008; Turrisi, Mastroleo, Mallett, Larimer, & Kilmer, 2007). Similar to the injunctive items, language was changed to target same-sex peers. After clarifying close same-sex peers, the following questions were asked of students: (1) "How many of your close friends drink alcohol?" (2) "How many of your friends get drunk on a regular basis (at least once a month)?" and (3) "How many of your close friends drink primarily to get drunk?" Items from the measure are scored on a 5-point scale ranging from 0 (none) to 4 (nearly all). Wood et al. (Wood, et al., 2001) reported coefficient alpha scores of .79. Internal consistency for the present sample was .91 , constituting an acceptable level.

Face-to-face interaction with students from hall. To assess the frequency of face-to-face interaction of students in the residence halls, we began by utilizing adapted items on the Neighboring subscale of the Neighborhood Cohesion Instrument (Buckner, 1988). These items

included "I visit with my neighbors in their homes", "I rarely have neighbors over to my house to visit", and "I borrow things and exchange favors with my neighbors". For the first two items, 'homes' was changed to 'rooms' to reflect the structure of the residence halls. While this three-item subscale of the Neighborhood Cohesion Instrument provided an acceptable set of questions regarding face-to-face interactions, to strengthen the content validity of the face-to-face variable, the researchers consulted with 3 residence directors regarding the way that students from the halls interact. Two additional scenarios were identified, namely interactions in residence hall common spaces and the experience of going out to dinner. The university functions with a central student center cafeteria; in addition, students frequently dine together at local privately owned restaurants. Thus, the two items of "I spend a lot of time talking with people in the common spaces (lounge, kitchen, lobby, etc.) of my hall/UAC" and "When I have dinner, it's usually with people from my residence hall/UAC" were added. Response options were on a 6-point scale ranging from "strongly disagree" to "strongly agree". Internal consistency of the three neighboring subscale items of the Neighborhood Cohesion Instrument has been reported as .73 (Wilkinson, 2007. For neighboring items, Cronbach's alpha for both the original 3 items from the Neighborhood Cohesion Instrument (Buckner, 1988) and the 5 (total including the 2 new items) were examined. For the present sample, internal consistency for Buckner's original three adapted items was .80, and for the set of five items .88. While adding items to a scale will mathematically inflate the alpha score somewhat (Kopalle & Lehmann, 1997), it should be noted that the inter-item correlations between the added variables and the original three variables were within the range of inter-item correlations for the three original items (r's = .45-.76), with only one added item-original item correlation slightly below ($r = .41$). Thus, it appears the new

variables added to the construct measurement of face-to-face interaction among students living in residence halls, at least for this particular university.

Communication Technology-based Interaction with students from hall. The amount of communication technology-based interaction (CTI) with fellow residential hall students was measured by a set of items. These items began by asking, "On a typical day, about how much time do you spend communicating with students who reside in your residence hall/university apartment community using the following?" Participants were then asked to respond to a list of communication technology media.

An initial list of communication technologies was developed based on review of similar contemporary studies of CTI among college students (Ellison, Steinfield, & Lampe, 2007; Subrahmanyam, Reich, Waechter, & Espinoza, 2008; Valenzuela, Park, & Kee, 2009). The list was then reviewed for completeness and relevance by one faculty member, the department of residential education director, an information technology specialist at the department of residential education, a clinical psychologist at a university counseling center, three graduate students, three residence directors, and five undergraduate residence assistants living in the halls. The final set of communication technology media included talking on the phone (including audio Skype without video), texting via phone (SMS), email, Facebook (non-IM), Twitter, Demon Direct, blogs, instant messaging (e.g., AIM, Yahoo, Facebook chat), video messaging (e.g, Skype with video), and online gaming (e.g., Second Life or other online gaming interface).

Participants responded along the following response categories regarding the amount of time spent per day: 1) No time at all, 2) less than 10 min, 3) 10-30 min, 4) More than 30 min, up to 1 hour, 5) more than 1 hour, up to 2 hours, and 6) more than 2 hours. This range was used in previous research, which included a seventh category of "more than 3 hrs" (Valenzuela, et al.,

2009). Since prior research found the percentage of students in this category to be very low, it was collapsed into "more than 2 hours", for both conceptual and statistical simplicity. For uniformity and comparability, the same range was applied to each item in the entire list of communication technologies.

Initial review of the data found that very few students reported the use of Demon Direct, a university online resource that was in the process of being phased out of use. In addition, blogging and online gaming were seldom used by students. These communication technology types were thus excluded from the total technology-based score, resulting in a total score consisting of 8 items with a response range from 1-5 each, for a total scale range of 8-40. It was not expected that these values would necessarily correlate in an alpha statistic; the purpose was to quantify total amount of time spent interacting with fellow residence hall students via communication technology-based mediums.

Frequency of alcohol use. General alcohol use variables included the frequency of use and number of binge drinking episodes. Frequency of use was measured by an alcohol item that asked "Since September 2009, how often have you used the following? [alcohol]". Response ranges included no use, once in the past 3 months, once a month, twice a month, once a week, 3 times a week, and 5 times a week or more. The survey was conducted during the second half of February, students were being asked by the item to report their average use since approximately the beginning of the academic school year.

Binge drinking episodes. Number of binge drinking episodes was measured by a single item, "In the past two weeks, how many times have you had: (If female, four or more standard drinks in one setting?/If male, five or more standard drinks in one setting?)". This item was derived from previous research defining the 4/5 criteria as binge drinking and utilized widely

(McCabe, 2006; Wechsler, 2003). While this measure has received considerable support, it should be noted that it has also been the source of some debate (Cranford, McCabe, & Boyd, 2006). Specifically, it has been critiqued as not having time constraints in the term "one setting". Functionally, the item is a relevant measurement of concentrated drinking during a specific situation, although in some cases the term 'binge' may be inappropriate (e.g., a woman drinking 4 alcoholic drinks during a 6-hour wedding event). This critique may be particularly salient for undergraduate students, in that many, if not most, of their social experiences may involve settings where alcohol is available.

     Support for residence hall programming. In addition to general questions about alcohol use, the survey included alcohol-related items assessing attitudes and behaviors specific to residence hall programming and policies. The first set of questions assessed support for residence hall programming. Programming questions asked about participant interest in attending: 1) a workshop in their hall on alcohol/drug use on campus, 2) an alcohol-free social event with students from their hall, and 3) a workshop in their hall on dating, relationships, and sex. Students indicated their level of interest on a six-point scale of not at all likely, unlikely, somewhat unlikely, somewhat likely, likely, and highly likely. These items were generated in collaboration with the department of residential education, and had not been standardized elsewhere. For this study, coefficient alpha was found to be .74 for the three residence hall programming items. Inter-item correlations ranged from .40 (a workshop in their hall on alcohol/drug use and an alcohol-free social event with students from their hall) to .70 (a workshop in their hall on alcohol/drug use and a workshop in their hall on dating, relationships, and sex).

Support for residence hall policies. Items related to residence hall policies asked students to report their level of support for the following residence hall administrative actions: 1) provide students with information on healthy choices about alcohol and drugs, 2) hold hosts responsible for problems with people drinking in their residence hall/apt. rooms, and 3) hold students accountable who regularly violate rules around noise during quiet hours. Response options ranged from strongly oppose to strongly support on a 6-point scale. Similar to the programming items, policy items were generated as part of the residential education project and as such did not have established psychometrics. Internal consistency was calculated for the three residence hall policy items and found to be .70. Inter-item correlations ranged from .39 (provide students with information and hold hosts responsible for problems) to .62 (hold students responsible who regularly violate rules around noise and problems and hold hosts responsible for problems). Removing the lowest correlated item (in relation to the other items) did not meaningfully change the internal consistency, so all of the items were included in the measure.

Use of alcohol in one's own residence hall. In addition to programming and policy questions, alcohol-related behaviors specific to the residence halls were assessed. These included three items. The first item was a two-part question that asks "Since September 2009, have you consumed alcohol in your residence hall/apt.?" (yes/no). If a participant answered "yes", he or she was then asked "If yes, approximately how often did you drink alcohol in your residence hall/apt. since September 2009?" Response options ranged from 1-3 times since September 2009, once a month, twice a month, or once a week. These four responses of the second part of the question were combined with a fifth 'never' category (assigned to those who answered 'no' to the first part of the question) to create a single, 5-point scale item.

Other control variables considered for alcohol attitudes and behaviors. Outcome expectancies for alcohol have been discussed in terms of both negative and positive outcomes (Burke & Stephens, 1999). While research focused on exploring outcome expectancies have employed measures consisting of many items and expectancy subscales (Leigh & Stacy, 1993), there is precedence for use of single-item measures. An item for negative expectancy outcomes has been used previously by Sun and colleagues (2003), and formed the basis for two items measuring negative and positive outcome expectancies in this study. The final question asked, "How much do you think people risk harming themselves (socially, emotionally, or physically) if they have five or more drinks in one setting?", with a four-response range including no risk, slight risk ,moderate risk, and substantial risk. This range was used by Sun et al. (2003). The item wording was modified slightly to include social and emotional outcomes to the physical outcome example. This modification was done to reflect the major categories for outcome expectancies found in more comprehensive measures (Leigh & Stacy, 1993). Such measures were not feasible due to the need for brevity in assessing the control variables. A second question was created using identical wording and response range, but replaced ' risk harming themselves' with the word 'benefit'. Ultimately, once data had been collected, outcome expectancies items were highly correlated with injunctive and descriptive peer norms (|.29-.40|). It was decided not to use outcome expectancies as a control variable, keeping the focus of the hypothesis on peer norms and their impact.

Procedure

Participants were recruited to take part in the online survey during the second half of February 2010 (16 days total). The procedure for recruitment was as follows. First, the department of residential education at the university sent an announcement via email to all

students living in the residence halls. Second, residence directors from each hall were instructed

to post the announcement with the survey link onto their Facebook hall pages. Third, during the

16-day period the directors and residential assistants (junior students who reside on and assist in

monitoring each floor) made a concerted effort to promote participation in their hall via 1-to-1

communication with students on the floor and in the lobby area, as well as via an advertisement

poster hung in the hall lobby. Fourth, additional email reminders were sent three times by the

residence hall director at strategic points during the 16-day period (including subsequent posting

of the email announcement on residence hall Facebook groups) to maximize survey response, as

informed by (Dillman, 2007).

This approach addresses research suggesting that a significant minority of students rarely

or never access their university email accounts (Junco & Mastrodicasa, 2007). In addition to

utilizing Facebook group pages and face-to-face promotion, the residential department's master

email list of students was structured such that students could change their primary email from

their university account to the address that they prefer (e.g., their personal accounts already in

use when they arrive on campus).

As an additional best practice measure, the survey was conducted in mid- to late-

February, at a time where the past two weeks (relevant to the binge drinking item) did not

coincide with any major academic year event that would potentially distort survey responses.

Prior research has demonstrated that college drinking rates vary based on proximity to the start

of the semester (low use), academic breaks (high use), and unique university events (e.g.,

Homecoming—high use) with blocks of weeks not including any of these features better

representing typical use for a given academic year (Greenbaum, Del Boca, Darkes, Wang, &

Goldman, 2005; Neighbors et al., 2011). The timing of the survey administration was therefore

chosen during a period that did not include any university breaks or unique university events that might indicate abnormally high or low alcohol use. Residence hall directors were consulted regarding the significance of Valentine's Day weekend, and indicated that it did not coincide with any large university events where alcohol is available or increased frequency of parties, compared to a typical weekend.

The survey was entirely anonymous, with no identifying information collected other than the demographic items within the survey. Small raffle prizes were offered to students as an incentive, which included $25 and $15 gift cards to the university bookstore and Amazon.com. For the raffle, identifying information (student name, email and ID) was provided via a separate, a single-page Qualtrics survey that was unlinked to the survey database. The anonymous nature of the main survey responses, and the inability of the research team to link student responses to student raffle information, was stressed several times during recruitment and within the text of the main survey to better ensure student confidence that responses were indeed anonymous.

CHAPTER III

RESULTS

Introduction

This chapter is divided into three sections. First, the strategies conducted for data preparation are described. Next, the specific issue of working with data potentially nested by residence hall is considered. The last and most substantive section describes the results of the study, organized by hypothesis.

Data Preparation

The initial examination of the data addressed missing data and tests of regression assumptions pertinent to the statistical analyses.

Tests of Assumptions

Distributions of each variable were checked for univariate outliers, and none were found. This lack of outliers can be partially accounted for by the construction of response ranges reflected in the online survey options for the variables of interest. Skewness and kurtosis were statistically measured for each of the variables of interest. Values for skew and kurtosis fell within the acceptable range of relatively normal distribution ($< |2|$ standard deviations), with one exception. The distribution of the ICT-based interaction variable was found to be problematic (kurtosis $= 2.93$). To address this issue, a square root transformation was conducted, generating an improved and acceptable distribution (kurtosis $= .98$).

Next, the possibility of multicollinearity between predictor variables was examined. The correlations between predictor variables were examined and are reported in Table 3.1. Multicollinearity for hypotheses 2-5 did not appear to be a problem, as sense of community had low correlations with injunctive peer norms ($r = -.08$, $p < .05$) and descriptive peer norms ($r = -$

.05, $p > .05$). It was predetermined in the design of the hypotheses that the predictive utility of

injunctive and descriptive peer norms, which have a high correlation of .60 ($p < .01$), would be

examined in separate hierarchical regression models that each included sense of community and

control variables. One additional indication of multicollinearity was found regarding hypothesis

1; the correlation between predictor variables of face-to-face interaction and CTI was .43 ($p <$

.01). Similar to the design of hypotheses 2-5, it was decided to address this issue by running

separate analytic models for face-to-face interaction and CTI for hypothesis 1.

Table 3.1: Inter-correlations of independent variables

Variable	M	SD	1	2	3	4	5
1. Face-to-face interaction	17.96	7.30	-				
2. Technology-based interaction	3.68	.70	.43** (815)	-			
3. Sense of community	32.50	9.17	.66 ** (817)	.31** (789)	-		
4. Injunctive peer norms	9.18	3.58	.08* (837)	.03 (812)	-.08* (812)	-	
5. Descriptive peer norms	9.98	3.68	.10* (844)	.03 (821)	-.05 (818)	.60** (841)	-

N's listed in parentheses underneath each correlation statistic.

*$p < .05$, **$p < .01$

Lastly, the data was tested for homoscedasticity (the assumption that the dependent

variables display similar variance across different values of the predictor variables). To assess

this concern, the variances of the residuals on the predictors were explored using plots.

Homoscedasticity is represented by an envelope shape on the graph, of approximate even width

across the horizontal axis. When a fan- or cone-shaped distribution occurs, a Goldfield-Quandt

test (Goldfeld & Quandt, 1965) or similar analysis is warranted to determine if heteroscedasticity

is present. Graphs were created for each of the predictor variable residuals on the dependent

variables, indicating homoscedasticity with the exception of two plots: descriptive peer norms on

frequency of alcohol use and injunctive peer norms on support for residence hall programming.

Figures 3.1. and 3.2. both show a decrease in variability of residuals at the lower end of the x-

axis of each plot.

Figure 3.1. Residuals for descriptive peer norms on frequency of alcohol use

Scatterplot

Dependent Variable: 14. In the past two weeks, how many times have you had: ...
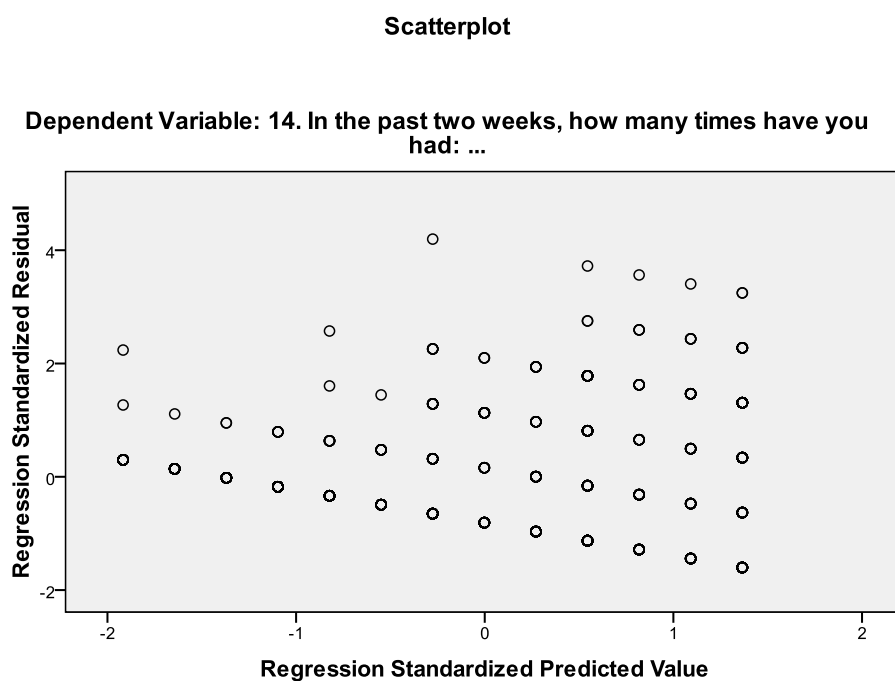
Figure 3.2. Residuals for injunctive peer norms on programming support

Scatterplot

Dependent Variable: Progamming support total (alc/drg, sex/dating, social event)
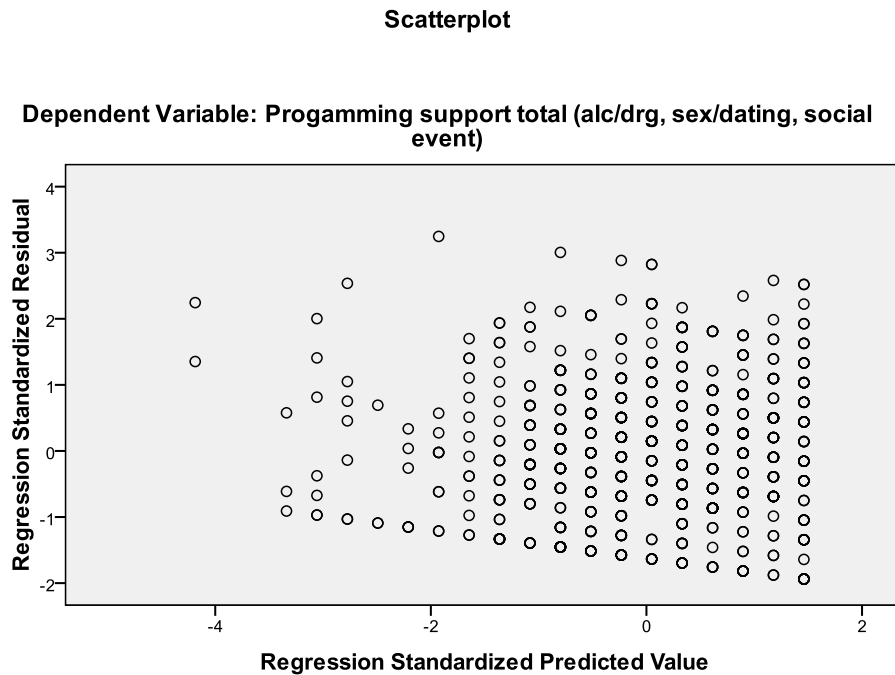
As each of these two plots may indicate violations of the assumption of homeoscedasticity, Goldfeld-Quandt tests were conducted for each. For this procedure, cases were divided by the bottom and top third scores for the dependent variable, and then computed the ratio of the residual sum of squares. Given that the range of scores was relatively narrow and the distributions normal, the actual percentage cutoff for high and low groups was slightly more than 33.3% (that is, the number of participants with the exact cutoff score exceeded the 33.3% cutoff). An F statistic was calculated, such that $F = SS_{hi}/SS_{lo}$. Degrees of freedom for the denominator and numerator were calculated using the equation $(N\text{-}m\text{-}2k)/2$, where N was the total number of cases, m the number of omitted cases, and k the total number of independent variables.

The test for descriptive peer norms on frequency of alcohol use was not significant,

($F(302, 285) = 73.49/52.74 = 1.39$, $p > .05$) indicating that heteroscedasticity was not an issue

for the data. Similarly, injunctive peer norms on support for residence hall programming was not

significant ($F(339, 324) = 3383.41/3036.66 = 1.11$, $p > .05$), suggesting that the potential

violations identified by the scatterplots were not extreme enough to be problematic.

<u>Missing Data</u>

As described in the Methods section, several strategies were employed in the

development of the survey to minimize data entry error and data loss. For example, set ranges

for possible entries were established and open-ended questions inquiring about numeric data

were not used for the variables of interest. In addition, the online system was tested to ensure

accurate transfer of data into SPSS 17.0.0.

As is the case with most survey research, some missing data occurred despite attempts to

minimize it. Once the data had been collected, each case (i.e., student response) was examined

for completeness. This process involved several steps. First, all cases with entirely missing data

(no data present between the first item, 'your academic year' and the last item 'did you take this

survey on a…') were deleted from the data set. Since these cases had no data whatsoever that

could identify the person taking the survey (which could assist in missing data analysis), they

were deleted from the data set entirely. Through this initial process, the original 1102 raw cases

were reduced to 1003. An additional 3 cases had virtually all of their data missing (e.g., two data

cells with all others blank), and were also deleted, bringing the overall n to exactly 1000.

For each variable used for the five hypotheses, a conservative 5% or less missing values

rate was used to determine whether or not a further assessment of missingness was required.

While none of the nine variables of interest exceeded a missing rate of 20% (a looser cutoff used

in some survey research), all nine had rates over 5%, ranging from 6.3% (support for programming) to 17.7% (CTI). The variables were therefore examined for patterns of incompletion. Little's MCAR (missing completely at random) test was conducted to determine the randomness for all nine variables. Results were significant ($X^2 = 207.28$ (88), $p = .001$), indicating that the data was non-MCAR.

Multiple imputation was then employed to address the nonrandom missing data for all variables with more than 5% missing. In the past, researchers have used pair- and case-wise deletion, mean substitution, single imputation, and other methods to address missing data. However, superior methods have emerged in the past 20 years, and contemporary authors recommend the two strategies of either multiple imputation or full information maximum likelihood (Schafer & Graham, 2002; Schlomer, Bauman, & Card, 2010). While there is some debate about the nuanced advantages of these two approaches, they are generally seen as equivalent in addressing missing data, and both are considered superior to their predecessors in nearly all cases. For this study, multiple imputation (Rubin, 1987) was chosen, and conducted using the Missing Values Analysis Module offered as part of the PASW/SPSS 18.0.0 statistical software package.

Rubin's (1987) formula was applied to determine the number of imputations to be run, where accuracy equals $(1 + \lambda / m)^{-1}$ (and where λ is the rate of missing information and m the number of imputations). It was calculated that 5 imputations would yield 96.15% accuracy (compared to an infinite number of imputations), and 10 imputations would yield 98.04% accuracy. Ten imputations was selected, as it was slightly superior to 5 and within the typical best practice of 5-10 imputations in a typical MI procedure.

The original imputation results generated ranges for some variables that were slightly outside of the variable's possible range. This issue was addressed by re-running the imputations in a custom model, which preserves the discrete distribution of data for a specific variable while not contributing to bias, as is the case in the method of rounding (Horton, Lipsitz, & Parzen, 2003). The new imputed data sets were reviewed for appropriate range and were determined to be satisfactory.

Reporting of results for hierarchical regression with multiply imputed datasets involve several features worth noting. First, results of the hierarchical linear regression models reported in this chapter include the pooled B, standard errors, and t-scores. Adjusted R2 and adjusted r2 change are averaged across the 10 multiply imputed datasets. Ranges are reported for beta weights for the 10 imputed datasets. As there is no consensus among statistical scholars on how to report the F statistic (J. von Hinkel, personal communication, August 8, 2011), they are reported for the original dataset. Levels of significance of F values for the imputed datasets were very similar. In a few cases where level of significance varied, the most conservative level (e.g., .05 rather than .01) is reported, therefore representing the most conservative p value found for the 10 imputed datasets.

Other Data Preparation Considerations

Common method variance refers to variance that can be attributed to the method of measurement rather than the constructs being measured (Campbell & Fiske, 1959; Podsakoff et al., 2003). Common method bias occurs when "discrepancies between the observed and the true relationships between constructs" exist as a result of common methods variance (variance accounted for by the instrument instead of the variables of interest) (Glick & Doty, 1998). This threat to validity is present in many research designs, and monomethod, single time point studies

have unique challenges in addressing common method bias. For example, the popular strategy of utilizing multiple survey modalities to assess the degree of common methods bias is not possible in a monomethod design. However, common methods bias for this study can be addressed by: 1) a review of the literature on multimethod measurement of college alcohol use; and 2) specific statistical procedures within the proposed monomethod data set.

First, prior multimethod research has examined alcohol self-report by college students, suggesting that student self-report alcohol measures do not significantly differ between paper and online modalities (Miller et al., 2002). McCabe, et al. (2009) examined students' levels of willingness to take part in the survey at all (which could, theoretically, relate to report bias), and found that no differences between paper and online surveys existed, regardless of student willingness. While some student bias in reporting use may still be present, these studies provide evidence that common methods bias is not present and support for the validity of our online survey of self-report as a single method.

Second, a Harman's single-factor test was conducted to explore whether or not statistical evidence of possible common methods bias existed. This procedure utilized an exploratory factor analysis, where all independent and dependent variables are loaded, to determine if a single factor accounted for a majority of the variance. If a single factor accounts for a majority portion of the variance, there is evidence for possible common methods bias. Notably, this single factor finding does not confirm that common method bias exists, but rather that there is a common factor accounting for the variance of all the items. If a single factor accounts for a majority of the variance, further examination is needed, and can involve procedures that specifically partial out method bias, social desirability, and other factors (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). For the current project, the Harman's single-factor test provided an

acceptable first step for determining if the data generated by the survey tool was being impacted by common methods variance.

All 10 of the independent and dependent variables used in the study were loaded into the exploratory factor analysis. The procedure employed principal components analysis and an unrotated component matrix. Furthermore, the analysis specified a single fixed factor. This factor yielded an Eigenvalue of 3.40, accounting for 33.96% of the variance after loadings were extracted; results from a principal components analysis specifying multiple dimensions (in our case 10), were roughly similar to this analysis, with the first factor yielding an Eigenvalue of 3.42 which accounted for 34.19% of the variance. As neither analyses exceed our cutoff of a majority of variance explained (>50%), we proceeded with the analyses (Harman, 1967).

<u>Preliminary Analyses to Determine Control Variables</u>

Preliminary analyses using t-tests, ANOVA, and linear regression were conducted to determine the relationship between control variables and the dependent variables. Appropriate statistical procedures were conducted for variables of gender, race/ethnicity, academic year, estimated GPA, work status, disability status, and GLBTQ status. Only control variables that were significantly related to dependent variable relevant to each hypothesis were included in the analyses of the specific model. Given the ability of hierarchical regression to parse out variance accounted for by level, the final regression models were reviewed to confirm that any selected controls made a significant contribution to explaining the variance within the overall model. In cases where this more complex procedure found the control to not be significant as a predictor, the variable was removed and a new model was run without the variable. Relevant controls are noted in the hypotheses results listed below, with R^2 and related statistics reported in the regression tables.

Working with Nested Data: Exploring the need for hierarchical linear modeling

An important issue to address in this study was the potential for the data to be nested by residence hall. It can be theorized that social interaction and alcohol use can vary between halls. During the 4-year project in which the current study is based, interviews with residence hall staff have frequently mentioned differences in sense of community within halls, as well as different reputations on campus of certain halls being "party halls", where alcohol use is more frequent than in other halls. These qualitative observations of experienced campus staff are supported by the literature. Sense of community has been found to vary between halls with different traffic patterns (corridor vs. cluster) (B. D. Hill, Shaw, & Devlin, 1999), and previous research found rates of alcohol consumption to vary based on differences in the built environment of a hall (i.e., suite-style halls vs. halls with shared bathrooms) (Cross, Zimmerman, & O'Grady, 2009) as well as gender composition (Harford, Wechsler, & Muthén, 2002).

Nested data can create dependence, where individual data is influenced by the individual's grouping. In other words, data for individuals in the same group can be more similar to one another than to individuals in other groups (e.g., work satisfaction for employees nested within work teams). Given the potentially nested nature of the data, two methods of exploring hypotheses were considered: 1) hierarchical linear regression with ordinary least squares estimation of regression coefficients and effect-coding for residence hall, and 2) 2-level hierarchical linear modeling (HLM) utilizing a data structure where students (level-1) were nested within residence halls (level-2).

In general, HLM presents several advantages over a hierarchical linear regression approach. Not accounting for nested data can result in model misspecification, decreasing standard errors of regression coefficients and therefore increasing the frequency of false positives

(Type I errors) (Raudenbush & Bryk, 2002). Moreover, not addressing nested data eschews the opportunity to better understand potentially insightful contextual issues, in this case residential halls. However, most forms of HLM require a Level-2 n of groups of at least 30, and in some cases hierarchical regression can produce equivalent and more parsimonious results when Level-2 n's are low (< 10).

The nested structure of the data required exploration into the 12 residence halls beyond the analyses done for simple control variables. To explore the need for HLM, the intraclass correlations (ICCs) of residence hall in relation to the dependent variables were first examined. ICCs represent the amount of variance accounted for by group membership in regard to a specific dependent variable. ICCs were calculated by running null HLM models (i.e., models with no predictors included), and are reported in Table 3.2. One dependent variable had a moderate ICC: Sense of community (ICC = .11). Since our sense of community variable is featured in the first hypothesis, further exploration into HLM was warranted.

Table 3.2: Intraclass Correlations among Residence Halls

Res Hall (Level 2) and:

Sense of Community	0.11
Frequency of Alcohol Use	0.00
Binge Drinking	0.01
Interest in Programming	0.01
Support of Policies	0.00

While HLM was indicated for analyses including SOC, the small level-2 sample size ($n = 12$) presented limitations to its application. For more complex forms of HLM (e.g., Means-as-Outcomes, cross-classified data structures, and cross-level interactions), a minimum level-2

sample size of 30-50 groups is required, depending on the procedure (Kahn, 2011; Scherbaum & Ferreter, 2009). However, a random coefficients regression hierarchical linear model provides robust regression coefficients, even with as few as 10 Level-2 cases (Maas & Hox, 2005).

Alternately, a more traditional hierarchical linear regression approach using ordinary least squares can address some features of nested data by using effect- or dummy-coding for the nesting variable (residence hall). This approach is particularly useful when level-2 sample sizes are low (viz.., below 30). For the present study, effect-coding was applied to residence hall, resulting in 11 (k-1) separate variables. These variables were then entered into a single level in the regression model (and removed for the final analysis if found not to be significant). The value of effects coding over dummy coding is that this method will compare each hall to the mean of the sample (Cohen, 2003), as opposed to a single reference group. Given that there is no theoretical drive to select one particular hall as a reference group, and that we wanted to preserve the opportunity to explore interactions in the future, the effect coding was selected over dummy coding for this variable.

The small level-2 sample size of our data set ($n = 12$) approaches a threshold within the contemporary statistical literature regarding how best to proceed with nested data when ICCs greater than .10 are present. As noted above, while many HLM models require larger numbers of groups, 2-level random coefficient HLM models can function with level-2 n's lower than 30 (Scherbaum & Ferreter, 2009). However, for level-2 sample sizes lower than 10, regression using ordinary least squares with effect- or dummy-coding is indicated (Snijders & Bosker, 1999).

Since both methods were justifiable for the current project, preliminary analyses were conducted for hypothesis 1 to better inform our final choice in statistical procedure. Separate

preliminary analyses were conducted for models using both HLM and hierarchical linear

regression with effect-coding for residence halls. One-way models were run examining the

relationship between the independent and dependent variables, controlling for relevant

demographic variables. In comparing the two approaches, findings of statistical significance (p

$< .05$) were equivalent for all dependent variables of interest.

In light of the preliminary analyses comparing linear regression to HLM, as well as

contemporary recommendations within the statistical literature, both procedures were justifiable.

Preliminary analyses using both OLS and HLM models for hypothesis 1 were conducted and

found to be equivalent. Therefore, to streamline the statistical procedures of the overall study,

hierarchical linear regression was used for the final analysis of all five hypotheses, with effect

coding for hall for hypothesis 1. Additionally, effect-coded residence hall variables in the

preliminary hypothesis 2-5 models were tested and, consistent with the ICC values for the

variables of interest, found hall not to be a significant predictor within these models.

To strengthen our decision, it is useful to address several potential advantages of HLM

(in general) as they relate to our specific data set. First, HLM is superior to linear regression

using ordinary least squares in regards to power. Given the number of halls in the present study,

a hierarchical regression approach required 11 effect-coded variables for hall (k-1). This number

of halls would reduce the overall degrees of freedom in the model ($df = N - k - 1$, where $k =$

number of variables). All else being equal, this reduction in degrees of freedom results in

decreased statistical power (that is, the ability to properly reject the null hypothesis when it is

false and avoid a Type II error). However, given the large size of our data set, our analyses were

robust to the added degrees of freedom, retaining sufficient power. Indeed, both social

interaction predictors were still found to be significant at the .001 level with meaningful ΔR^2 values (see Hypothesis 1 results below).

A second potential advantage of the HLM model is that it is better able to address the random nature of group effects, which are treated as fixed in an linear regression ordinary least squares approach (Luke, 2004). From this logic, capturing significance when it exists would be more difficult using OLS hierarchical linear regression. Again, the comparable results using regression do not appear to require capitalizing on this advantage of HLM. It is our hope that the rich data set on which this study is based will generate many future studies with different variables of interest; this issue and the use of HLM will be reappraised in future projects using the same procedure undergone here.

<center>Exploring the Hypotheses</center>

Descriptive Statistics for Independent and Dependent Variables

Descriptive statistics for independent and dependent variables of the study are reported in Table 3.3. Descriptives for control variables and the ranges for variables of interest are reported previously in Chapter 2 under in the Participants section.

Table 3.3. Descriptive Statistics for Study Variables

Variable	M	SD	Range	n
Face-to-face interaction	17.96	7.30	5-30	848
CTI	14.05	5.40	8-40	823
Injunctive peer norms	9.18	3.58	4-24	846
Descriptive peer norms	9.98	3.68	3-15	854
Sense of community	32.50	9.17	8-48	824
Frequency of alcohol use	3.48	1.84	1-7	936

Binge drinking	1.85	1.20	1-6	899
Support for programs	8.36	3.48	3-18	937
Support for policies	13.38	3.19	3-18	930
Use in one's own hall	.90	1.35	0-4	910

[1]Square root transformation.

What follows are the results of the study, organized by primary hypotheses.

<u>Hypothesis 1. Interaction between students in the residence halls is positively related to sense of community.</u>

    <u>Hypothesis 1a. Face-to-face interaction is positively related to sense of community.</u>

    <u>Hypothesis 1b. Communication technology-based interaction is positively and distinctively related to sense of community.</u>

Hierarchical linear regression models were used to test Hypotheses 1a. and 1b. While collinearity diagnostic scores were within a satisfactory range for both communication technology-based interaction ($VIF = 1.04$) and face-to-face interaction ($VIF = 1.42$), given the high correlation between face-to-face and communication technology-based interaction ($r = .39$, $p < .01$), separate models were run with the other social interaction variable entered into the level before the targeted independent variable. This was a conservative approach that minimizes the likelihood of overstating the variance accounted for by the independent variable of interest for each of the sub-hypotheses. For both models, academic year was entered as the sole control variable on the first level. To better understand the impact of residence hall, the 11 effect-coded variables for the 12 residence halls (k-1) were entered on level two, separate from academic year.

Results for the model are reported in Table 3.4. Both controls were found to be significant in the models, with residence hall accounting for a substantial ($\Delta R^2 = .08$) amount of

the variance. For academic year, more advanced students reported lower levels of sense of community compared to students in their earlier years of undergraduate study.

The model for Hypothesis 1a. tested whether face-to-face social interaction would positively predict sense of community. CTI was entered into the third level as a control, and significantly predicted sense of community ($\Delta R^2 = .05$, $F (13, 984) = 78.31$, $p < .001$). The fourth level examined the hypothesis that face-to-face interaction would independently predict sense of community. This hypothesis was strongly supported ($\Delta R^2 = .30$, $F (14, 984) = 442.56$, $p < .001$). Students reporting high face-to-face interaction with other students in their hall also reported a higher sense of community.

Table 3.4.
Hierarchical Regression Results for Face-to-face Interaction as a Predictor of Sense of Community

Predictor Variable	B^1	SEB^1	β^2	t^1	$R^2_{adj}{}^\dagger$	$\Delta R^2_{adj}{}^\dagger$	F
Step 1					.01	.01	11.83**
Academic Year	-1.60	.46	-.09 – -.13	-3.12**			
Step 2					.09	.08	7.76**
Residence Hall[3]	-	-	-	-			
Step 3					.14	.05	78.31**
Technology-based	.44	.05	.24-.27	8.64**			
Step 4					.44	.30	442.56**
Face-to-face	.79	.04	.61 – .63	22.52**			

*$p < .05$, **$p < .01$

[†]Statistic represents the mean average of the 10 multiply imputed datasets.

[1]Pooled statistic for 10 multiply imputed datasets.

[2]Beta range reported for the 10 multiply imputed datasets.

[3]Residence Hall was effect-coded into 11 dichotomous variables; individual hall statistics not reported for purpose of brevity.

The hierarchical linear regression model for Hypothesis 1b. included face-to-face interaction in the third level of the model (control variables were identical, as they were derived

in the preliminary analysis from their relationship to the dependent variable, which did not

change). Face-to-face as a control variable was significant ($\Delta R^2 = .36$, $F (13, 984) = 614.45$, $p <$

.001). Findings also supported the hypothesis that CTI positively predicted sense of community

($\Delta R^2 = .01$, $F (14, 984) = 4.78$, $p < .05$). Results for the model are reported in Table 3.5.

Table 3.5.
Hierarchical Regression Results for Communication Technology-based Interaction as a Predictor
of Sense of Community

Predictor Variable	B[†]	SEB[†]	β[1]	t[†]	R^2_{adj}[†]	ΔR^2_{adj}[†]	F
Step 1					.01	.01	12.45**
Academic Year	-1.60	.68	-.10 – -.13	-3.42**			
Step 2					.08	.07	7.37**
Residence Hall[1]	-	-	-	-			
Step 3					.44	.36	614.45**
Face-to-face	.82	.03	.62-.66	24.52**			
Step 4					.44	.01	4.78*
Technology-based	.10	.05	.04 – .07	2.33*			

*$p < .05$, **$p < .01$

[†] Statistic represents the mean average of the 10 multiply imputed datasets.

[1]Range represents beta weights for the 10 multiply imputed datasets.

[2]Residence Hall was effect-coded into 11 dichotomous variables; statistics not reported for brevity. See

R^2_{adj} and ΔR^2_{adj} to appraise the impact of hall in accounting for variance within the model.

Hypothesis 2. Compared to sense of community in the residence hall, peer norms for drinking

are more strongly related to alcohol use.

Hypothesis 2a. Compared to sense of community in the residence hall, injunctive peer

approval norms for drinking are more strongly related to alcohol use.

Hypothesis 2b. Compared to sense of community in the residence hall, descriptive peer

norms around drinking are more strongly related to general alcohol use.

Hypothesis 2.a. examined the influence of injunctive peer approval norms for drinking and sense of community (SOC) within the residence halls in predicting rates of alcohol use. Separate hierarchical linear regression analyses were conducted for the two dependent variables of 1) frequency of alcohol use since the beginning of the school year and 2) frequency of binge drinking during the past two weeks. Interaction effects between centered injunctive norms and sense of community scores were assessed in initial models for both dependent variables. Interaction effects were not found to be significant for either of the dependent variables, and were therefore excluded from the final analyses.

For the hierarchical models used in hypotheses 2-5, the ordering of SOC and peer norms was determined based on the theoretical rationale of each hypotheses. However, it is important to note that the relative impact of SOC and peer norm variables on the dependent variables in hypotheses 2-5 did not vary substantially ($\Delta R^2 < .02$) when their hierarchical order was switched in preliminary analyses. This increases confidence that the individual relationships between sense of community, injunctive norms, and descriptive norms to the dependent variables are accurate.

For frequency of alcohol use, control variables of academic year were entered into the first level, with four dummy-coded race/ethnicity variables entered separately on the second. For the model that used binge drinking rates as the dependent variable, these same control variables were used, with the addition of gender and estimated GPA (which were also found to predict binge drinking in the preliminary analyses) on level one. Injunctive peer norms for alcohol use were entered into the third level, followed by sense of community on the fourth. It was expected that injunctive peer norms would have a strong positive relationship to alcohol use (frequency

and binge rates), followed by a weaker negative relationship between SOC and alcohol use, as measured by R^2 change at each level.

Results can be found in Table 3.6, including statistics for control variables. For frequency of use and rates of binge drinking, students tended to report slightly lower frequency of use the longer they had been on campus. That is, year 1 students reported the highest rates, followed by sophomores and then upperclassmen. For frequency of use and rates of binge drinking among different racial/ethnic groups, white/European-Americans reported higher levels of use compared to the other race/ethnicity groups. Men reported higher rates of binge drinking compared to women, and students' estimated GPA was negatively related to rates of binge drinking.

Findings partially supported the hypothesis, in that injunctive peer norms were found to strongly, positively predict both the frequency of alcohol use during the past academic year ($R^2 =$ .17, $F(1, 978) = 196.60$, $p < .001$) as well as binge drinking during the past two weeks ($R^2 = .17$, $F(1, 951) = 163.58$, $p < .001$). However, sense of community did not significantly predict frequency of alcohol use ($R^2 = .00$, $F(1, 977) = .16$, $p > .05$) or rate of binge drinking ($R^2 = .00$, $F(1, 950) = 1.17$, $p > .05$).

Table 3.6.

Hierarchical Regression Results for Injunctive Peer Norms and Sense of Community as
Predictors of Alcohol Use

Frequency of Alcohol Use

Predictor Variable	B^1	SEB^1	β^2	t^1	$R^2_{adj}{}^\dagger$	$\Delta R^2_{adj}{}^\dagger$	F
Step 1					.01	.01	4.95*
Academic Year	-.22	.09	-.07-.08	-2.35*			
Step 2					.03	.03	6.43**
Race/ethnicity[4]	-	-	-	-			
Step 3					.20	.17	196.60**
Injunctive Norms	.22	.02	.41-.44	13.41**			
Step 4					.20	.00	.16
Sense of Community	.00	.01	.-.01-.01	-.13			

Binge Drinking

Predictor Variable	B^1	SEB^1	β^2	t^1	$R^2_{adj}{}^\dagger$	$\Delta R^2_{adj}{}^\dagger$	F
Step 1					.02	.02	6.64**
Academic Year	-.18	.06	-.08 - -.11	-2.90**			
Gender	-.22	.08	-.08 - -.10	-2.60**			
Estimated GPA	.06	.03	.04 - .10	1.79[3]			
Step 2					.04	.03	3.62**
Race/ethnicity[4]	-	-	-	-			
Step 3					.21	.17	163.58**
Injunctive Norms	.14	.01	.41 - .43	13.83**			
Step 4					.21	.00	1.17
Sense of Community	.00	.00	.00 - .04	.70			

*$p < .05$, **$p < .01$

[†] Statistic represents the mean average of the 10 multiply imputed datasets.

[1]Pooled statistic for 10 multiply imputed datasets.

[2]Range represents beta weights for the 10 multiply imputed datasets.

[3]$p = .07$ for estimated GPA. Since coefficients for this variable on subsequent levels were significant ($p < .05$), estimated GPA was retained in the model.

[4]Race/ethnicity was dummy coded into four variables; statistics not reported for purposes of brevity. See R^2_{adj} and ΔR^2_{adj} to appraise the impact of race/ethnicity variable in accounting for variance within the model.

Hypothesis 2b. was then examined using an identical structure for control variables, testing for possible interaction effects as part of the preliminary analysis. Results from

descriptive peer norms were similar to those for injunctive peer norms found in hypothesis 2a., and are listed in detail in table 3.7. Descriptive norms strongly predicted both frequency of alcohol use (R^2= .35, F (1, 978) = 496.39, $p < .001$) and binge drinking episodes (R^2= .24, F (1, 978) = 230.38, $p < .001$) in a positive direction; students whose peers used alcohol more often and in greater amounts reported higher rates of use for themselves. Sense of community was not found to predict either frequency of use (R^2= .00, F (1, 977) = .06, $p > .05$) or binge rates (R^2= .00, F (1, 977) = .62, $p > .05$).

Table 3.7.
Hierarchical Regression Results for Descriptive Peer Norms and Sense of Community as
Predictors of Alcohol Use

Frequency of Alcohol Use

Predictor Variable	B^1	SEB^1	β^2	t^1	$R^2_{adj}{}^\dagger$	$\Delta R^2_{adj}{}^\dagger$	F
Step 1					.01	.01	5.66*
Academic Year	-.22	.09	-.07 - -.08	-2.35*			
Step 2					.03	.02	7.11**
Race/ethnicity[1]	-	-	-	-			
Step 3					.38	.35	496.39**
Descriptive Norms	.31	.01	.59 - .62	22.46**			
Step 4					.38	.00	.06
Sense of Community	.00	.01	-.01 - .01	-.22			

Binge Drinking

Predictor Variable	B^1	SEB^1	β^2	t^1	$R^2_{adj}{}^\dagger$	$\Delta R^2_{adj}{}^\dagger$	F
Step 1					.02	.02	6.64**
Academic Year	-.18	.06	-.08 - -.11	-2.89**			
Gender	-.22	.08	-.08 - -.10	-2.60**			
Estimated GPA	.06	.03	.04 - .08	1.79[3]			
Step 2					.03	.01	3.51**
Race/ethnicity[4]	-	-	-	-			
Step 3					.24	.21	230.38**
Descriptive Norms	.16	.01	.46 - .48	15.42**			
Step 4					.24	.00	.62
Sense of Community	.01	.01	-.01 - .03	.43			

*$p < .05$, **$p < .01$

[†] Statistic represents the mean average of the 10 multiply imputed datasets.

[1] Pooled statistic for 10 multiply imputed datasets.

[2] Range represents beta weights for the 10 multiply imputed datasets.

[3] $p = .07$ for estimated GPA. Since coefficients for this variable on subsequent levels were significant ($p < .05$), estimated GPA was retained in the model.

[4] Race/ethnicity was dummy coded into four variables; statistics not reported for purposes of brevity. See R^2_{adj} and ΔR^2_{adj} to appraise the impact of race/ethnicity variable in accounting for variance within the model. In general, white/European-Americans reported higher levels of of use compared to the other race/ethnicity groups.

Hypothesis 3. Sense of community and peer norms are independently related to attitudes toward alcohol-free residence hall social programming, with peer norms for alcohol use moderating the relationship between sense of community in the residence halls and attitudes toward alcohol-free residence hall social programming.

Hypothesis 3a. Sense of community is related to attitudes toward alcohol-free residence hall social programming, such that sense of community is positively related to interest in attending programs. Hypothesis 3b. Peer norms (injunctive) are related to attitudes toward alcohol-free residence hall social programming, such that norms are inversely related to interest in attending programs.

Hypothesis 3c. Peer norms (descriptive) are related to attitudes toward alcohol-free residence hall social programming, such that norms are inversely related to interest in attending programs.

Hypothesis 3d. Sense of community is positively related to attitudes toward alcohol-free residence hall social programming when injunctive peer norms are disapproving of drinking (viz., low approval norms), and not related to attitudes toward alcohol-free residence hall social programming when injunctive peer norms are approving of drinking (viz., high approval norms).

Hypothesis 3e. Sense of community is positively related to attitudes toward alcohol-free residence hall social programming when descriptive peer norms around drinking are low (viz. disapproving of drinking) and not related to attitudes toward alcohol-free residence hall social programming when descriptive peer norms around drinking are high (viz. approving of drinking).

Hypotheses 3a., 3b., and 3d. were assessed within a single hierarchical linear regression model. Gender was entered into the first level. Race/ethnicity was entered into the second level, followed by work status (dummy-coded into two variables) on the third. It was expected that sense of community (SOC) would have a positive relationship with support for programming, and injunctive peer norms would have a negative relationship with support for programming in that the more approving students' peers were of negative drinking behavior, the less likely a student would be supportive of residence hall programming. It was also predicted that an interaction effect would exist where SOC was positively related to attitudes toward programming when injunctive peer norms are disapproving of drinking, but not related to attitudes toward programming when injunctive peer norms are approving of drinking. From this logic, sense of community was entered into the fourth level, followed by injunctive peer norms on the fifth and the interaction effect of the two independent variables on the sixth.

Support for the hypotheses was found on each level, and is reported in table 3.8 (including statistics for controls). Females were slightly more likely than males to express interest in programming. White/European-American students, in general, were less interested in taking part in programming compared to African-American, Latino, and Asian students. Students working part-time on campus were more likely to express interest in programming than students who were not working and students working part-time off campus.

Both sense of community ($R^2 = .11$, $F(1,780) = 101.93$, $p < .001$) and injunctive peer norms ($R^2 = 02$, $F(1, 779) = 19.47$, $p < .001$) predicted support for programming. Sense of community was positively related to support of programming, whereas injunctive norms had a negative relationship. Sense of community more strongly predicted support for programming than injunctive peer norms, overall. In addition, a small interaction effect was found ($R^2 = 01$, F

$(1,778) = 9.57$, $p < .001$), such that students whose peers had high injunctive norms that promoted alcohol use were less likely to express interest in programming, particularly those with a higher sense of community (see Figure 3.3). That is, students with low sense of community expressed a low level of support for programming regardless of injunctive peer norms. On the other hand, students with both a high sense of community and low injunctive peer norms expressed a higher support for programming than students with a high sense of community and a high level of injunctive peer norms. This was a slightly different outcome that the original prediction in hypothesis 3d., which hypothesized that an interaction effect would exist where sense of community would be positively related to attitudes toward programming when injunctive peer norms were low, but not related to attitudes toward programming when injunctive peer norms around drinking are high.

Table 3.8.

Hierarchical Regression Results for Sense of Community and Injunctive Peer Norms as Predictors of Support for Programming

Predictor Variable	B^1	SEB^1	β^2	t^1	$R^2_{adj}{}^\dagger$	$\Delta R^2_{adj}{}^\dagger$	F
Step 1					.01	.01	7.70**
Gender	.73	.26	.10 - .10	2.78**			
Step 2					.03	.02	5.03
Race/ethnicity[3]	-	-	-	-			
Step 3					.04	.01	5.70
Work status[4]	-	-	-	-			
Step 4					.15	.11	101.93**
Sense of community	.13	.01	.33 - .34	-10.10**			
Step 5					.17	.02	19.47**
Injunctive norms	-.14	.03	-.15 - -.15	-4.41**			
Step 6					.18	.01	9.57**
Sense of comm. X Injunctive norms	-.01	.00	-.10 - -.10	-3.10**			

*$p < .05$, **$p < .01$

[†]Statistic represents the mean average of the 10 multiply imputed datasets.

[1]Pooled statistic for 10 multiply imputed datasets.

[2]Range reported for the 10 multiply imputed datasets.

[3]Race/ethnicity was dummy coded into four variables; statistics not reported for purposes of brevity. See R^2_{adj} and ΔR^2_{adj} to appraise the impact of race/ethnicity in accounting for variance within the model. In general, white/European-Americans reported lower levels of support for programming compared to the other race/ethnicity groups.

[4]Work status was dummy coded into two variables; statistics not reported for purposes of brevity. See R^2_{adj} and ΔR^2_{adj} to appraise the impact of work status in accounting for variance within the model. In general, students working part-time on campus reported higher levels of support for programming than students who were not working or were working part time off campus.

Figure 3.3. Interaction effect between sense of community and injunctive peer norms as predictors of support for programming.
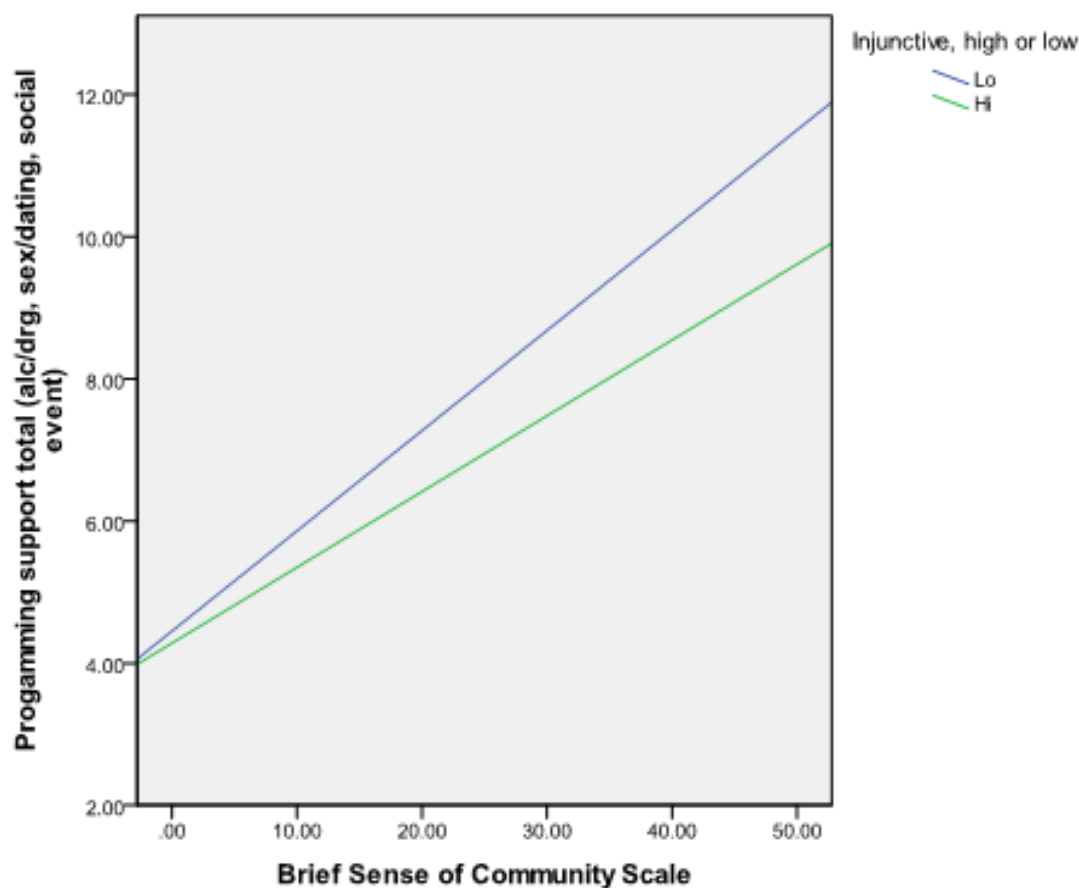
Hypotheses 3a., 3c., and 3e. were included in the second hierarchical linear regression model for Hypothesis 3. Gender was entered into the first level. Race/ethnicity was entered into the second level, followed by work status (dummy-coded into two variables) on the third. Sense of community was entered on the fourth level, followed by descriptive peer norms on the fifth and the interaction of sense of community and descriptive norms on the 6th. Results of the model are reported in Table 3.9.

As in the prior model, sense of community again positively predicted support for social programming ($R^2 = .12$, $F (1, 792) = 100.61$, $p < .001$). Similar to injunctive peer norms,

descriptive norms significantly predicted support for social programming, although to a lesser degree than sense of community ($R^2 = .02$, $F(1, 791) = 14.06$, $p < .01$). The interaction effect predicted in Hypothesis 3e. was not found to be significant ($R^2 = .00$, $F(1,790) = 2.81$, $p > .05$).

Table 3.9.
Hierarchical Regression Results for Sense of Community and Descriptive Peer Norms as Predictors of Support for Programming

Predictor Variable	B^1	SEB^1	β^2	t^1	$R^2_{adj}{}^\dagger$	$\Delta R^2_{adj}{}^\dagger$	F
Step 1					.01	.01	6.62
Gender	.67	.26	-.14 - -.14	2.58**			
Step 2					.03	.02	4.86
Race/ethnicity[3]	-	-	-	-			
Step 3					.04	.01	5.28
Work status[4]	-	-	-	-			
Step 4					.16	.12	100.61
Sense of community	.13	.01	.33 - .33	10.03**			
Step 5					.17	.02	14.06
Descriptive norms	-.12	.03	-.12 - -.13	-3.74**			
Step 6					.18	.00	2.81
Sense of comm. X descriptive norms	-.01	.00	-.05 - -.06	-1.68			

*$p < .05$, **$p < .01$

[†]Statistic represents the mean average of the 10 multiply imputed datasets.

[1]Pooled statistic for 10 multiply imputed datasets.

[2]Range reported for the 10 multiply imputed datasets.

[3]Race/ethnicity was dummy coded into four variables; statistics not reported for purposes of brevity. See R^2_{adj} and ΔR^2_{adj} to appraise the impact of race/ethnicity in accounting for variance within the model. In general, white/European-Americans reported lower levels of support for programming compared to the other race/ethnicity groups.

[4]Work status was dummy coded into two variables; statistics not reported for purposes of brevity. See R^2_{adj} and ΔR^2_{adj} to appraise the impact of work status in accounting for variance within the model. In general, students working part-time on campus reported higher levels of support for programming than students who were not working or were working part time off campus.

Hypothesis 4. Sense of community and peer norms are independently related to attitudes toward alcohol-specific residence hall policies, with peer norms for alcohol use moderating the relationship between sense of community in the residence halls and attitudes toward alcohol-specific residence hall policies.

Hypothesis 4a. Sense of community is related to attitudes toward alcohol-specific residence hall policies, such that sense of community is related to support of policies that discourage alcohol use.

Hypothesis 4b. Injunctive peer norms are related to attitudes toward alcohol-specific residence hall policies such that norms are related to opposition of policies that discourage alcohol use.

Hypothesis 4c. Descriptive peer norms are related to attitudes toward alcohol-specific residence hall policies such that norms are related to opposition of policies that discourage alcohol use.

Hypothesis 4d. Sense of community is positively related to attitudes toward alcohol-specific residence hall policies when injunctive peer norms are disapproving of drinking (viz., low approval norms), and not related to attitudes toward alcohol-specific residence hall policies when injunctive peer norms are approving of drinking (viz., high approval norms).

Hypothesis 4e. Sense of community is positively related to attitudes toward alcohol-specific residence hall policies when descriptive peer norms around drinking are low and not related to attitudes toward alcohol-specific residence hall policies when descriptive peer norms around drinking are high.

Hypotheses 4a., 4b., and 4d. were assessed within a single hierarchical linear regression model. Level 1 included control variables of gender, academic year, and estimated GPA. Sense of community was entered on the second level. The third level included injunctive peer norms, and the fourth level consisted of the interaction between SOC and injunctive peer norms.

It was expected that Sense of community would have a positive relationship with support for alcohol-specific residence hall policies, and peer approval norms for alcohol use would have a negative relationship to support for policies. It was also predicted that an interaction effect would exist where sense of community would be positively related to attitudes toward policies when injunctive peer approval norms are low, but not related to attitudes toward policies when injunctive peer approval norms are high.

Results of the model are reported in Table 3.10. In general, junior/senior students were more supportive of policies than year 1/sophomore students. In addition, female students and students reporting higher GPAs were more likely to support policies than males and students with lower reported GPAs.

Sense of community significantly, positively predicted support of policies, although its ability to predict was quite small (R^2= .01, F (1,778) = 10.27, p < .01. Injunctive norms, on the other hand, had more substantial predictive power (R^2= .07, F (1,777) = 65.60, p < .001). The interaction effect of the two variables was not significant (R^2= .00, F (1,776) = 1.29, p > .05).

Table 3.10.
Hierarchical Regression Results for Sense of Community and Injunctive Peer Norms as
Predictors of Support for Policies

Predictor Variable	B^1	SEB^1	β^2	t^1	$R^2_{adj}{}^\dagger$	$\Delta R^2_{adj}{}^\dagger$	F
Step 1					.07	.07	19.50**
Academic Year	.46	.18	.09 - .09	2.55**			
Gender	1.30	.24	.19 - .19	5.44**			
Estimated GPA	-.41	.09	-.16 - -.17	-4.72**			
Step 2					.08	.01	10.27**
Sense of community	.04	.01	.11 - .12	3.32**			
Step 3					.15	.07	65.60**
Injunctive norms	-.25	.03	-.27 - -.28	-8.13**			
Step 4					.15	.00	1.29
Sense of community X Injunctive norms	.00	.00	.03 - .04	1.20			

*$p < .05$, **$p < .01$

†Statistic represents the mean average of the 10 multiply imputed datasets.

^{1}Pooled statistic for 10 multiply imputed datasets.

^{2}Range reported for the 10 multiply imputed datasets.

The second hierarchical linear regression model for Hypothesis 4 included Hypotheses 4a., 4c., and 4e. All entered variables were identical to the previous model, except that injunctive peer norms were switched for descriptive peer norms on levels 3 and 4.

It was expected that sense of community would have a positive relationship with support for alcohol-specific residence hall policies, and descriptive peer norms around drinking would have a negative relationship with support for policies. It was further predicted that an interaction effect would exist where sense of community will be positively related to attitudes toward policies when descriptive peer norms are low, but not related to attitudes toward policies when descriptive peer norms are high.

Results of the model are presented in Table 3.11. Sense of community ($R^2 = .01$, F (1,784) = 12.10, $p < .01$) again significantly predicted support of policies with a very modest

adjusted R^2. Students with a higher sense of community reported a slightly higher level of support for policies than students with a lower reported sense of community. Descriptive norms had greater predictive power, with an R^2 of .06 (F (1,783) = 52.58, $p < .001$). Similar to the first model, the interaction between sense of community and descriptive peer norms was not found to be significant ($R^2 = .00$, F (1,782) = .44, $p > .05$).

Table 3.11.
Hierarchical Regression Results for Sense of Community and Descriptive Peer Norms as Predictors of Support for Policies

Predictor Variable	B^1	SEB^1	β^2	t^1	R^2_{adj}[†]	ΔR^2_{adj}[†]	F
Step 1					.06	.06	19.61**
Academic Year	.47	.18	.08 -.10	2.61**			
Gender	1.20	.24	.17 - .18	5.11**			
Estimated GPA	-.44	.09	-.17 - -.18	-5.06**			
Step 2					.08	.01	12.10**
Sense of community	.04	.01	.12 - .13	3.59**			
Step 3					.14	.06	52.58**
Descriptive norms	-.21	.03	-.24 - -.25	-7.42**			
Step 4					.14	.00	.44
Sense of community X Desc. norms	.00	.00	.02 - .04	.96			

$*p < .05$, $**p < .01$

[†]Statistic represents the mean average of the 10 multiply imputed datasets.

[1]Pooled statistic for 10 multiply imputed datasets.

[2]Range reported for the 10 multiply imputed datasets.

Hypothesis 5. Peer norms for alcohol use moderates the relationship between residence hall sense of community and alcohol use in the residence hall.

Hypothesis 5a. Sense of community is inversely related to alcohol use in the residence hall when injunctive peer norms are disapproving of drinking (viz., low approval norms), and not related to alcohol use in the residence hall when injunctive peer norms are approving of drinking (viz., high approval norms).

Hypothesis 5b. Sense of community is negatively or inversely related to alcohol use in the residence hall when descriptive peer norms around drinking are low and not related to alcohol use in the residence hall when descriptive peer norms around drinking are high.

Hierarchical linear regression was utilized to assess Hypothesis 5a. Level 1 included the control variable of gender, and Level 2 included the four dummy-coded race/ethnicity variables. Level 3 consisted of SOC scores, followed by injunctive peer norms on level 4. The fifth level consisted of the interaction between SOC and injunctive peer norms.

It was expected that SOC would have a negative relationship with alcohol use in the residence halls, and peer approval norms for alcohol use will have a positive relationship to alcohol use in the residence halls. It was further predicted that an interaction effect would exist where SOC will be negatively related to alcohol use in the residence halls when injunctive peer approval norms are low, but not related to alcohol use in the residence halls when injunctive peer approval norms are high.

Results of the model are presented in table 3.12 and include statistics for control variables. Female students were found to have lower rates of drinking in their own residence hall compared to men, and white/European-American students reported higher rates of alcohol use in their hall compared to African-American, Asian, and Latino students.

Sense of community ($R^2= .01$, $F (1,798) = 5.72$, $p < .05$) only slightly predicted use in one's residence hall. This relationship was such that students with higher sense of community reported slightly higher rates of use in the hall. Injunctive norms had a stronger effect ($R^2= .13$, $F (1,797) = 126.07$, $p < .001$), with students with high injunctive norms reporting greater use in the hall. A slight interaction effect was found to be significant ($R^2= .01$, $F (1,796) = 3.89$, $p < .05$), suggesting that the tendency of students with sense of community to drink in the halls more

often was notably intensified by having close friends who hold high (supportive of use)

injunctive norms (see Figure 3.4).

Table 3.12.
Hierarchical Regression Results for Sense of Community and Injunctive Peer Norms as
Predictors of Use in Hall

| Predictor Variable	B^1	SEB^1	β^2	t^1	R^2_{adj}[†]	ΔR^2_{adj}[†]	F
Step 1					.01	.01	7.48**
Gender	-.29	.10	-.09 - -.10	-2.76**			
Step 2					.02	.01	3.86
Race/ethnicity	-	-	-	-			
Step 3					.03	.01	5.72
Sense of community	.01	.01	.07 - .08	2.27			
Step 4					.16	.13	126.07**
Injunctive norms	.15	.01	.37 - .39	11.22**			
Step 5					.17	.01	3.89*
Sense of community X Injunctive norms	.00	.00	.06 - .07	1.97*			

$*p < .05$, $**p < .01$

[†]Statistic represents the mean average of the 10 multiply imputed datasets.

[1]Pooled statistic for 10 multiply imputed datasets.

[2]Range reported for the 10 multiply imputed datasets.

Figure 3.4. Interaction effect between sense of community and injunctive peer norms as predictors of alcohol use in one's own hall.
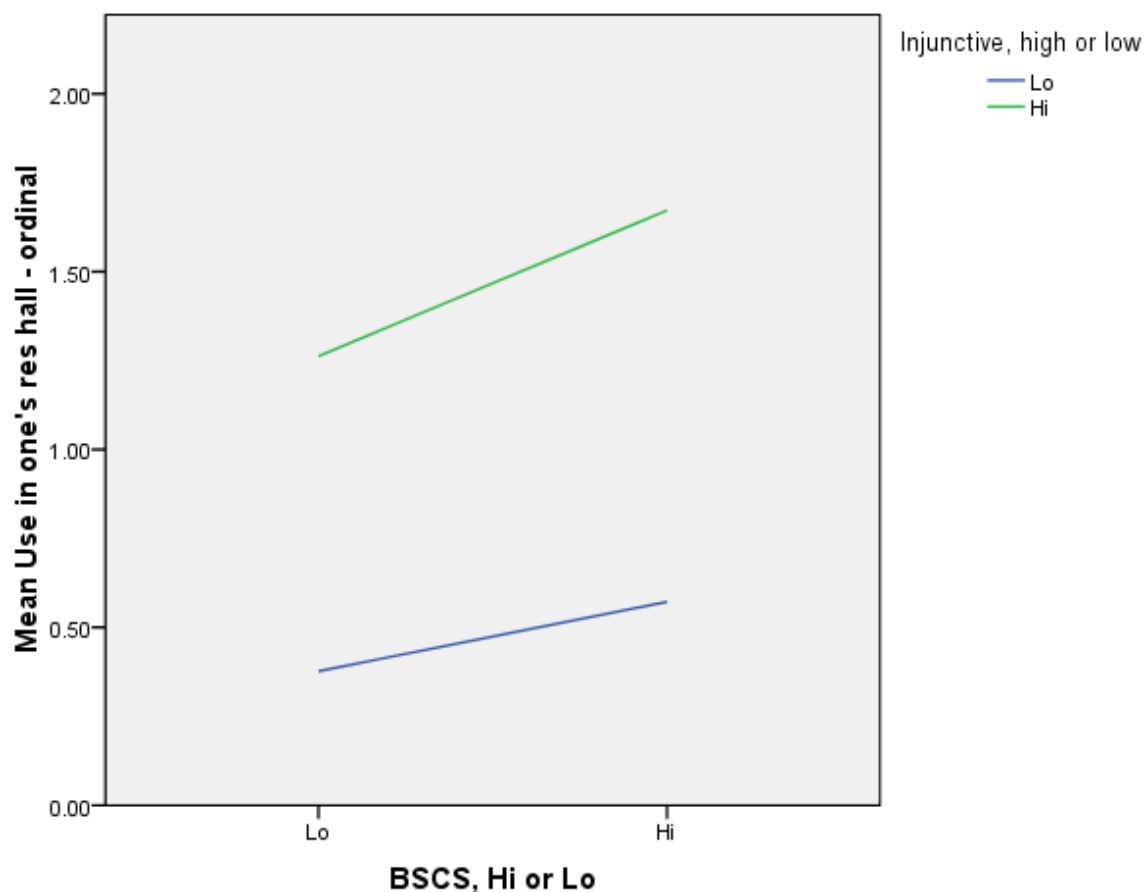
Hierarchical linear regression was also utilized to assess Hypothesis 5b. Variables of the model were identical to the prior model except that descriptive replaced injunctive peer norms on the 4th and 5th step.

It was expected that SOC would have a negative relationship with alcohol use in the residence halls, and descriptive peer norms for alcohol use would have a positive relationship to alcohol use in the residence halls. It was further predicted that an interaction effect would exist where SOC was negatively related to alcohol use in the residence halls when descriptive peer

norms are low, but not related to alcohol use in the residence halls when descriptive peer norms are high.

Results of the model can be found in Table 3.13. Sense of community ($R^2 = .01$, F (1,804) = 5.84, $p < .05$) was again found to modestly predict use in one's own hall. Descriptive norms had more substantial predictive power ($R^2 = .15$, F (1,803) = 151.08, $p < .001$). A small interaction effect was again found ($R^2 < .01$, F (1,802) = 4.33, $p < .05$), in the same direction of findings for hypothesis 5a. That is the positive relationship between sense of community and use in one's own hall was more salient when there existed high descriptive norms for alcohol use among the participant's close friends (see Figure 3.5)

Table 3.13.
Hierarchical Regression Results for Sense of Community and Descriptive Peer Norms as Predictors of Use in Hall

| Predictor Variable	B^1	SEB^1	β^2	t^1	$R^2_{adj}{}^\dagger$	$\Delta R^2_{adj}{}^\dagger$	F
Step 1					.01	.01	7.67**
Gender	-.29	.10	.10 - .11	-2.81**			
Step 2					.03	.02	4.16
Race/ethnicity	-	-	-	-			
Step 3					.03	.01	5.84*
Sense of community	.01	.01	.08 - .09	2.31*			
Step 4					.19	.15	151.08**
Descriptive norms	.15	.01	.40 - .40	12.36**			
Step 5					.19	.00	4.33*
Sense of community X Desc. norms	.00	.00	.06 - .07	2.02*			

$*p < .05$, $**p < .01$

[†]Statistic represents the mean average of the 10 multiply imputed datasets.

[1]Pooled statistic for 10 multiply imputed datasets.

[2]Range reported for the 10 multiply imputed datasets.

Figure 3.5. Interaction effect between sense of community and descriptive peer norms as
predictors of alcohol use in one's own hall.
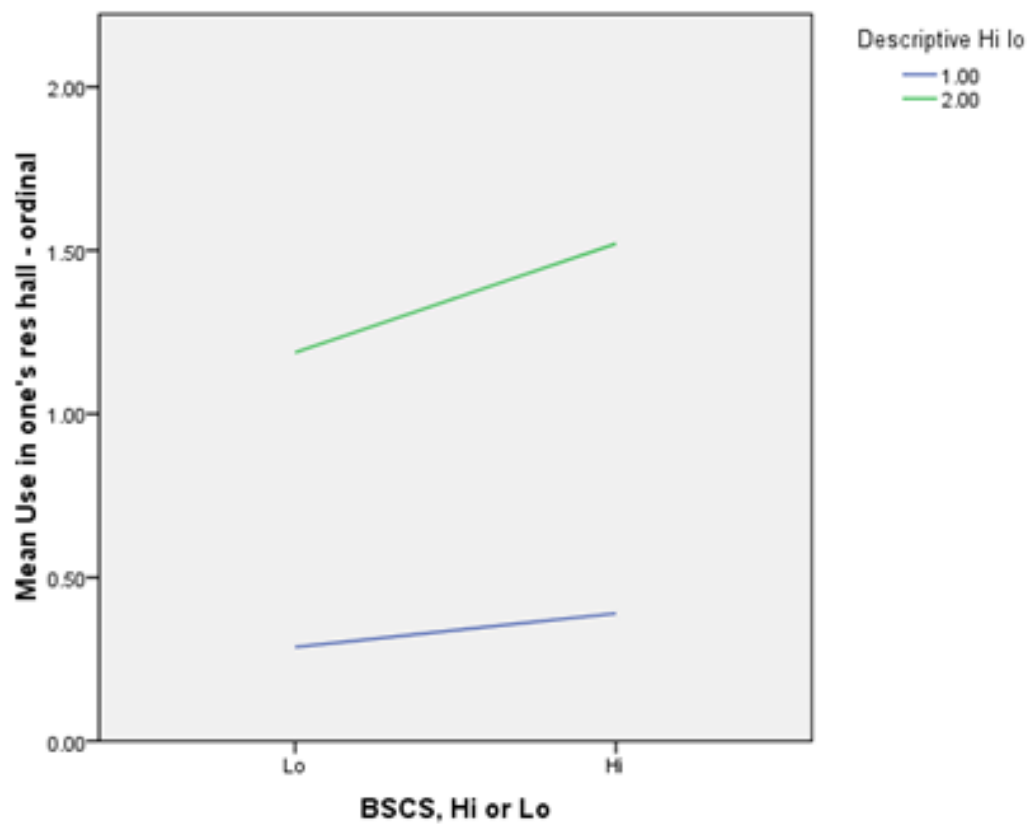
CHAPTER IV

DISCUSSION

Results from the present study offer important implications for theory, research and practice. This chapter begins with a summary of the major findings. The next subsection explores the implications of findings regarding sense of community (SOC) and physical/technology-facilitated interaction. The section that follows considers the results of the study and their implications concerning SOC, peer norms, and alcohol-related attitudes and behaviors. Next, the strengths and limitations of the study are assessed, followed by a proposed program for future research on the larger existent dataset.

Summary of Major Findings

The avenues that students have at their disposal for interacting with one another has changed dramatically in recent years, and will continue to change as new communication technologies emerge. The first hypothesis examined the ways in which different types of social interaction impact students' sense of community (SOC) within residence halls. The analyses found that face-to-face interactions among students—such as visiting one another in rooms and going out to dinner together—were more closely related to SOC than communication technology-based interaction (CTI) such as text messaging, Facebook, email, and instant messaging. However, CTI was found to have a modest, positive relationship with SOC. Results from hypotheses 1a. and 1b. suggest that the CTI is an important and emergent component to how students experience SOC, but also affirm the enduring need for physical social interaction in the experience of SOC. Moreover, the findings have important implications for understanding the way social interaction—be it through a shared dinner or an invigorating IM chat—relates to the experience of community.

The established relationship between injunctive/descriptive peer norms and alcohol use were affirmed in hypotheses 2-5. A novel feature of the study was the comparison of peer norms and SOC, including interaction effects, in predicting alcohol use, support of programming and policies, and alcohol use in specific violation of policy (viz., use of alcohol in one's own hall). The comparative impact of peer norms and SOC varied, depending on the outcome measure. Peer norms (both injunctive and descriptive) unequivocally and positively predicted alcohol use (frequency and rate of binge drinking), with SOC having no predictive power. Support of alcohol-free programming in residence halls, however, was more strongly predicted by SOC than peer norms, with a small interaction effect; injunctive (but not descriptive) norms moderated the otherwise positive impact of SOC on support of programming. Support for policies around alcohol use were driven primarily by peer norms (both injunctive and descriptive), with SOC having a small, positive relationship to support for responsible drinking. Alcohol use within one's hall, which represents a behavioral outcome consisting of both actual use and willingness to violate policy, was again driven primarily by peer norms. However, for this variable, both SOC and the interaction of SOC and peer norms did predict use in one's own hall. These interaction suggested that increased peer norms supporting drinking combined with a strong sense of community serve to heighten student willingness to consume alcohol in their own hall. Overall, previous findings differentiating between injunctive and descriptive norms (Neighbors, et al., 2008) were not supported; injunctive and descriptive norms had similar predictive power in the various models tested within hypotheses 2-5.

Implications for Theory, Research, and Practice

Sense of Community and Social Interaction

Findings from the first hypothesis make a distinct contribution to the current literature on sense of community (SOC), in that face-to-face interaction and communication technology-based interaction (CTI) is examined among groups of people within a specific community. That is, rather than compare general physical interaction and CTI across the vast social network of an individual's life, our study defined a single community experience (residence hall) and looked at the role that interaction in physical and technology-based spaces played for member experiences. While previous research has found some linkages of SOC to specific forms of interaction, no research to date has directly examined both variables in relation to one another among the same community of people.

The assertion that CTI relates to SOC was supported by the results of the project. Students with higher levels of CTI reported higher levels of SOC. This finding parallels qualitative research which underscored the importance of social networking websites in students' sense of community on campus (Martinez, Aleman & Wartman, 2009), as well as quantitative research linking instant messaging to sense of community on campus (Thomas, 2010). The results of the project expand our theoretical knowledge on the relationship between CTI and SOC by comparing its relative impact on SOC with physical interaction among students. Findings suggest that while the growing enthusiasm for research on CTI within higher education is clearly warranted, basic neighboring behavior in physical space, such as visiting in each others' rooms and having dinner together, more directly relates to SOC within residence halls. These findings affirm prior research asserting that physical interaction is paramount in the

experience of SOC (Buckner, 1988), while encouraging future research to better understand the complex role that various communication technologies play in connecting students to their peers.

Stokols, et al. (2009) expands seminal ecological and community psychology theory on behavioral settings (Barker, 1968; Bronfenbrenner & Vasta, 1992) to examine how physical and technology-based social spaces intermingle. This study offered a direct investigation into how these overlapping 'R-V' settings function in student experience of SOC. The high correlation between physical interaction and CTI suggest that the distinction between the two may not be so clear. It may be that student experience of social interaction only partially differentiates between 'real' and 'virtual' forms. In the case of Tyler Clemente, a Year 1 undergraduate at Rutgers University who committed suicide after a video of he and another male engaging in sexual behavior was posted on a social networking site, as well as other less extreme social experiences online (both positive and negative) demonstrate the very *real* interpersonal salience of CTI. Even so, it is noteworthy that physical interaction in the form of more traditional neighboring behavior had a stronger relationship to SOC than CTI. Future theory on 'R-V settings' should target the role that different types of interaction play in creating and expressing SOC. Further qualitative investigation of student experiences, such as Martinez, Aleman & Wartman's (2009) investigation of Facebook use among undergraduates, as well as longitudinal studies to better determine casual relationships between interaction and SOC, would greatly benefit theory.

While new communication technologies have at times been viewed by university administration as a substitute for physical or 'real' interaction among college students, new research has suggested that an interplay may exist between physical interaction and CTI, with both forms of interaction building upon one another. Support for this view has been found in both college populations (Martinez , Aleman & Wartman, 2009) and elderly people (Sum, et al.,

2009). A frontier of future work is the examination of how physical interaction and CTI feed into one another to create SOC. Qualitative research to better understand how students derive social meaning for from various exchanges, and longitudinal designs to capture the development of SOC, offer the opportunity to delve deeper into these specific theoretical issues.

The findings around social interaction and sense of community offer several implications for higher education student affairs staff, campus counseling centers, and others concerned with student wellness. First, given that CTI did play a role in predicting SOC, efforts to build SOC within residence halls may be more successful when they include activities that utilize and facilitate CTI. One example is the establishment of Facebook groups before the start of the fall quarter, after students have selected the hall in which they will reside. Such a strategy can create a connectedness and prime students for the community experience of living in a residence hall. Second, the enduring role of physical interaction should not be overlooked. Many college campuses have moved toward suite-style residence halls, allowing for more independence and privacy but also less structural interaction among students. In addition, some universities (such as the university in which this project was based) do not have a hall-based cafeteria where students interact on a daily basis. Thus, thinking intentionally about providing and promoting opportunities to physically interact (such as events held in common spaces or involving shared meals) might help create increased sense of community within the halls.

Sense of Community, Peer Norms, and Alcohol-related Attitudes and Behaviors

Prior research has demonstrated that SOC can serve as both a predictor (Chavis & Wandersman, 1990) and outcome (Hughey, et al., 1999) for various issues related to personal wellness. Peer norms, both injunctive and descriptive, have been clearly established as predictors of college alcohol use (Neighbors, et al., 2008). Hypotheses 2-5 of the present study

examined the intersection of peer norms and SOC as predictors for a host of alcohol-related behaviors and attitudes among undergraduates residing in residence halls. By exploring a range of attitudinal and behavioral outcomes related to alcohol use, SOC's influence can be understood in relation to the more proximal influence of close friends. Thus, the results from the study add several important contributions to the substantial body of research on college alcohol use.

In examining frequency of alcohol use and rate of binge drinking, a moderating relationship between SOC and peer norms was not proposed. Results confirmed that there was no relationship between SOC and peer norms in predicting the frequency of alcohol use or rates of binge drinking. In contrast, peer norms were strong predictors of both the frequency of alcohol use and the number of binge episodes.

Prior research has made a conceptual distinction between the values and attitudes peers hold about alcohol use (injunctive norms) and norms for peers' actual use of alcohol (descriptive norms), and found some differences between the two (Carey, et al., 2010; Neighbors, et al., 2008). Findings from the present study, however, did not find differences between the two types of peer norms, overall. The impact of injunctive and descriptive norms on frequency of alcohol use was equivalent. One slight exception was found, in that descriptive norms had a stronger predictive power (as measured by R^2 change) for rates of binge drinking, compared to injunctive peer norms. Prior research found that brief motivational interventions for college student drinkers were more effective when they provided a more accurate appraisal of descriptive, but not injunctive, peer norms (Carey, et al., 2010). Findings in the present study are consistent with the view that descriptive norms more strongly influence a student's binge drinking than injunctive norms.

A more complex picture of how SOC and peer norms relate to college alcohol use emerged when the variables of interest in programming, support of policies, and alcohol use in one's hall were examined. SOC was found to be a stronger predictor of interest in alcohol-free programming, when compared to peer norms. The opposite was true for support of alcohol-related policies; peer norms were stronger predictors of support for policies (higher norms predicting lower support). In light of the demonstrated, significant role that peer norms play here and across the literature on college alcohol use, one interpretation of these three findings for interest in programming, support of policies, and actual use in halls is that SOC plays a greater role when linked to positive, voluntary opportunities such as programming, and that peer norms play a greater role when linked to activities that could result in some form of sanction or disciplinary action.

To our knowledge, no study has examined the specific role that SOC plays in predicting various alcohol-related issues such as interest in alcohol-free programming and policies related to alcohol use, as well as actual use of alcohol in residence halls. Findings from the study offer several implications to the way SOC links to such outcomes.

Alcohol-free social programming represents an interesting domain for intervention, from the perspective of residential education departments on college campuses. The use of alcohol among students is quite common across many college campuses, but perhaps even more ubiquitous is the desire for a sense of belonging to one's university community. Findings from hypothesis 3 suggest that SOC is a greater factor in determining whether or not a student will take part in alcohol-free social programming, even when peer norms in support of drinking are high. While only modest in its impact, the interaction between SOC and injunctive peer norms is noteworthy. The theoretical bias of how SOC is understood has been critiqued as being

universally positive and homogenous across experiences (Townley, et al., 2011). However, students with high SOC and low injunctive norms were more interested in taking part in alcohol-free social programming than students with high SOC and high injunctive norms. This interaction suggests that the role of SOC is complex, and also relates to the more proximal attitudes of one's close same-sex peers.

Residence education departments strive to provide holistic, supportive contexts for undergraduate learning. University policies around alcohol use reflect this commitment, and introduce an arena that both promotes student wellness and regulates their actions. Findings from the current study suggests that peer norms—both injunctive and descriptive—are far more relevant than overall SOC within residence halls in predicting student support of alcohol-related policies. Findings from our study do not suggest that SOC is a universal predictor for student support of policies around alcohol use. Rather, our results indicate that peer norms are a stronger predictor of the extent to which students see residential hall policies around alcohol use to be legitimate and fair.

The present study examined the intersection of attitudes and behaviors around alcohol use by looking at the use of alcohol within one's own residence hall. Thus, the final hypothesis represented a crossroads of student attitudes and actual behavior around alcohol use. Here, peer norms were much stronger predictors of alcohol use in one's own hall, compared to SOC. Interestingly, the relationship between SOC and use in one's own hall was positively related; that is, higher SOC related to higher rates of use in one's hall. This relationship was moderated slightly by injunctive peer norms, where students' SOC more positively impacted the use of alcohol in one's own hall when injunctive peer norms were high. From a theoretical perspective, this underscores the flexible role that SOC plays in facilitating social interaction across a

spectrum of behavior. It is noteworthy that, in a sense, SOC actually promoted student alcohol use in the halls, especially when paired with high injunctive peer norms. While residence hall was not found to be a significant predictor, there may be more subtle hall norms that were not found in the data that also influence student alcohol use in the hall; this examination of hall impact would be a worthwhile area of focus for future research.

Residential education departments strive to promote student wellness, yet can have only limited influence on the choices students ultimately make during their early college years. Alcohol use by college students has proven an inextricable phenomenon at many institutions of higher education. This study differentiated several different outcome variables both within and outside of residential education departments' sphere of influence. Implications of the findings suggest that residence life can have the most impact on student alcohol use by focusing on 1) providing alcohol-free social programming, 2) clarifying the norms of close, same-sex peers (real and perceived) and 3) offering interventions that target close, same-sex peer groups. When combined with efforts to promote SOC within halls, such approaches can offer a climate for positive and responsible choices around alcohol use, and maximize the scope of influence residential education departments have on student wellness.

<div align="center">Strength and Limitations</div>

A strength of the present study was the opportunity it provided for examining physical interaction and communication technology- based interaction (CTI) among a specific community of people, defined by residence hall. This research fills a gap in the literature, which has previously explored such social experiences independently. As an illustration, one could experience a very rich social life among face-to-face friends, but be totally estranged from technological social interaction. Conversely, a person could have a wealth of Facebook friends,

chatroom correspondences, and phone conversations, without significant physical interaction with others. Examining physical interaction and CTI within the same community of people expands our knowledge about the way the two forms of interaction function concurrently in the community experiences of members.

A second strength of the study is that it compared the role of sense of community (SOC) to peer norms in relation to attitudes and behaviors around alcohol use. Both social experiences are a significant feature for college undergraduates residing in residence halls, yet prior research had not studied the two in conjunction. The work presented here allowed for a systematic comparison of the two.

Lastly, the collaborative nature of the university relationship between the residence education department and the psychology department cannot be understated in its role in the current study. The perspective of residence education offered the study both motivation and insight into student and staff experience. The interest, flexibility, and enthusiasm in integrating the study constructs into wider exploration of student wellness on campus was instrumental in framing student items and crafting questions to be asked. Support from residential education was key in generating the project's high overall response rate of over 40% of students that were at the time residing in the residence halls.

A limitation of the study was the fact that it occurred at a single point in time. While the prior literature provides some evidence of casual relationships between both SOC and peer norms in predicting wellness outcomes, there most likely exists iterative relationships between the independent and dependent variables of the study. That is, in addition to the relationships proposed here, a strong SOC might also drive increased social interaction, and attitudes and behaviors around alcohol use may drive the seeking out of and formation of friendships with

like-minded peers. Given the interesting findings of the study, longitudinal research examining similar predictors and outcomes across time could expand the results and yield further clarification of the role each variable plays.

Consistent with most of the previous literature (LaBrie, et al., 2010), our study treated peer norms as relatively fixed in time. However, peer norms can evolve over time. Future research on peer norms might examine the malleability of peer norms, both injunctive and descriptive. Recent work in this area has suggested that perceptions around injunctive norms can be shaped by brief interventions on college campuses (Prince & Carey, 2010), and it is likely true that descriptive norms can shift during a student's undergraduate career. This area might further inform intervention strategies for residence life and other university entities in addressing alcohol use during one's college years.

Lastly, while our measurement of communication technology-based interaction (CBI) was based on previous national surveys, the area of CBI measurement is in its infancy. Therefore, the measurement approach of student approximations of time spent using CBI's may be limited in terms of accuracy, especially when one considers how different technological devices are used (e.g., multi-tasking while on Facebook) and quantified (e.g. time texting vs. number of text messages sent). Future research to develop a more precise assessment of time spent communicating using technology is clearly indicated.

Future Directions: A proposed research program for the existent dataset

In the prior section of the current chapter, we addressed general implications for future research based on contemporary theory. The current project, housed within a larger, 4-year, survey-based evaluation to address student wellness, offers rich opportunities for furthering research on the variables of interest in combination with new topics. Thus, we have the fortunate

(if somewhat unorthodox) position of proposing a concrete set of future studies that might build on the constructs examined here, while adding new areas of focus based on variables generated from the larger dataset. This section proposes a program of research topics based on three new areas of study within the larger survey dataset: 1) The relationship between the use of specific communication technologies and sense of community; 2) Engagement in campus life and sense of community; 3) Family history, parental attitudes, and high school use in predicting college peer norms and alcohol-related attitudes and behavior at college.

Use of Communication Technologies and Sense of Community

Utilizing frameworks from groundbreaking research on the use of communication technology-based interaction (CTI) among undergraduate students (Ellison, et al., 2007; Smith & Caruso, 2010), a measurement gauge for student connectivity was created, and found CTI to be positively related to sense of community (SOC). While the nature of the project was linked to student attitudes and behaviors around alcohol use, the linkage between CTI and SOC is in and of itself relevant to theory, and a future study might inform our nascent knowledge on CTI by breaking down specific drivers of CTI as it relates to SOC. Recent research has suggested a connection between instant messaging and SOC (Thomas, 2010), and our current dataset offers the opportunity for examining single-item variables specific to the use of Facebook, email, text messaging, instant messaging, video messaging, and other forms of interaction based on communication technology. New research in this area can benefit residence education departments by better understanding the various (and ever-evolving) ways that students interact with one another across technology-assisted spaces.

Engagement in Campus Life and Sense of Community

Prior research has established the positive relationship between SOC and campus involvement (Cicognani, et al., 2008; DeNeui, 2003) . The survey dataset in which the current project is based included a wide range of student involvement activities, derived from the literature, that included activities such as membership in student organizations, participation in recreation and fitness centers, involvement in study groups, religious community affiliation, and other campus life activities. Importantly, the larger survey project asked students to report the extent to which participation in such social endeavors were done with students from one's own hall. A promising area of future research involves examining these variables in light of hall SOC within and beyond the residence hall. An examination of hypotheses targeting the relationship between hall SOC and these important campus engagement variables may help shed light on how best to further efforts to ground students in their campus community and support their overall goals around academic and social success during their college years.

Family History, Parental Attitudes, and High School Use as Predictors of Alcohol-related Attitudes & Behaviors at College

Family history of alcohol use, parental attitudes around alcohol use, and prior alcohol use in high school have all been found to be strong predictors of college alcohol use (Abar, Abar, & Turrisi, 2009; Turrisi, et al., 2007). Subsequent peer norms around alcohol use while at college have not been systematically explored in their relationship to these variables. The current survey dataset included items that explored these variables, based on student report of past experience. A future proposed study would involve the examination of how these past-oriented variables predict current use, as well as the potential mediating role of current injunctive and descriptive peer norms on student attitudes and behaviors around alcohol use.

CHAPTER V

SUMMARY

Social experiences such as sense of community (SOC) and the role of close friends have the potential to influence an individual's attitudes and behaviors around a host of wellness-related issues. Social interaction facilitated by the rapid growth of communication technology, in addition to the enduring desire to interact in physical space, represent two important potential features to the experience of SOC. University college residence halls are of interest to community psychology, in that they are highly interactive, technologically-savvy social environments where communities develop.

In terms of alcohol-related attitudes and behaviors, the role of peer norms is well established, with peer norms having a strong relationship to a student's perspective and choices around alcohol use. Less understood is the role that SOC plays, and the different forms of social interaction that help generate a SOC.

The current study provided new research on social interaction and SOC, as well as the role of SOC and more proximal peer norms in impacting a set of alcohol-related attitudes and behaviors. The project involved online survey data for 1003 undergraduate students residing in residence halls at a large, private, Midwestern university. Social interaction was measured in terms of both physical neighboring behavior and communication-technology facilitated interaction. SOC and both injunctive and descriptive peer norms were measured, as well as frequency of alcohol use, interest in alcohol-free social programming, support for alcohol-related hall policy, and use of alcohol in one's own hall.

Findings from the study suggested that both physical and communication-technology-based social interaction related to a students' SOC, with face-to-face interaction having a

substantially greater impact. Peer norms for alcohol use, but not SOC, were related to both frequency of alcohol use and rates of binge drinking. SOC in residence halls and peer norms were related to interest in alcohol-free social programming in residence halls, with SOC being more strongly related. SOC and peer norms for alcohol use (both injunctive and descriptive) were significantly related to support for policies concerning alcohol use in the halls and use of alcohol in one's own hall, with peer norms being stronger predictors than SOC. A modest interaction effect was found, where injunctive norms moderated the influence of SOC on interest in programming. The greater peer norms around use, the lesser the impact of SOC in predicting interest. In addition, interaction effects were found for both injunctive and descriptive norms, where increased peer norms increased the positive relationship between SOC and use in one's hall.

Findings from this study are highly relevant to community psychology theory as it relates to SOC, as they examine overlapping physical and technology-based social spaces experienced by the same community of people. Findings can also benefit student affairs and others concerned with promoting student wellness on campus. They also have implications for research on substance use and abuse, and expand the way social experience and alcohol-related attitudes and behaviors are understood. Specifically, findings suggest that, while peer norms do provide a strong influence on student behavior, SOC also plays a role, and can substantially drive student decisions and actions regarding alcohol-related social programming. The project underscores the important role that collaborative, ongoing relationships between community researchers and residential education departments can have in promoting student wellness and expanding our knowledge on community experience.

References

Abar, C., Abar, B., & Turrisi, R. (2009). The impact of parental modeling and permissibility on alcohol use and experienced negative drinking consequences in college. *Addictive Behaviors, 34*(6-7), 542-547.

Anderson, & Gadaleto, A. (2001). Results of the 2000 College Alcohol Survey: Comparison with 1997 results and baseline year. Fairfax, VA: Center for the Advancement of Public Health, George Mason University.

Anderson, M. R. (2009). Beyond membership: A sense of community and political behavior. *Political Behavior, 31*(4), 603-627.

Baer, J. S., Stacy, A., & Larimer, M. (1991). Biases in the perception of drinking norms among college students. *Journal of Studies on Alcohol, 52*(6), 580-586.

Barker, R. G. (1968). *Ecological Psychology: Concepts and methods for studying the environment of human behavior*. Palo Alto, CA: Stanford University Press.

Bathum, M. E., & Baumann, L. C. (2007). A sense of community among immigrant Latinas. *Family & Community Health: The Journal of Health Promotion & Maintenance, 30*(3), 167-177.

Berkowitz, A. D. (2003). Applications of social norms theory to other health and social justice issues. In H. W. Perkins (Ed.), *The social norms approach to preventing school and college age substance abuse: A handbook for educators, counselors, and clinicians.* (pp. 259-279). San Francisco, CA US: Jossey-Bass.

Bishop, B., Colquhoun, S., & Johnson, G. (2006). Psychological sense of community: An Australian Aboriginal experience. *Journal of Community Psychology, 34*(1), 1-7.

Borsari, B. (2001). Peer influences on college drinking: A review of the research. *Journal of Substance Abuse, 64*(3), 331-341.

Bosari, B. (2007). Predictors of alcohol use during the first year of college: Implications for prevention. *Journal of Addictive Behaviors, 32*, 2062-2086.

boyd, d. m., & Ellison, N. B. (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication, 13*(1), 210-230.

Bronfenbrenner, U., & Vasta, R. (1992). Ecological systems theory. *Six theories of child development: Revised formulations and current issues.* (187-249). London England: Jessica Kingsley Publishers.

Buckner, J. C. (1988). The development of an instrument to measure neighborhood cohesion. *American Journal of Community Psychology, 16*(6), 771-791.

Burke, R. S., & Stephens, R. S. (1999). Social anxiety and drinking in college students: A social cognitive theory analysis. *Clinical Psychology Review, 19*(5), 513-530.

Cail, J., & LaBrie, J. W. (2010). Disparity between the perceived alcohol-related attitudes of parents and peers increases alcohol risk in college students. *Addictive Behaviors, 35*(2), 135-139.

Carey, K. B., Henson, J. M., Carey, M. P., & Maisto, S. A. (2010). Perceived norms mediate effects of a brief motivational intervention for sanctioned college drinkers. *Clinical Psychology: Science and Practice, 17*(1), 58-71.

Chavis, D. M., & Wandersman, A. (1990). Sense of community in the urban environment: A catalyst for participation and community development. *American Journal of Community Psychology, 18*(1), 55-81.

Chawla, N., Neighbors, C., Logan, D., Lewis, M. A., & Fossos, N. (2009). Perceived approval of friends and parents as mediators of the relationship between self-determination and drinking. *Journal of Studies on Alcohol and Drugs, 70*(1), 92-100.

Cicognani, E., Pirini, C., Keyes, C., Joshanloo, M., Rostami, R., & Nosratabadi, M. (2008). Social participation, sense of community and social well being: A study on American, Italian and Iranian university students. *Social Indicators Research, 89*(1), 97-112.

Cranford, J. A., McCabe, S. E., & Boyd, C. J. (2006). A new measure of binge drinking: Prevalence and correlates in a probability sample of undergraduates. *Alcoholism: Clinical and Experimental Research, 30*(11), 1896-1905.

Cross, J. E., Zimmerman, D., & O'Grady, M. A. (2009). Residence hall room type and alcohol use among college students living on campus. *Environment and Behavior, 41*(4), 583-603.

Davidson, W. B., Cotter, P. R., & Stovall, J. G. (1991). Social predispositions for the development of sense of community. *Psychological Reports, 68*(3), 817-818.

DeJong, W., Schneider, S. K., Towvim, L. G., Murphy, M. J., Doerr, E. E., Simonsen, N. R., . . . Scribner, R. A. (2009). A multisite randomized trial of social norms marketing campaigns to reduce college student drinking: A replication failure. *Substance Abuse, 30*(2), 127-140.

DeNeui, D. L. C. (2003). An investigation of first-year college students' psychological sense of community on campus. *College Student Journal, 37*(2), 224-234.

Dillman, D. A. (2007). *Mail and Internet Surveys: The Tailored Design, Second Edition*. Hoboken, NJ: John Wiley.

Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook 'friends:' Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication, 12*(4), 1143-1168.

Farrell, S. J., Aubry, T., & Coulombe, D. (2004). Neighborhoods and Neighbors: Do They Contribute to Personal Well-Being? *Journal of Community Psychology, 32*(1), 9-25.

Fisher, A. T., Sonn, C. C., & Bishop, B. J. (2002). *Psychological sense of community: Research, applications, and implications*. New York, NY US: Kluwer Academic/Plenum Publishers.

Goldfeld, S. M., & Quandt, R. E. (1965). Some Tests for Homoskedasticity. *Journal of the American Statistical Association, 60*, 539-547.

Graham, B. C., Jason, L. A., Ferrari, J. R., & Davis, M. I. (2009). Sense of Community within Oxford House Recovery Housing: Impact of Resident Age and Income. *Journal of Groups in Addiction & Recovery, 4*(1), 62 - 70.

Greenbaum, P. E., Del Boca, F. K., Darkes, J., Wang, C.-P., & Goldman, M. S. (2005). Variation in the Drinking Trajectories of Freshmen College Students. *Journal of Consulting and Clinical Psychology, 73*(2), 229-238.

Harford, T. C., Wechsler, H., & Muthén, B. O. (2002). The impact of current residence and high school drinking on alcohol problems among college students. *Journal of Studies on Alcohol, 63*(3), 271-279.

Harman, H. H. (1967). *Modern factor analysis*. Chicago, IL University of Chicago Press.

Hill. (1996). Psychological sense of community: Suggestions for future research. *Journal of Community Psychology, 24*(4), 431-438.

Hill, B. D., Shaw, M. D., & Devlin, A. S. (1999). Sense of community in cluster versus corridor dormitory design. In T. Mann (Ed.), *The Power of Imagination.* (77-83). Edmond, OK US: Environmental Design Research Association.

Hingson, R., Heeren, T., Winter, M., & Wechsler, H. (2005). Magnitude of alcohol-related mortality and morbidity among U.S. college students ages 18-24: Changes from 1998 to 2001. *Annual Review of Public Health, 26*(1), 259-279.

Horton, N. J., Lipsitz, S. R., & Parzen, M. (2003). A Potential for Bias When Rounding in Multiple Imputation. *The American Statistician, 57*, 229-232.

Hughey, J., Speer, P. W., & Peterson, N. A. (1999). Sense of community in community organizations: Structure and evidence of validity. *Journal of Community Psychology, 27*(1), 97-113.

Junco, R., & Mastrodicasa, J. (2007). *Connecting to the Net.Generation: What Higher Education Professionals Need to Know About Today's Students.* National Association of Student Personnel Administrators.

Kahn, J. H. (2011). Multilevel modeling: Overview and applications to research in counseling psychology. *Journal of Counseling Psychology, 58*(2), 257-271.

Kopalle, P. K., & Lehmann, D. R. (1997). Alpha inflation? The impact of eliminating scale items on Cronbach's alpha. *Organizational Behavior and Human Decision Processes, 70*(3), 189-197.

Korcuska, J. S., & Thombs, D. L. (2003). Gender role conflict and sex-specific drinking norms: Relationships to alcohol use in undergraduate women and men. *Journal of College Student Development, 44*(2), 204-216.

LaBrie, J. W., Hummer, J. F., Neighbors, C., & Larimer, M. E. (2010). Whose opinion matters? The relationship between injunctive norms and alcohol consequences in college students. *Addictive Behaviors, 35*(4), 343-349.

LaRose, R., Eastin, M. S., & Gregg, J. (2001). Reformulating the Internet paradox: Social cognitive explanations of Internet use and depression. *Journal of Online Behavior, 1*(2).

Leigh, B. C., & Stacy, A. W. (1993). Alcohol outcome expectancies: Scale construction and predictive utility in higher order confirmatory models. *Psychological Assessment, 5*(2), 216-229.

Long, D. A., & Perkins, D. D. (2003). Confirmatory factor analysis of the Sense of Community Index and development of a brief SCI. *Journal of Community Psychology, 31*(3), 279-296.

Lou, L. L. (2010). *Loneliness, friendship, and self-esteem: First-year college students' experience of using facebook.* 70, ProQuest Information & Learning, US. Retrieved from http://library.depaul.edu/CheckURL.aspx?address=http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2010-99120-206&site=ehost-live&scope=site.

Lounsbury, J. W., & DeNeui, D. (1995). Psychological sense of community on campus. *College Student Journal, 29*(3), 270-277.

Lounsbury, J. W., Loveland, J. M., & Gibson, L. W. (2003). An Investigation of Psychological Sense of Community in Relation to Big Five Personality Traits. *Journal of Community Psychology, 31*(5), 531-541.

Luke, D. A. (2004). *Multilevel Modeling*. Thousand Oaks, CA: Sage Publications.

Maas, C. J. M., & Hox, J. J. (2005). Sufficient Sample Sizes for Multilevel Modeling. *Methodology: European Journal of Research Methods for the Behavioral and Social Sciences, 1*(3), 86-92.

Madge, C., Meek, J., Wellens, J., & Hooley, T. (2009). Facebook, social integration and informal learning at university: 'It is more for socialising and talking to friends about work than for actually doing work.'. *Learning, Media and Technology, 34*(2), 141-155.

McCarthy, M. E., Pretty, G. M., & Catano, V. (1990). Psychological sense of community and student burnout. *Journal of College Student Development, 31*(3), 211-216.

McMillan, D. W., & Chavis, D. M. (1986). Sense of community: A definition and theory. *Journal of Community Psychology, 14*(1), 6-23.

Morgan, C., & Cotten, S. R. (2003). The relationship between internet activities and depressive symptoms in a sample of college freshmen. *CyberPsychology & Behavior, 6*(2), 133-142.

Neighbors, C., Atkins, D. C., Lewis, M. A., Lee, C. M., Kaysen, D., Mittmann, A., . . . Rodriguez, L. M. (2011). Event-specific drinking among college students. *Psychology of Addictive Behaviors*.

Neighbors, C., O'Connor, R. M., Lewis, M. A., Chawla, N., Lee, C. M., & Fossos, N. (2008). The relative impact of injunctive norms on college student drinking: The role of reference group. *Psychology of Addictive Behaviors, 22*(4), 576-581.

O'Hare, T. M. (1990). Drinking in college: Consumption patterns, problems, sex differences and legal drinking age. *Journal of Studies on Alcohol, 51*(6), 536-541.

O'Malley, P. M., & Johnston, L. D. (2002). Epidemiology of alcohol and other drug use among American college students. *Journal of Studies on Alcohol, 14*, 23-39.

Obst, Smith, S. G., & Zinkiewicz, L. (2002). An exploration of sense of community, Part 3: Dimensions and predictors of psychological sense of community in geographical communities. *Journal of Community Psychology, 30*(1), 119-133.

Obst, & Stafurik, J. (2010). Online we are all able bodied: Online psychological sense of community and social support found through membership of disability-specific websites promotes well-being for people living with a physical disability. *Journal of Community & Applied Social Psychology, 20*(6), 525-531.

Obst, & White, K. M. (2004). Revisiting the sense of community index: A confirmatory factor analysis. *Journal of Community Psychology, 32*(6), 691-705.

Obst, & White, K. M. (2007). Choosing to belong: The influence of choice on social identification and psychological sense of community. *Journal of Community Psychology, 35*(1), 77-90.

Olson, B. D., Curtis, C. E., Jason, L. A., Ferrari, J. R., Horin, E. V., Davis, M. I., . . . Alvarez, J. (2003). Physical and Sexual Trauma, Psychiatric Symptoms, and Sense of Community Among Women in Recovery: Toward a New Model of Shelter Aftercare. *Journal of Prevention & Intervention in the Community, 26*(1), 67-80.

Omoto, A. M., Snyder, M., & Sturmer, S. (2009). Influences of psychological sense of community on voluntary helping and prosocial action *The psychology of prosocial behavior: Group processes, intergroup relations, and helping.* (224-243): Wiley-Blackwell.

Pempek, T. A., Yermolayeva, Y. A., & Calvert, S. L. (2009). College students' social networking experiences on Facebook. *Journal of Applied Developmental Psychology, 30*(3), 227-238.

Peterson, N. A., Speer, P. W., & McMillan, D. W. (2008). Validation of a Brief Sense of Community Scale: Confirmation of the principal theory of sense of community. *Journal of Community Psychology, 36*(1), 61-73.

Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5), 879-903.

Prince, M. A., & Carey, K. B. (2010). The malleability of injunctive norms among college students. *Addictive Behaviors, 35*(11), 940-947.

Raudenbush, S. W., & Bryk, A. S. (2002). *Hierarchical Linear Models: Application and data analysis methods (2nd ed.)*. Thousand Oaks, CA: Sage Publications.

Rubin, D. B. (1987). *Multiple Imputation for Nonresponse Surveys*. New York: John Wiley & Sons.

Saltz, R. F. (2004). PREVENTING ALCOHOL-RELATED PROBLEMS ON COLLEGE CAMPUSES *Alcohol Research & Health* (pp. 249-251): National Institute on Alcohol Abuse & Alcoholism.

Scherbaum, C. A., & Ferreter, J. M. (2009). Estimating statistical power and required sample sizes for organizational research using multilevel modeling. *Organizational Research Methods, 12*(2), 347-367.

Services, U. S. D. o. H. a. H. (2007). The Surgeon General's call to action to prevent and reduce underage alcohol use. Rockville, MD: Public Health Service, Office of the Surgeon General.

Smith, S. D., & Caruso, J. B. (2010). ECAR Study of Undergraduate Students and Information Technology, 2010 (Vol. 6). Boulder, CO: EDUCAUSE Center for Applied Research.

Smyth, J. D., Dillman, D. A., Christian, L. M., & McBride, M. (2009). Open-ended questions in web surveys: Can increasing the size of answer boxes and providing extra verbal instructions improve response quality? *Public Opinion Quarterly, 73*(2), 325-337.

Snijders, T. A. B., & Bosker, R. J. (1999). *Multilevel Analysis: An introduction to basic and advanced multilevel modeling*. Thousand Oaks, CA: SAGE Publications Inc.

Solomon, D., Watson, M., Battistich, V., & Schaps, E. (1996). Creating classrooms that students experience as communities. *American Journal of Community Psychology, 24*(6), 719-748.

Stevens, E. B. J., L.A.; Ferrari, J.R. . (2011). Measurement performance of the Sense of Community Index in substance abuse recovery communal housing. *Australian Community Psychologist, 23*, 125-147.

Stokols, D., Misra, S., Runnerstrom, M. G., & Hipp, J. A. (2009). Psychology in an age of ecological crisis: From personal angst to collective action. *American Psychologist, 64*(3), 181-193.

Subrahmanyam, K., Reich, S. M., Waechter, N., & Espinoza, G. (2008). Online and offline social networks: Use of social networking sites by emerging adults. *Journal of Applied Developmental Psychology, 29*(6), 420-433.

Sum, S., Mathews, R. M., Pourghasem, M., & Hughes, I. (2009). Internet use as a predictor of sense of community in older people. *CyberPsychology & Behavior, 12*(2), 235-239.

Thomas, A. G. (2010). *The relationships between students' use of instant messaging and their psychological sense of community.* 70, ProQuest Information & Learning, US. Retrieved from

http://library.depaul.edu/CheckURL.aspx?address=http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2010-99071-131&site=ehost-live&scope=site.

Thombs, D. L., Ray-Tomasek, J., Osborn, C. J., & Olds, R. S. (2005). The Role of Sex-specific Normative Beliefs in Undergraduate Alcohol Use. *American Journal of Health Behavior, 29*(4), 342-351.

Thomee, S., Eklof, M., Gustafsson, E., Nilsson, R., & Hagberg, M. (2007). Prevalence of perceived stress, symptoms of depression and sleep disturbances in relation to information and communication technology (ICT) use among young adults – an explorative prospective study. *Computers in Human Behavior, 23*, 1300-1321.

Townley, G., Kloos, B., Green, E. P., & Franco, M. M. (2011). Reconcilable differences? Human diversity, cultural relativity, and sense of community. *American Journal of Community Psychology, 47*(1-2), 69-85.

Turrisi, R., Mastroleo, N. R., Mallett, K. A., Larimer, M. E., & Kilmer, J. R. (2007). Examination of the mediational influences of peer norms, environmental influences, and parent communications on heavy drinking in athletes and nonathletes. *Psychology of Addictive Behaviors, 21*(4), 453-461.

Unger, D. G., & Wandersman, A. (1985). The importance of neighbors: The social, cognitive, and affective components of neighboring. *American Journal of Community Psychology, 13*(2), 139-169.

Valenzuela, S. n., Park, N., & Kee, K. F. (2009). Is there social capital in a social network site?: Facebook use and college students' life satisfaction, trust, and participation. *Journal of Computer-Mediated Communication, 14*(4), 875-901.

Wechsler, H., Kuo, M., Lee, H., & Dowdall, G. W. (2000). Environmental correlates of underage alcohol use and related problems of college students. *American Journal of Preventive Medicine, 19*(1), 24-29.

Wood, M. D., Read, J. P., Palfai, T. P., & Stevenson, J. F. (2001). Social influence processes and college student drinking: The mediational role of alcohol outcome expectations. *Journal of Studies on Alcohol, 62*(1), 32-43.

Yasuda, T. (2009). Psychological sense of community in university classrooms: Do achievement goal orientations matter? *College Student Journal, 43*(2), 547-561.

Appendix A. Complete Survey Instrument

For the complete online survey instrument, please see:

http://depaulsa.qualtrics.com/SE/?SID=SV_9BpCttimAwaVIpu&SVID=Prod