

Motivational and Social Network Dynamics of
Ensemble Music Making:
A Longitudinal Investigation of a Collegiate Marching Band
by
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ABSTRACT

People are motivated to participate in musical activities for many reasons. Whereas musicians may be driven by an intrinsic desire for musical growth, self-determination theory suggests that this drive must also be sustained and supported by the social environment. Social network analysis is an interdisciplinary theoretical framework and collection of analytical methods that allows us to describe the social context of a musical ensemble. These frameworks are utilized to investigate the relationship of participatory motivation and social networks in a large Division I collegiate marching band. This study concludes that marching band members are predominantly self-determined to participate in marching band and are particularly motivated for social reasons, regardless of their experience over the course of the band season. The members who are highly motivated are also more integrated into the band's friendship and advice networks. These highly integrated members also tend to be motivated by the value and importance others display for the marching band activity suggesting these members have begun to internalized those values and seek out others with similar viewpoints. These findings highlight the central nature of the social experience of marching band and have possible implications for other musical leisure ensembles. After a brief review of social music making and the theoretical frameworks, I will provide illustrations of the relationship between motivation and social networks in a musical ensemble, consider the implications of these findings for promoting self-determined motivation and the wellbeing of musical ensembles, and identify directions for future research.

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CHAPTER 1

INTRODUCTION

Human beings can be proactive and engaged or, alternatively, passive and alienated, largely as a function of the social conditions in which they develop and function. (Ryan & Deci, 2000, p. 68)

People are motivated to participate in musical activities for many reasons. A person's perceptions of and attitudes towards an activity are affected by their feelings about themselves and others. These perceptions undoubtedly affect a person's source of motivation. As musicians, we often focus on the specific musical aspects of the experience as a central motivating force to participate in musical activities, but other motivational components also need to be considered. Whereas musicians may be driven by an intrinsic desire for musical growth, self-determination theory (SDT), a psychological theory of motivation, suggests that this drive must also be sustained and supported by the social environment (Deci & Ryan, 2002). In other words, SDT proposes that the broader social context of the musical experience is important when investigating why people choose to participate and remain engaged in musical leisure activities. Social network analysis (SNA) is an interdisciplinary theoretical framework and collection of analytical methods that enables the quantification of social relationships in an organization (Valente, 2010). More simply, it allows us to describe the social context of a musical ensemble. To the best of my knowledge, this study is the first to integrate SDT approaches to participatory motivation and SNA approaches in describing social contexts that delineate and track over time the relationships between these two critical components

of group music making and leisure activities. After a brief review of social music making and the theoretical frameworks, I will provide illustrations of the relationship between motivation and social networks in a musical ensemble, consider the implications of these findings for promoting self-determined motivation and the health and wellbeing of musical ensembles, and identify directions for future research.

MUSIC MAKING AS A SOCIAL EXPERIENCE

Evidence of group music making has been observed throughout human history. Some researchers, such as neurobiologist Walter Freeman, suggest that participation in social music making by early humans performed an important evolutionary role in the development and survival of societies. For example, some hypotheses speculate that group music making modulates oxytocin and other neuro-mediators, along with hormones that facilitate social cohesion and bonding important to building trust and strength among members in communities (e.g., Dunbar, 2004; Freeman, 2000; Grape, Sandgren, Hansson, Ericson, & Theorell, 2003); if found to be true, these hypotheses have important implications for understanding the innate desire to experience music with others. McNeill (2000) also discusses how the communal experience of music making involves actively creating a sense of unity that facilitates cognitive coordination, shared emotional states, ‘boundary loss’, and a development of trust in the community of music makers. While social music making may no longer be integral to daily survival, humans may still have a primal predisposition to react to group music making in a way that affects wellbeing and social integration.

A critical paper by Ian Cross (2001), the director of the Center for Music and Science at Cambridge University, reviews the nature of music from an evolutionary

theory perspective; Cross concludes that music is a “product of both our biologies and our social interactions (Cross, 2001, p. 28).” Cross continues to elaborate on the role of music making in human cultures when he states:

[M]usic is uniquely fitted to have played a significant role in facilitating the acquisition and maintenance of the skill of being a member of a culture—of interacting socially with others—as well as providing a vehicle for integrating our domain-specific competences so as to endow us with the multipurpose and adaptive cognitive capacities that make us human (Cross, 2001, p. 38).

Although I am not directly addressing questions of the evolution and role of music in this investigation, Cross’ statement underpins the integral relationship between people’s desire to participate in music-making experiences today and their social experiences. In the past few hundred years of human history, some cultures have begun to diminish and control the social experience of music making by delineating musical performers from musical consumers, a divide that did not exist previously. Examples representative of this change include the concert tradition in Western societies, where high-level professional musicians perform a concert for an audience of passive listeners or the potentially solitary consumption of recorded music. This decrease in communal music making within a large part of our society and the subsequent creation of musical haves and have-nots, at least where participatory group music is concerned, seem to go against our natural human tendencies, at least as suggested by these evolutionary researchers.

Despite this cultural shift in communal music making and consuming, we, as humans, may not have lost our innate desire to connect to others through this medium; however, some in the music profession have questioned the value of participating in large

musical ensembles and suggest that this form of social music making is no longer relevant, including as a serious leisure activity like that of many non-professional musical ensembles. Serious leisure can be defined as the “systematic pursuit of an amateur, hobbyist, or volunteer activity that is highly substantial, interesting, and fulfilling and where, in the typical case, participants find a career in acquiring and expressing a combination of its special skills, knowledge, and experience (Stebbins, 1992, p.3).” Many arguments on either side of this debate have been supported anecdotally or through tradition, and not scientifically, mainly because there is a lack of significant scholarship. Research does continue to demonstrate the emotional and psychological power of musical engagement (e.g., Persson, 2001; Sloboda, 1998; Csikszentmihalyi, 1990; Lewis & Sullivan, 2005; Welch & Adams, 2003), and also the importance of the broader context of that musical experience to its meaning (e.g., Fritz & Avsec, 2007; O’Neill, 1999; Bailey & Davidson, 2005; Booth, 1999). I seek to address this lacuna in the literature in order for us to better understand the nature and purpose of social music making, especially in a serious leisure setting. This study will take an objective look at a musical ensemble and its social context in order to better understand its motivational and social network dynamics, with the hope of clarifying why many people remain musically engaged with others.

TOWARDS AN UNDERSTANDING OF MOTIVATIONAL AND SOCIAL NETWORK DYNAMICS IN A MUSICAL ENSEMBLE

The previous discussion suggests that music-making activities are intimately and inseparably connected to the social environment in which they are performed and experienced. Consequently, I submit that the social environment of a musical ensemble is

related to a musician's motivation to participate and remain engaged in specific musical activities. Although research has been conducted on participatory motivation in musical ensembles (e.g., Evans, McPherson, & Davidson, 2012; Sichivitsa, 2003; Werpy, 1996), to the best of my knowledge, no research to date uses rigorous quantitative methods, including SNA approaches, to examine the relationship between participatory motivation and the ensemble's social dynamics. I seek to describe the motivation and social network dynamics within a large musical ensemble and investigate how these dynamics are related to each other within that ensemble experience.

CHAPTER 2

MOTIVATIONAL AND SOCIAL NETWORK DYNAMICS:

THEORETICAL FRAMEWORKS

SELF-DETERMINATION THEORY AS APPLIED TO PARTICIPATORY

MOTIVATION

SDT is an approach to human motivation and personality that uses traditional empirical methods while employing an organismic metatheory that highlights the importance of humans' evolved inner resources for personality development and behavioral self-regulation. (Ryan & Deci, 2000, p. 68)

A broad array of theoretical frameworks is commonly used when investigating human motivation, but few exist for exploring specifically participatory motivation. SDT has become the most widely used and accepted theory for examining participatory motivation since it provides a more comprehensive framework than other approaches such as self-efficacy or goals theory (Frederick-Recascino, 2002). SDT assumes people are driven by a desire for personal growth that is necessary for fulfillment, developing a more cohesive sense of self, and satisfaction of innate psychological needs (Ryan & Deci, 2000). When a person becomes self-determined they are more intrinsically motivated to pursue the things that interest them (Deci & Ryan, 1985). Activities that hold intrinsic interest for a person would have novelty, challenge, or a desired aesthetic value. SDT posits that there are three psychological needs – the need for autonomy (deCharms, 1968; Deci, 1975), competence (Harter, 1978; White, 1963), and relatedness (Baumeister & Leary, 1995; Reis, 1994) – that must be satisfied to become self-determined (Deci

&Ryan, 1985, 1991; Ryan & Deci, 2000). This organismic dialectic perspective (Ryan & Deci, 2002) suggests that humans have developed this motivation to guide them “toward more competent, vital, and socially integrated forms of behavior (Deci & Ryan, 2000, p. 252).”

Autonomy refers to a person’s desire to control their choices, behaviors and effects on his or her environment. In other words, the locus of causality, or the perceived origin of a behavior (Deci & Ryan, 2002), of an intrinsically motivated person is internal rather than external; essentially, meaning the person believes they have the ability to effect change in their environment rather than the environment effecting change on them. This notion is similar to aspects of attribution theory. Competence refers to a person’s desire to master and affect their environment (White, 1959); this feeling of competence proves significant when choosing activities (e.g., Evans et al., 2012). Finally, relatedness refers to a person’s desire to connect to others, which is supported by Baumeister’s and Leary’s (1995) research on a human’s need to belong. A desire to relate and belong to a group may be a powerful motivator for people to join musical ensembles. Unfortunately, most research to date has focused on aspects of autonomy and competence, so significant questions regarding the role of relatedness in participatory motivation still exist (Frederick-Recascino, 2002; Vallerand, Pelletier, & Koestner, 2008). The research on relatedness’ relationship to motivation has been limited, distal and primarily focused on dyadic and didactic relationships such as a parent-child (e.g., Frodi, Bridges & Grolnick, 1985) or teacher-student (e.g., McPherson & Davidson, 2002). In this study, I seek to look at the broader social networks of an entire musical ensemble.

Furthermore, SDT is based on a multidimensional view of the concept of motivation that distinguishes measures of the intensity of motivation from the type of motivation. The types of motivation identified in SDT (Deci, 1975; Vallerand, 1997) create a self-determination continuum from highly intrinsic to amotivated (see figure 1). Each type of motivation outlined in SDT suggest the underlying impulse for a person to regulate, or control, their behavior in a specific manner. For example, introjected regulation of behavior indicates a person is motivated to act based upon a feeling of guilt or anxiety (Deci & Ryan, 2002). A brief explanation of each form of regulation along the SDT continuum is found in figure 1.

In addition to identifying the types of motivation, the intensity of each type of motivation can also be measured. Together, the information about both the type and intensity of motivations allows for the creation of a more comprehensive motivational profile for an individual. Motivational profiles can be linked to a variety of behavioral outcomes such as persistence at a task (Vallerand & Bissonnette, 1992) or academic performance (Fortier, Vallerand, & Guay, 1995) with the expectation that being self-determined is associated with positive psychological functioning (Deci, 1980). The varying balance between types of motivation can be both additive and interactive, and environmental factors can either support or undermine the satisfaction of any of the three needs that must be satisfied to become self-determined. For people engaging in leisure activities such as music ensembles, it is a reasonable expectation to observe a motivational profile high in self-determined (intrinsic) motivation or high in both self-determined and nonself-determined (extrinsic) motivation (Vlachopoulos, Karageorghis, & Terry, 2000), because they are most likely to support voluntary engagement in an

activity. The first of these profiles would be associated with more positive psychological functioning in the environment.

According to the work of Deci and Ryan (2000), among others, a motivational profile that is more self-determined would facilitate more socially integrated forms of behavior. In other words, more intrinsic or identified regulation would manifest in differing positions in the structure of the social network from people more extrinsically regulated. More simply, self-determination would support the formation of relationships within a group of people. Additionally, the social ecology of a marching band, in the case at hand, will play a role in either supporting or undermining the satisfaction of the three areas of need, especially relatedness. By investigating individuals' self-reported motives to participate in an activity and relating those to the broader context of that experience we can move towards a greater understanding of conditions that may support or undermine satisfaction in the three areas of need, as proposed by SDT. This study will investigate how the social ecology of the experience relates to participatory motivation. There is an expectation that the choice to participate in musical ensembles for leisure purposes would be strongly associated with higher levels of intrinsic motivation as well as more integration into the ensemble's social network. Additionally, retention and positive outcomes in these leisure activities would be related to the environment's ability to support and enhance a person's intrinsic motivation while participating in the activity.

SOCIAL NETWORK ANALYSIS AND SOCIAL STRUCTURES OF MUSICAL ENSEMBLE

SNA is the study of the structures made up of dyadic ties between social actors, or individuals in a network, which form local and global patterns. SNA assumes that social

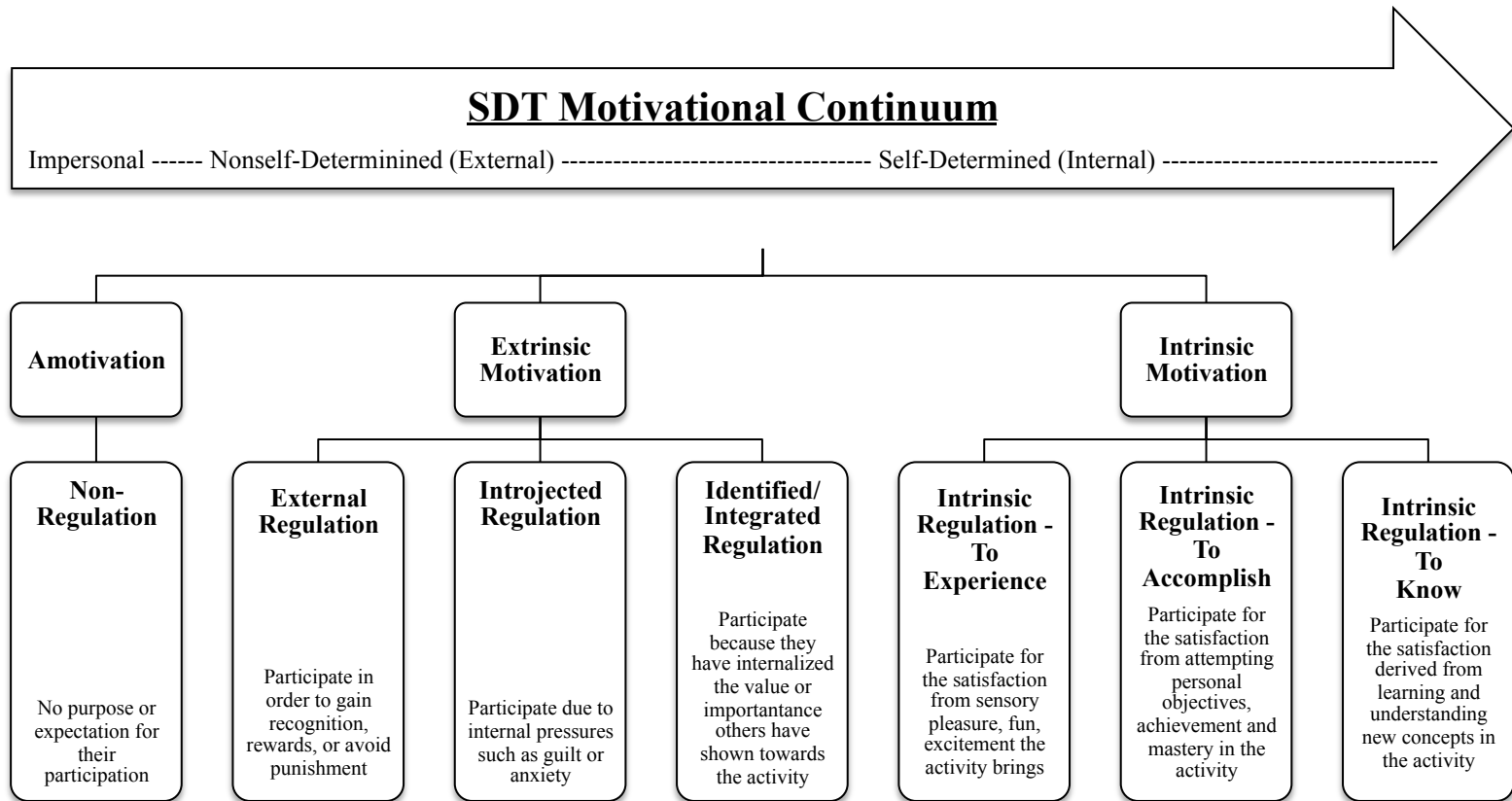
structures emerge through stochastic and deterministic processes, and that network structural processes and individual attribute-related processes operate simultaneously in networks (Robins & Lusher, 2012). In line with these assumptions, SNA methods involve advanced multivariate modeling techniques designed to examine the multiple processes that contribute to network structure and the effects of network structures on their constituent members (Robins, 2013; Snijders, 2011). An actor's position within the network provides information about the group dynamics, that individual's behavior in the network, and psychological processes. Studying the relationships among actors in a network can elucidate the network's social ecology and provide a better understanding of the flow of information, resources, and support (Borgatti et al., 2009).

At a broad level, networks emerge as a result of group members' pursuit of fundamental goals to belong and affiliate (Baumeister & Leary, 1995; Heinrich & Gullone, 2006) and to attain and maintain status (Hawley, 1999). Individual differences in motivations, behaviors, and biology are associated with these factors, and lead to different patterns of ties around an individual. Measures of network position are derived from nominations collected from individuals (i.e., egos) and their peers (i.e., alters) within a defined social group, in this case a musical ensemble. Various indices of network position have been developed to quantify individuals' social ecologies by focusing on their position in a network (Robins, 2013; Valente, 2010). Complete network data, referring to multi-informant (egos and alters) assessment of network ties (Wasserman & Faust, 1994) within a bounded social system (e.g., marching band), allows the consideration of directed and mutual relationships within this system. An individual's outgoing ties depict network activity or gregariousness; incoming ties

describe network popularity (Robins, 2013; Valente, 2010). Mutual friendship ties tend to depict social relationships that are characterized by greater levels of stability, intimacy, and social support (Cauce, 1986). We can also observe these three types of network indices in different types of networks (i.e., friendship or advice networks). By quantitatively measuring these indices in different types of networks we are not only able to observe a person's network position, but it also provides a method for quantitatively relating a person's social context to participatory motivation.

Figure 1

The Self-Determination Motivational Continuum with the type of motivation and styles of regulation with their associated reasons for participation adapted from Ryan & Deci (2000), Vellerand & Ratelle (2002), Pelletier et al. (1995).



CHAPTER 3

RESEARCH DESIGN AND METHODS

In order to investigate the association of participatory motivation and social networks, I sought a large leisure ensemble with regular and sustained engagement that would allow for the creation and development of complex social relationships. The collegiate marching band is a large musical ensemble, often with hundreds of individuals who engage in the activity as a serious leisure pursuit. Although some individuals will view their participation as a professional requirement (e.g., music education), a majority of collegiate marching band members have made the significant commitment to participate independent of a professional or educational requirement. The result of the significant time spent together in both musical and non-musical activities, such as traveling or supporting an athletic team, naturally provide more opportunities to develop relationships beyond that of many other concert ensembles whose primary interaction is musical. Although bands across the country vary, members of a college marching band often spend upwards of 20 hours a week together in band-related events, which provide a significant amount of time to develop these complex relationships. Consequently, this type of musical activity is a model system for investigating the relationship of participatory motivation and social networks.

PARTICIPANTS

Participants were undergraduate students from a respected Division I collegiate marching band, located in the Southwestern United States. Each collegiate marching band is idiosyncratic to its home institution (e.g., traditions or style) and thus unique; however, more broadly, this marching band is representative of the most typically

observed corps style collegiate marching program in its purpose, basic organizational structure, and the activity that is fundamental to its appearance and sound. Participation in this band involves 8-12 hours of rehearsal per week (i.e., 3-4 practice sessions) as well as 6 or more hours of performance per week. Most performances are associated with activities surrounding the university's football program, but also include local marching festivals and other university athletic events. Consent was obtained from 220 students (72% of the active marching band members), and 205 (68% of the active marching band members) completed network assessments at two times. The study procedures were approved by the university's Institutional Review Board (Appendix B).

PROCEDURE

At the end of September and end of November, all participants received an email with a unique username and password and were asked to complete an online survey focusing on demographic characteristics and activity-related motivations. At both time-points, students completed the online survey during one week prior to a band rehearsal, when the in-person social network data collection took place. At the conclusion of the rehearsal, participants were asked to complete social network measures. The choice of assessment timeframe was intended to capture the initial configuration of social relationships, which formed over the first 6 weeks of the season; then again, two months later, at the end of the regular band season, to capture continuity and change in social ties.

MEASURES

Friendship and advice nominations and network data. For the friendship and advice network inventory, an alphabetized list was constructed which contained the ID codes and names of all students who agreed to participate in the study. Participants began

by writing their own ID on the first page of the questionnaire booklet. They were then asked to list the IDs of their band-mates who were their closest friends (i.e., “Please list the ID codes of the band-mates who are your closest friends with whom you spend a lot of time doing different activities and whom you can count on when you need help”); they could name as many classmates as they wanted. The same procedure was used to ask them which band-mates they go to for advice (i.e., “Please list the ID codes of the band-mates to whom you go to for Marching Band related advice, information, and help”). Students returned the alphabetized list with the ID codes and names of all participants to the study team. This list was subsequently destroyed, so that the questionnaires only contained ID numbers and no names.

Data based on friendship and advice nominations were arranged in two binary matrices, with each row and column representing an individual within the band. In the matrix, cell x_{ij} corresponds to i 's relation to j , as reported by i . That is, if i nominated j as a friend, cell x_{ij} was coded as 1. If i did not nominate j as a friend, cell x_{ij} was coded as 0. This matrix represented unilateral or asymmetrical friendship ties. A matrix for advice network was constructed in the same manner. Based on the unilateral matrices, a mutual ties matrix in which cell x_{ij} was coded as 1 only if i nominated j as a friend and j nominated i as a friend (and a reciprocated friendship matrix) were created. Using the unilateral friendship matrix two measures of friendship network position were constructed: (1) the *number of incoming friendship nominations* depicted friendship network popularity, and (2) the *number of outgoing friendship* nominations described friendship network gregariousness. From the mutual tie matrix, a third measure of friendship network was created – *number of mutual friendship ties*. Using the unilateral

advice matrix two measures of advice network position were constructed: (1) the *number of incoming advice nominations* depicted network sources of advice, and (2) the *number of outgoing advice nominations* described network seekers of advice.

Participatory Motivation Scales. Since no known scales to measure motives for participation in marching band exist, two established scales intended to assess the motives for participation in physical activity were used. Both of these scales were adapted for use with this marching band study (i.e., statement of “physical activity” changed to “marching band”). While both scales are grounded in SDT and measure types and intensity of motivation, their subscales allow for different conclusions to be drawn regarding the type of motivation or goal for participating. Researchers suggest the use of these two scales simultaneously may be advantageous in this type of research (Frederick-Recascino, 2002).

Participants completed a 28-item Sports Motivation Scale (SMS; Pelletier et al., 1995), adapted for marching band, which asked them to indicate the reasons they were presently participating in marching band using the following scale anchored by 1 - *does not correspond at all*, 4 - *corresponds moderately*, and 7 - *corresponds exactly*. Sample item includes: “Because it is one of the best ways to maintain good relationships with my friends”. A composite score for each type of motivation along the SDT continuum was created by summing the corresponding items. See Appendix A for the complete scale. A total motivational composite index score using a pre-established weighted formula (Fortier, Vallerand, & Guay, 1995) was calculated. This composite index score can be used to determine the predominate type of motivation – self-determined, nonself-determined, or amotivated. The SMS was shown to be internally consistent and reliable

(Cronbach α 's for the subscales ranged from .698 to .881 at wave 1 and .722 to .911 at wave 2).

Participants also completed a 19-item Motives for Physical Activities Measure - Revised (MPAM-R; Ryan, Frederick, Lepas, Rubio, & Sheldon, 1997) adapted for marching band which asked them to indicate the reasons they were presently participating in marching band using the following scale anchored by 1 - *not at all very true for me* to 7 - *very true for me*. Sample item includes: "Because I want to improve existing skills". A composite score for different categories of intrinsic motivation – enjoyment, competence, and social – was created by summing the corresponding items. See Appendix A for the complete scale. The MPAM-R was shown to be internally consistent and reliable (Cronbach α 's for the subscales range from .72 to .895 at wave 1 and .762 to .961 at wave 2).

CHAPTER 4

RESULTS

All data collected from the peer nominations and participatory motivational scales were entered into SPSS for analysis. Data analysis included descriptive statistics as well as Pearson Product-Moment Correlations and *t*-tests for all motivation and network indices in order to observe relationships between variables and significant changes longitudinally. The following section will detail the results of the analyses for reference in the discussion section.

PARTICIPANT DEMOGRAPHICS

Participants were 48% male and 52% female. Mean age was 19.43 years ($SD = 1.51$, range: 18-30 years). Ethnic/racial composition of the band was diverse, representing the ethnic composition of the university: 5.3% African-American, 5.3% Asian-American, 62.1% European-American, 20.9% Hispanic/Latino, and 3.4% Native American. Participants had completed 1-14 semesters of college ($M = 4.45$, $SD = 2.52$) and had completed one to six seasons of marching band at the college level ($M = 2.17$, $SD = 1.21$). Approximately 27% of participants reported being in other ensembles at the university and 24% were members of Kappa Kappa Psi, a co-educational music service fraternity. Participants in formal leadership positions constituted 13% of the sample population. Retention data were collected at the beginning of the following band season, which indicate that 64% of participants returned to the band, 18% graduated and therefore were not eligible to return, and 18% chose not to return to the band.

MOTIVATION

A mean score for each motivational subscale was calculated for the SMS and MPAM-R, by time, based upon the responses to the 7-point Likert scale. A score of 1 indicates individuals report none of that type of motivation. A score of 7 indicated individuals report the highest degree of motivation of that type. A total motivation composite index score for each individual based on all subscales in the SMS using a pre-established weighted formula (Fortier, Vallerand, & Guay, 1995) was calculated. This composite index score can be used to determine the predominate type of motivation – self-determined, nonself-determined, or amotivated. Scores which are positive indicate a mostly self-determined motivational profile and scores that are negative indicate a more nonself-determined motivational profile. Extremely negative scores, which were not observed in the data, indicate an amotivational profile. See Table 1 for the descriptive statistics of the motivational responses.

Each type of motivation was then correlated with specific demographic data to identify any relationships. Social motivation was found to be significantly correlated with participation in other university ensembles ($r(187) = -.15, p < .05$) and Kappa Kappa Psi ($r(187) = -.21, p < .01$). Multiple forms of intrinsic and higher forms of extrinsic motivation were also found to be significantly correlated with participation in other university ensembles (see Table 2). Identified regulation was found to be significantly correlated with participation in Kappa Kappa Psi ($r(188) = -.22, p < .01$). No significant correlations were found between motivation and the time spent in marching band before and during college, retention, or holding a formal leadership position (see Table 2).

Finally, paired samples *t*-tests were conducted to determine if the levels of motivation changed significantly from time 1 to time 2. A significant decrease in most types of motivation including the composite index ($t(126) = -5.32, p < .001$), to accomplish ($t(148) = -5.01, p < .001$), to experience ($t(148) = -5.56, p < .001$), identified regulation ($t(126) = -3.17, p < .01$), introjected regulation ($t(126) = -2.14, p < .05$), enjoyment ($t(146) = -4.13, p < .001$), and competence ($t(146) = -2.66, p < .001$) were observed (see Table 3). To know ($t(149) = -1.26, p = .208$) and external regulation ($t(148) = -1.61, p = .110$) also decreased, but not significantly. Amotivation was the only type of motivation to significantly increase ($t(148) = 3.25, p < .001$). Social motivation remained steady and showed no significant change between time 1 and time 2 ($t(145) = 0.23, p = .816$).

Table 1

Descriptive Statistics of Motivational Responses

Participatory Motivation Subscale	<i>M</i>	<i>SD</i>
<u>SMS</u>		
Time 1		
Motivation Composite Index	51.99	16.04
Intrinsic – To Know	4.24	1.56
Intrinsic – To Accomplish	5.00	1.35
Intrinsic – To Experience	5.56	1.08
Extrinsic – Identified Regulated	5.18	1.14
Extrinsic – Introjected Regulated	3.59	1.47
Extrinsic – Externally Regulated	3.97	1.39
Amotivation	1.66	0.95
Time 2		
Motivation Composite Index	45.53	17.25
Intrinsic – To Know	4.01	1.54
Intrinsic – To Accomplish	4.50	1.40
Intrinsic – To Experience	5.10	1.21
Extrinsic – Identified Regulated	4.92	1.17
Extrinsic – Introjected Regulated	3.36	1.41
Extrinsic – Externally Regulated	3.77	1.31
Amotivation	1.95	1.15
<u>MPAM-R</u>		
Time 1		
Intrinsic – Enjoyment	6.51	0.65
Intrinsic – Competence	5.89	1.09
Intrinsic – Social	5.84	0.99
Time 2		
Intrinsic – Enjoyment	6.29	0.79
Intrinsic – Competence	5.70	1.23
Intrinsic – Social	5.87	0.98

Table 2

Correlations of Marching Band Related Demographics and Motivational Responses at Time 1

	Number of Seasons in College Marching Band	Number of Seasons in Marching Band Prior to College	Participation in other University Ensembles	Participation in Kappa Psi	Retention in the Following Season	Band Section Leader
<u>SMS</u>						
Motivation Composite Index	.08	-.09	-.09	-.20*	-.12	.04
Intrinsic – To Know	-.05	.04	-.13	-.00	-.05	-.03
Intrinsic – To Accomplish	-.05	.06	-.16*	-.01	.04	-.05
Intrinsic – To Experience	.05	-.02	-.20**	-.13	-.03	-.05
Extrinsic – Identified Reg.	.05	-.05	-.26**	-.22**	-.03	.09
Extrinsic – Introjected Reg.	.02	.03	-.16*	.00	-.04	-.09
Extrinsic – Externally Reg.	-.07	.08	-.13	.00	-.02	-.05
Amotivation	-.07	-.04	.08	.19*	.13	-.14
<u>MPAM-R</u>						
Intrinsic – Enjoyment	.02	-.06	-.13	-.04	-.06	-.01
Intrinsic – Competence	-.04	-.01	-.13	.03	.00	-.02
Intrinsic – Social	.14	-.13	-.15*	-.21**	-.06	.09

**Correlation is significant at $p < 0.01$ level (2-tailed).

*Correlation is significant at $p < 0.05$ level (2-tailed).

Table 3

Paired-Samples t-Test for Motivational Responses between Time 1 and Time 2

	Mean Difference	<i>t</i>	df	<i>p</i> (2-tailed)
	<u>SMS</u>			
Motivation Composite Index	-6.85	-5.34	126	.000***
Intrinsic – To Know	-0.12	-1.26	149	.208
Intrinsic – To Accomplish	-0.46	-5.01	148	.000***
Intrinsic – To Experience	-0.47	-5.56	148	.000***
Extrinsic – Identified Regulated	-0.27	-3.17	148	.002**
Extrinsic – Introjected Regulated	-0.22	-2.14	148	.034*
Extrinsic – Externally Regulated	-0.13	-1.61	148	.110
Amotivation	0.29	3.25	148	.001**
	<u>MPAM-R</u>			
Intrinsic – Enjoyment	-0.21	-4.13	146	.000***
Intrinsic – Competence	-0.20	-2.66	145	.009**
Intrinsic – Social	0.01	0.23	145	.816

****t*-test is significant at $p < 0.001$ level (2-tailed).

***t*-test is significant at $p < 0.01$ level (2-tailed).

* *t*-test is significant at $p < 0.05$ level (2-tailed).

FRIENDSHIP AND ADVICE NETWORKS

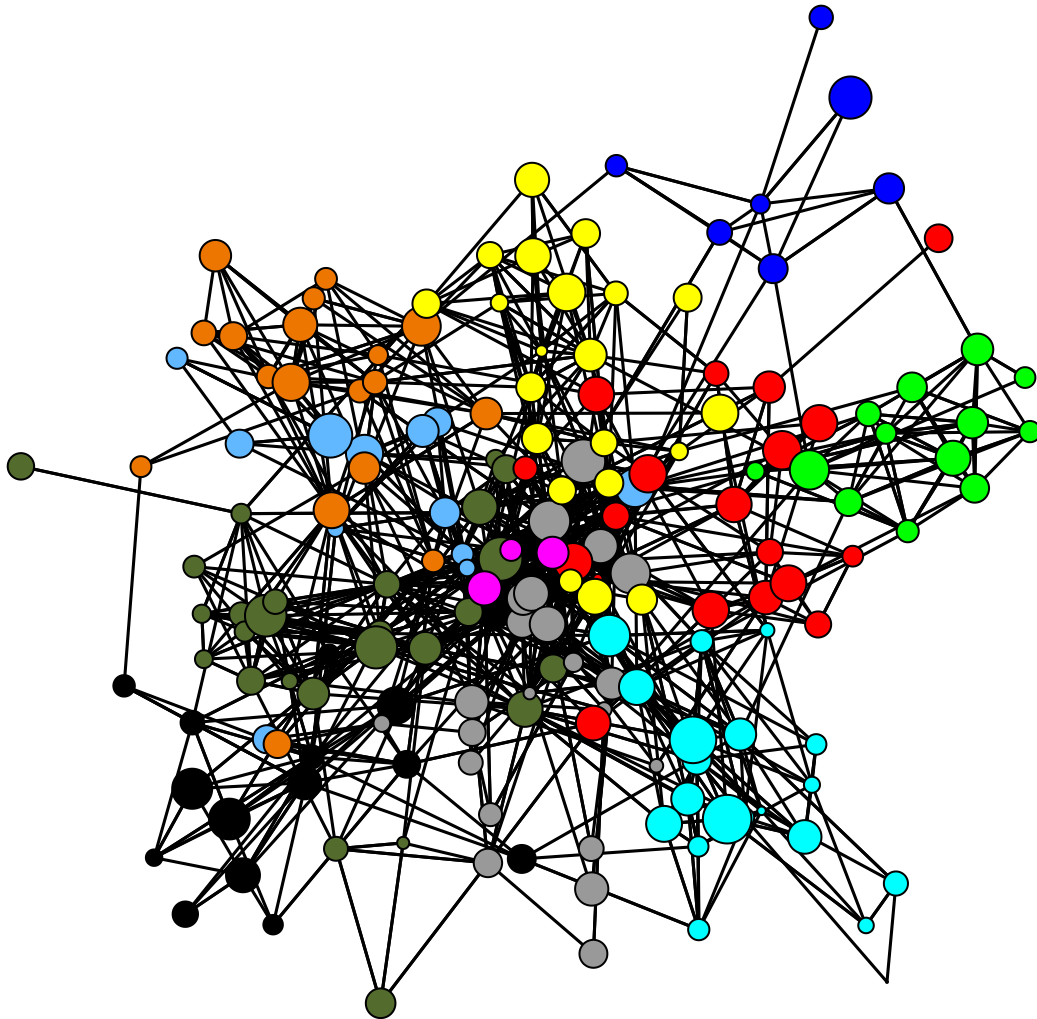
Friendship Networks. Network-level descriptive statistics indicated that the network of 193 individuals had 1204 unilateral friendship ties at time 1 and 1117 ties at time 2. The friendship networks had a density (i.e., proportion of existing ties relative to the total possible ties) of .039 for time 1 and .036 for time 2, which is a level consistent with other research on human social networks (Wasserman & Faust, 1994). A visualization of the friendship network at time 1 (Figure 2) provides a two-dimensional view of a three-dimensional model of the directed (i.e., incoming or outgoing) friendship ties within the band. The size of the circles (i.e., each individual in the network) indicates the level of motivation based on the motivation composite index score calculation. Visual inspection of these images suggest there tends to be clustering that occurs within sections

of the band. In other words, individuals appear to make friends with a higher proportion of members in their own section than with the band in general. There is a range of connectivity within the friendship network demonstrated by the individual (i.e., single circle) who reported no friendship ties with any members in the sample population and circles that are surrounded by a high density of ties like some individuals in the saxophones, colorguard, and drum majors (harder to see in the two-dimensional visualization). Based on these visualizations alone, no trends in motivation are easily observable.

Advice Networks. Network-level descriptive statistics indicated that the network of 193 individuals had 680 unilateral advice ties at time 1 and 683 ties at time 2. The advice networks had a density (i.e., proportion of existing ties relative to the total possible ties) of .021 for time 1 and .022 for time 2. A visualization of the advice network at time 1 (Figure 3) provides a two-dimensional view of the directed advice ties within the band. The size of the circles (i.e., each individual in the network) indicates the level of motivation based on the motivation composite index score calculation. Again, visual inspection of these images suggest there tends to be clustering that occurs within sections of the band. In other words, individuals appear to go to people in their section for advice more often rather than others in the band. There is a range of connectivity within the advice network demonstrated by individuals who reported a single advice tie and some circles that are surrounded by a high density of ties like individuals in the saxophones, mellophones, colorguard, and drum majors. Based on these visualizations alone, no trends in motivation are easily observable.

Figure 2

Social Network Visualization: Friendship Network Time 1



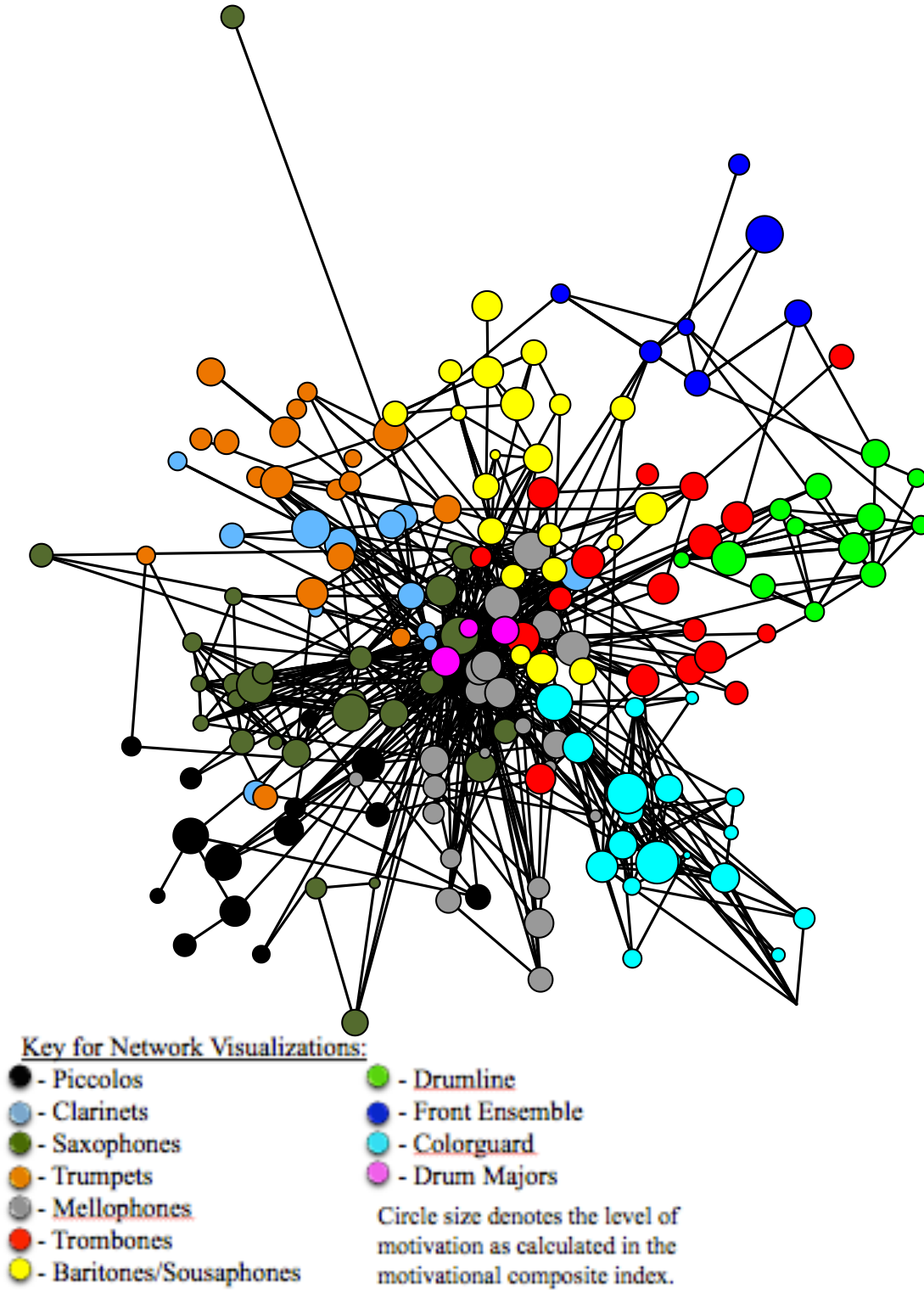
Key for Network Visualizations:

- | | |
|---------------------------|--------------------|
| ● - Piccolos | ● - Drumline |
| ● - Clarinets | ● - Front Ensemble |
| ● - Saxophones | ● - Colorguard |
| ● - Trumpets | ● - Drum Majors |
| ● - Mellophones | |
| ● - Trombones | |
| ● - Baritones/Sousaphones | |

Circle size denotes the level of motivation as calculated in the motivational composite index.

Figure 3

Social Network Visualization: Advice Network Time 1



CORRELATIONS BETWEEN MOTIVATION AND SOCIAL NETWORK INDICES

Time 1. In order to discover relationships between the levels of motivation and the size of the individual's social networks, Pearson Product-Moment Correlations were conducted for each motivational subscale and five network indices that measure position in friendship and advice networks at time 1 (see Table 4). The motivation composite index was positively correlated with the number of outgoing and reciprocated ties in the friendship network ($r(163) = .23$ and $.18, p < .01$ and $.05$, respectively). Within the motivational continuum, to experience ($r(172) = .17$ and $.15, p < .05$) and identified regulation ($r(172) = .29$ and $.20, p < .01$) were also positively correlated with outgoing and reciprocated friendship ties. The levels of self-reported social motivation were positively correlated with all friendship network indices ($r(172) = .24, .25$, and $.20, p < .01$) and outgoing advice ties ($r(171) = .19, p < .05$). All other types of motivation were not found to be correlated to the network indices (see Table 4).

Time 2. The same Pearson Product-Moment Correlations were conducted for each motivational subscale and five network indices that measure position in friendship and advice networks with the data measured at time 2 (see Table 5). In time 2, the motivation composite index was more strongly positively correlated with all three friendship network indices ($r(128) = .27, .25, .31, p < .01$) and with outgoing advice ties ($r(128) = .21, p < .05$). Within the motivational continuum, to experience ($r(145) = .18$ and $.21, p < .05$ and $.01$, respectively) and identified regulation ($r(145) = .27, .28, .26, p < .01$) were again positively correlated with friendship network ties. Introjected regulation was also found to be positively correlated with outgoing friendship ties ($r(145)$

= .21, $p < .01$) and amotivation was negatively correlated with the number of mutual friendships ($r(145) = -.22, p < .01$). The levels of self-reported social motivation strengthened its positive correlation with all friendship network indices ($r(142) = .32, .34,$ and $.34, p < .01$) and outgoing advice ties ($r(142) = .21, p < .05$). Additionally, enjoyment motivation was found to positively correlate to the number of reciprocated ties ($r(142) = .20, p < .05$) and competence motivation positively correlated to outgoing friendship ties ($r(142) = .17, p < .05$). Overall, there more significant relationships between the types of motivations and integration in the friendship network in time 2 over time 1.

Table 4

Correlations of Motivational Responses and Social Network Indices at Time 1

	Friendship Networks			Advice Networks	
	Indegree	Outdegree	Reciprocated	Indegree	Outdegree
	<u>SMS</u>				
Motivation Composite Index	.15	.23**	.18*	.15	.10
Intrinsic – To Know	.00	.04	-.01	-.02	.02
Intrinsic – To Accomplish	-.03	.03	-.04	-.02	-.03
Intrinsic – To Experience	.08	.17*	.15*	.04	.11
Extrinsic – Identified Regulated	.15	.29**	.20**	.11	.10
Extrinsic – Introjected Regulated	-.11	.11	-.03	-.16	.01
Extrinsic – Externally Regulated	-.03	.15*	.02	-.09	.01
Amotivation	-.10	-.13	-.12	-.14	-.04
	<u>MPAM-R</u>				
Intrinsic – Enjoyment	.00	.08	.03	.00	.11
Intrinsic – Competence	.02	.08	-.01	.00	.03
Intrinsic – Social	.24**	.25**	.20**	.09	.19*

**Correlation is significant at $p < 0.01$ level (2-tailed).

*Correlation is significant at $p < 0.05$ level (2-tailed).

Table 5

Correlations of Motivational Responses and Social Network Indices at Time 2

	<u>Friendship Networks</u>			<u>Advice Networks</u>	
	Indegree	Outdegree	Reciprocated	Indegree	Outdegree
	<u>SMS</u>				
Motivation Composite Index	.27**	.25**	.31**	.08	.21*
Intrinsic – To Know	.00	.12	.08	-.06	.02
Intrinsic – To Accomplish	.05	.14	.12	.01	.10
Intrinsic – To Experience	.15	.18*	.21**	.00	.13
Extrinsic – Identified Regulated	.27**	.28**	.26**	.09	.14
Extrinsic – Introjected Regulated	.04	.21**	.15	-.09	.06
Extrinsic – Externally Regulated	.05	.14	.07	-.01	-.04
Amotivation	-.18*	-.14	-.22**	-.11	-.14
	<u>MPAM-R</u>				
Intrinsic – Enjoyment	.16	.13	.20*	.06	.13
Intrinsic – Competence	.12	.17*	.16	.03	.07
Intrinsic – Social	.32**	.34**	.34**	.03	.21*

**Correlation is significant at $p < 0.01$ level (2-tailed).

*Correlation is significant at $p < 0.05$ level (2-tailed).

Change in Motivation and Social Network Indices. In order to determine if there were any correlations between the net change in motivation and the net change in network position over the course of the marching band season, the difference scores between time 1 and time 2 were computed for each type of motivation and network variable. Pearson Product-Moment Correlations were conducted for each difference score for the motivational subscales and five network indices that measure position in the friendship and advice networks (see Table 6). The most significant positive correlations were found between the change in the number of outgoing friendship ties and the change in multiple motivational subscales – to know ($r(132) = .21, p < .05$), to accomplish ($r(132) = .23, p < .01$), identified regulation ($r(132) = .22, p < .05$), and external regulation ($r(132) = .25, p < .01$). Changes in amotivation were negatively correlated

with changes in outgoing friendship ties ($r(132) = -.18, p < .05$). The changes in friend seeking behaviors rather than advice seem to be most related to changes in participatory motivation.

Table 6

Correlations of the Change in Motivational Responses to the Change in Social Network Indices

	<u>Friendship Networks</u>			<u>Advice Networks</u>	
	Indegree	Outdegree	Reciprocated	Indegree	Outdegree
	<u>SMS</u>				
Motivation Composite Index	.09	.05	.09	.06	-.02
Intrinsic – To Know	.06	.21*	.15	-.03	-.06
Intrinsic – To Accomplish	.02	.23**	.16	.07	-.06
Intrinsic – To Experience	.08	.07	.03	.01	-.03
Extrinsic – Identified Regulated	-.03	.22*	.09	.08	-.02
Extrinsic – Introjected Regulated	-.01	.16	.08	-.03	.07
Extrinsic – Externally Regulated	.03	.25**	.13	-.06	-.12
Amotivation	-.15	-.18*	-.00	-.08	.03
	<u>MPAM-R</u>				
Intrinsic – Enjoyment	.08	-.15	-.12	.04	-.14
Intrinsic – Competence	.09	-.05	-.04	-.03	-.19*
Intrinsic – Social	.08	.13	.04	-.04	.01

**Correlation is significant at $p < 0.01$ level (2-tailed).

*Correlation is significant at $p < 0.05$ level (2-tailed).

CHAPTER 5

DISCUSSION

A SELF-DETERMINED ENSEMBLE

Leisure activities can be defined as "those activities that people do in their free time, because they want to, for their own sake, for fun, for entertainment, for goals of their own choosing, but not for payment (Argyle, 1996)." This definition suggests that a person's motivation to participate in a leisure activity, such as marching band, would be strongly intrinsic. The results of this study support this assertion; the motivation composite index score for all participants at the beginning of the season overwhelmingly indicated self-determined participation in marching band. Participants did report extrinsic reasons for participating, but the intensity of those types of motivation were minimal compared to high levels of intrinsic motivation. A vast majority of participants reported almost no level of amotivation. Despite the high levels of reported intrinsic motivation at the beginning of the season, there was a statistically significant decrease in motivation along the continuum between time 1 and time 2. Despite this decrease, a majority of the band still reported high enough levels of intrinsic motivation to sustain self-determined participation in marching band at the end of the band season. Further examining the reasons why intrinsic motivation may have decreased over the season were not investigated in this study, but would be of value in future work.

According to SDT, self-determination is supported when individuals' autonomy, competence, and relatedness needs have been satisfied (e.g., Ryan & Deci, 2000, 2002; Vallerand, 2000). Because SMS indexes motivation as a whole, the MPAM-R was used to assess the degree to which each of the three needs was specifically being met. The

construction of the MPAM-R measures intrinsic motivation, but includes subscales that are more directly related to the psychological needs outlined in SDT including the isolation of social motivation (Ryan et al., 1997). As mentioned, overall levels of intrinsic motivation significantly decreased during the marching band season, which was supported by the overall MPAM-R data, but the composite scores for the subscales suggest this change was driven by decreases in feelings of autonomy and competence rather than relatedness. Levels of social motivation, an indicator of relatedness, increased during the season, although not significantly. More simply, participants remained highly motivated to connect to others in the band even though they were less motivated to master elements of the activity and to feel enjoyment. These findings suggest that relatedness may be one of the most continuously met psychological needs maintaining self-determined motivation to continue participating in band.

This observation also supports the assertion that music making in a social setting provides an experience that can fulfill our innate psychological need to relate, which is important for multiple reasons. First, most of the research on participatory motivation from a SDT approach has focused on measuring perceptions of autonomy and competence. The focus on these two needs has often meant that relatedness has been under addressed in previous psychological literature on participatory motivation (Frederick-Recascino, 2002; Vallerand et al., 2008). The same can be said regarding band leadership practices. Both the psychological literature and informal band practices often focus on helping members meet their autonomy and competence needs, while neglecting social needs. These results suggest the third psychological need, relatedness, may be just as influential in understanding the motivational dynamics of participation in social

experiences and thus warrant further examination. Second, high levels of social motivation that remain unchanged throughout the season suggest the social element of marching band participation may be an important predictor of a person's choice to maintain engagement in the activity. This type of motivation may also be an important mediator for changes in other types of motivation associated with decreased wellbeing, such as external rewards or negative evaluation (e.g., Ryan & Deci, 2000; Vallerand & Ratelle, 2002). For example, feeling related and integrated into a social network may help buffer against the effects of negative evaluation that have been shown to decrease intrinsic motivation.

There are significant demands on the time and energy for collegiate marching band members throughout the fall band season. Additionally, as students, the band members must also balance this activity with their academic and personal lives. The researcher hypothesizes that these demands and the fatigue of the season may, at least partially, contribute to a decrease in feelings of autonomy and competence towards participation in the band. As the band season progresses, there are more deadlines and pressures to perform at a higher level; research has associated these extrinsic influences with a decrease in intrinsic motivation. Further investigations into the causes of this decrease would be useful to better understand other environmental dynamics that are affecting specific types of motivation. Moreover, investigating any possible mediating effects from other types of motivation, such as social motivation, will be important.

Additional analyses show that band members who are more intrinsically and socially motivated to participate in marching band are also likely to be active in other music-related activities. Highly self-determined individuals are likely to be in other

musical ensembles at the university and members of Kappa Kappa Psi, a music service fraternity that is heavily involved with most instrumental music activities. The correlation between engagement in multiple musical activities and intrinsic and social motivation suggests that those individuals have a high value for musical experiences and view them as an important social experience. These results indicate that those who are highly socially motivated to participate in band seek additional ways to become more engaged in social music making. Although a desire to become a better musician may be a contributing factor, this evidence suggests becoming more socially rooted in a broader musical community is important.

Interestingly, no relationship was found between the number of years a person was involved in marching band prior to college and their motivation to participate in college. Also, no correlation between a change in motivation and retention in the band during the following marching season was observed. A trend may be difficult to observe since the number of people who did not return to the band the following year was relatively small. Additionally, very few band members were not reporting some level of self-determination at the end of the season, so the variance in motivation needed to observe this trend may not be present. In this case, retention may have more to do with external factors, such as a scheduling issue, rather than a change in motivation to participate in marching band. It is also possible that people who were not highly motivated to participate in band were also not motivated to participate in this study making it difficult to capture that subset of the band. It has been established that intrinsic and social motivation perform an important role in a person's choice to join and remain engaged in the marching band. Taking a closer look at the social environment of the band

using SNA will allow us to observe ways in which these social networks may support or hinder motivation.

MOTIVATIONAL AND SOCIAL NETWORK DYNAMICS

The following sections will explore how the friendship and advice networks embedded in the marching band may support a person's participatory motivation and fulfillment of the three psychological needs according to SDT. This discussion will lead to additional questions and areas of research that may be useful in further clarifying the relationship between motivational and social network dynamics in music ensembles, especially those for leisure purposes.

Motivation in the Friendship Network. A positive relationship between social motivation and the size of a given individual's friendship network within the marching band was observed. Those individuals who reported higher levels of social motivation tended to be more popular, gregarious, and more likely to have their friendships reciprocated. The relationship between social motivation and the size of the person's social network appears to strengthen over the course of the season. There was no relationship between the change in social motivation and the change in network size from time 1 to time 2, but this is expected since there was no significant change observed in the self-reported levels of social motivation over the course of the season. These results suggest that individuals who are highly socially motivated at the start of the band season continue to build the size of their friendship networks throughout the season. These individuals become more integrated into the social network of the band as a whole. In general, it seems reasonable to expect that people who value social relationships would increase the number of friendship ties, at least to a point, in multiple directions (incoming

and outgoing) over the course of the band season rather than see the number decrease (Ojanen, Sijtsema, Hawley, & Little, 2010).

A positive relationship between the level of intrinsic motivation and the size of the individual's friendship network was observed. At time 1, this positive relationship was true only for outgoing and reciprocal friendship ties. In other words, more highly motivated individuals tended to be more gregarious and develop stronger mutual relationships. An investigation of individual types of motivation along the continuum revealed that intrinsic motivation to experience (i.e., enjoyment of the activity) and identified regulation (i.e., others deem the activity valuable) correlated to higher levels of network size. Identified regulated individuals are motivated to participate because they have internalized the high value and importance others have for the activity. These positive connections to the social network indices may suggest that people seek out others who also find marching band important and share a similar set of values. This type of homophilic behavior is commonly observed in other research on friendship networks (e.g., Reagans & McEvily, 2003; Siciliano, 2015). Furthermore, this type of motivation is associated with internalization and transmission of values (Ryan & Deci, 2000, 2002), which may be important to the functioning of an ensemble where shared performance goals can aid in positive performance outcomes for the entire group. This concept of internalization, or integrativeness as referred to by Gardner & McIntyre (1993), has been theorized as part of a socio-educational model of music motivation (MacIntyre, Potter, & Burns, 2012), but to my knowledge has never been quantified as is done in the current approach. The social contagion model (Wild & Enzle, 2002) also suggests that the values

and perceived motivation of others in our social networks can have an observable effect on a person's motivation.

At time 2, this positive relationship between highly motivated individuals and all three friendship network indices is observed, which indicates that self-determined regulation is becoming more aligned with the size of a person's friendship network. Again, identified regulation is most correlated with friendship network size. As previously discussed, overall intrinsic motivation decreased, possibly due to stressors or burnout occurring over the course of the season. Previous research suggests that when the activity is inherently interesting to the person, intrinsic motivation is most relevant, but when the activity becomes less interesting or too challenging, higher forms of extrinsic motivation, in this case identified regulation, become most relevant to maintaining positive outcomes (Koestner & Losier, 2002). A stronger relationship was observed between identified regulation and friendship network indices suggesting this connection to the values of others may be associated with continued engagement and positive outcomes. Although a causal relationship is not established in this analysis, this relationship supports conducting further research into how friendship networks might be important to supporting motivation as feelings of autonomy or competence decrease over the season.

Friend-seeking behaviors can also be an indication of feeling autonomous, since having more friends can provide a more stable and supportive system allowing an individual to feel safer to engage more freely with the environment (Kadushin, 2002). Moreover, higher levels of intrinsic motivation are also associated with wellbeing, self-esteem, supporting the autonomy of others, self-actualization, behavioral effectiveness,

greater volitional persistence, and better assimilation of the individual within his or her social group (e.g., Ryan & Deci, 2000). A positive correlation between an increase in the number of friendships a person makes over the season and an increase in level of most types of motivation on the SDT continuum was observed. This further supports that relatedness has a possible mediating effect on motivation and further investigation is necessary. Overall, people who are more self-determined to participate in marching band also have larger friendship networks. More research is warranted to determine the directionality and predictive nature of this relationship between motivation and social networks.

Motivation in the Advice Network. At time 1, a positive relationship with the number of outgoing advice ties with the level of social motivation was observed. A positive correlation between social motivation and advice seeking behaviors may, in part, be related to a person's perception of the people from whom they are seeking advice. Research suggests that people view friends as having a similar 'status' to themselves (Siciliano, 2015) and that advice ties are more likely to occur between friends (Lazega and Pattison 1999) or people who have a similar 'status' within an organization (Lee, 1997; Siciliano, 2015). These results have established that highly socially motivated people tend to have larger friendship networks. Therefore, those people who are socially motivated and have larger friendship networks would also be more likely to seek out advice from friends. At time 2, a positive correlation between high levels of intrinsic motivation and outgoing advice ties was observed, which suggests highly intrinsically motivated people do end up increasing the size of their advice networks over the course

of the season. Again, this may be directly related to the general increase in friendship ties among highly motivated people.

In an ensemble where realizing shared goals is directly related to performance outcomes, providing and seeking advice from others would be an important part of attaining those goals, but this connection was not easily observable in these results. There are numerous explanations for a lack of correlation. First, research has found that even when there is a formal leadership structure, people tend to seek advice from those in their friendship network (e.g., Lazega & Pattison, 1999). Second, perceptions of incompetence or competition within the marching band may also contribute to a lack of advice seeking and giving behaviors (e.g., Lee, 1997; Siciliano, 2015). This possible connection between advice and friendship networks in the band supports the assertion that the social context (i.e., creation of friendships) may be integral to the overall performance of the group, especially if it aids in the development of advice ties essential to the flow of performance related information. It is possible that more investigation into the relationships between the formal leadership structure, the general band members, and friendship networks may yield additional results. Finally, even if band members mainly develop advice ties with formal leaders in the band, the statistical power needed to observe the expected relationship with motivation may not be present.

CHAPTER 6

FUTURE DIRECTIONS

These results have demonstrated that marching band members are predominantly self-determined to participate in marching band and are particularly motivated for social reasons, regardless of their experience over the course of the band season. The members who are highly motivated are also more integrated into the band's social networks. While these findings are useful to highlight the central nature of the social experience of marching band, the present analysis does have some limitations. The results are correlational and would benefit from further analysis that could yield information about the direction of influence between motivational and social variables and their predictive value. This analysis could lead towards the development of interventions to provide an environment that is more supportive of intrinsic motivation and general psychological wellbeing. Furthermore, research regarding the possible mediating effects of relatedness on autonomy and competence would broaden our understanding of the interconnected nature of the three psychological needs. Deepening the investigation to include the participants' relationship with directors or other staff would also be valuable, since research suggests those relationships are influential in cultivating an intrinsically motivated climate in musical settings (Creech & Hallam, 2011; Evans et al., 2012; Matthews & Kitsantas, 2007).

Another useful direction may be to investigate representative motivational profiles for groups within the ensemble, which may yield further trends among motivation, networks, and retention. The use of the motivational composite index score was a first step towards this type of investigation; a cluster analysis would provide more

possibilities for complex statistical modeling and has been used with some success in educational settings (e.g., Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009). Based on observations of the network visualizations (Figure 2 and 3), investigating motivational trends within band sections or formal leadership may yield further information regarding how the formal structures of the marching band may affect motivation. These people may have a unique motivational profile or situate themselves in a specific position in the social networks due to a specific role in the ensemble. This avenue for exploration has the potential for interesting discoveries about leadership structure in ensembles that may support or inhibit motivation and the flow of information through the band.

Replication of this study with other marching bands and leisure ensembles is also vital. This study is a snapshot of one band's season. Different types of bands with different goals, experiences, and leadership structures may yield different results. Comparisons between different musical and social contexts will provide useful variance in order to draw broader conclusions about social music making and the development of possible interventions to support ensemble wellbeing and retention. Within the same ensemble, increasing the number of times data is collected would also help to better understand the changes occurring in the morphology of networks and the context. As indicated by SDT, the social ecology of a marching band will play a role in either supporting or undermining the satisfaction of the three psychological needs. This more detailed longitudinal data could lead to specific interventions that may facilitate positive changes in motivation.

Finally, investigating the role biology may perform in this system may also yield valuable results. Research has demonstrated that biology and behavior are interconnected (e.g., Granger et al., 2012) and that biobehavioral processes may be influential in the observed structure of social networks (e.g., Kornienko, Clemans, Out, & Granger, 2014). Finding relationships between the biology and social network structure may be another important layer to consider in the present area of enquiry. Additionally, SDT researchers have discussed individual differences in a person's ability to be motivated and to satisfy their psychological needs (e.g., Deci & Ryan, 2000). It is possible these biobehavioral processes perform a role in motivation as well. This also leads back to an early discussion in this paper which speculated that social music making modulates certain hormones and neuro-mediators that are found to facilitate social cohesion and bonding among members in a group (e.g., Dunbar, 2004; Freeman, 2000; Grape, Sandgren, Hansson, Ericson, & Theorell, 2003; McNeill, 2000). Examining the associations and interactions between biology, social networks, and motivation may be an important direction for continued investigation.

CHAPTER 7

CONCLUSIONS

The results of this study suggest the social environment may be influential in the success and longevity of participation within leisure musical ensembles. Although the musical experience is certainly a reason to participate in leisure musical ensembles, the motivation to connect to other people through this medium appears critical, at least as demonstrated in this marching band. Although connecting to others and experiencing social support have been documented reasons for adult participation musical ensembles (e.g., Coleman & Iso-Ahola, 1993; Carruci, 2012), these reasons have never been empirically linked to the actual formation of social networks in this way. Creating an environment that supports and fosters intrinsic motivation includes nurturing these social relationships. Ensembles that maintain high levels of self-determined motivation to participate may yield improved psychological wellbeing, positive perceptions of autonomy and competence, greater volitional persistence, and more social cohesion and support, in addition to positive performance outcomes. It is my hope that this study will encourage further research in this area and may continue to inform how we can create a more intrinsically motivating music making experience.

REFERENCES

- Argyle, M. (1996). *The social psychology of leisure*. London: Penguin Books Ltd. ISBN: 0-14 023887-5.
- Bailey, B.A. & Davidson, J.W. (2005). Effects of group singing and performance for marginalized and middle-class singers. *Psychology of Music*, 33, 269-303.
- Baumeister, R., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117, 497-529.
- Booth, A., Johnson, D., Granger, D.A. (1999). Testosterone and men's health. *Behavior and Medicine*, 20, 1-20. <http://dx.doi.org/10.1023/A:1018705001117>.
- Borgatti, S.P., Mehra, A., Brass, D.J., Labianca, G., 2009. Network analysis in the social sciences. *Science* 323, 892-895. <http://dx.doi.org/10.1126/science.1165821>.
- Cauce, A.M. (1986). Social networks and social competence: Exploring the effects of early adolescent friendships. *American Journal of Community Psychology*, 14, 607-628. doi:10.1007/BF00931339
- Coleman, D. & Iso-Ahola, S.E. (1993). Leisure and health: The role of social support and self-determination. *Journal of Leisure Research*. 25(2), 111-128.
- Creech, A., & Hallam, S. (2011). Learning a musical instrument: the influence of interpersonal interaction on outcomes for school-aged pupils. *Psychology of Music*, 39(1), 102-122. doi:10.1177/0305735610370222
- Cross, I. (2001). Music, cognition, culture, and evolution. *Annals of the New York Academy of Sciences*, 930, 28-42.
- Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience*. New York: Harper & Row.
- deCharms, R. (1968). *Personal causation*. New York: Academic Press.
- Deci, E. L. (1975). *Intrinsic motivation*. New York: Plenum.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
- Deci, E. L., & Ryan, R. M. (1991). A motivational approach to self: Integration in personality. In R. Dienstbier (Ed.), *Nebraska Symposium on Motivation: Vol. 38. Perspectives on motivation* (pp. 237-288). Lincoln: University of Nebraska Press.

- Dunbar, R.I.M. (2004). *The Human Story*. London: Farber and Farber.
- Evans, P., McPherson, G. E., & Davidson, J. W. (2012). The role of psychological needs in ceasing music and music learning activities. *Psychology of Music*, 41(5), 600-619. doi:10.1177/0305735612441736
- Fortier, M. S., Vallerand, R. J., & Guay, F. (1995). Academic Motivation and School Performance: Toward a Structural Model. *Contemporary Educational Psychology*, 20, 257-274. doi:10.1006/ceps.1995.1017
- Frederick-Recascino, C.M. (2002). Self-determination theory and participation motivation research in the sport and exercise domain. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 277-296). Rochester, NY: University of Rochester Press.
- Freeman, W. J. (2000). A neurobiological role of music in social bonding. In N. Wallin, B. Merkur, & S. Brown (Eds.), *The origins of music* (pp. 411-424). Cambridge, MA: MIT Press.
- Fritz B.S. & Avsec, A. (2007). The experience of flow and subjective well-being of music students. *Horizons of Psychology*, 16, 5-17.
- Frodi, A., Bridges, L., & Grolnick, W. S. (1985). Correlates of mastery- related behavior: A short-term longitudinal study of infants in their second year. *Child Development*, 56, 1291-1298.
- Gardner, R. C., & MacIntyre, P. D. (1993). On the measurement of affective variables in second language learning. *Language Learning*, 43, 157-194. doi: 10.1111/j.1467-1770.1992.tb00714.x
- Granger, D. a., Fortunato, C. K., Beltzer, E. K., Virag, M., Bright, M. a., & Out, D. (2012). Focus on Methodology: Salivary bioscience and research on adolescence: An integrated perspective. *Journal of Adolescence*, 35(4), 1081–1095. doi:10.1016/j.adolescence.2012.01.005
- Grape, C., Sandgren, M., Hansson, L.O., Ericson, M., & Theorell, T. (2003). Does singing promote well-being?: An empirical study of professional and amateur singers during a singing lesson. *Integrative Physiological and Behavioral Science : The Official Journal of the Pavlovian Society*, 38(1), 65–74. doi:10.1007/BF02734261
- Harter, S. (1978). Effectance motivation reconsidered: Toward a developmental model. *Human Development*, 1, 661-669.

- Hawley, P.H., 1999. The ontogenesis of social dominance: a strategy-based evolutionary perspective. *Developmental Review*, 19, 97-132.
<http://dx.doi.org/10.1006/drev.1998.0470>.
- Heinrich, L.M., Gullone, E. (2006). The clinical significance of loneliness: a literature review. *Clinical Psychology Review* 26, 695-718.
<http://dx.doi.org/10.1016/j.cpr.2006.04.002>.
- Kadushin, C. (2002). The motivational foundation of social networks. *Social Networks*, 24, 77-91. doi:10.1016/S0378-8733(01)00052-1
- Koestner, R. & Gaëtan, L.F. (2002). Distinguishing three ways of being highly motivated: A closer look at introjection, identification, and intrinsic motivation. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 101-122). Rochester, NY: University of Rochester Press.
- Kornienko, O., Clemans, K. H., Out, D., & Granger, D. a. (2014). Hormones, behavior, and social network analysis: Exploring associations between cortisol, testosterone, and network structure. *Hormones and Behavior*, 66(3), 534-544.
 doi:10.1016/j.yhbeh.2014.07.009
- Lazega, Emmanuel, and Philippa E. Pattison. 1999. Multiplexity, Generalized Exchange and Cooperation in Organizations: A Case Study. *Social Networks*, 21(1), 67-90.
- Lee, F. (1997). When the Going Gets Tough, Do the Tough Ask for Help? Help Seeking and Power Motivation in Organizations. *Organizational Behavior and Human Decision Processes*, 72(3), 336-63. doi:10.1006/obhd.1997.2746
- Lewis, M. & Sullivan, M.W. (2005). The development of self-conscious emotions. In A.J. Elliot & C.S. Dweck (eds), *Handbook of competence and motivation* (pp. 185-201). New York: Guilford Press.
- MacIntyre, P. D., Potter, G. K., & Burns, J. N. (2012). The Socio-Educational Model of Music Motivation. *Journal of Research in Music Education*, 60(2), 129-144.
 doi:10.1177/0022429412444609
- Matthews, W. K., & Anastasia Kitsantas. (2007). Group Cohesion, Collective Efficacy, and Motivational Climate as Predictors of Conductor Support in Music Ensembles. *Journal of Research in Music Education*, 55(1), 6-17.
- McNeill, D. (2000). *Language and Gesture*. Cambridge: Cambridge University Press.
- McPherson, G. E., & Davidson, J. W. (2002). Musical practice: Mother and child interactions during the first year of learning an instrument. *Music Education Research*, 4, 141-156.

- Ojanen, T., Sijtsema, J. J., Hawley, P. H., & Little, T. D. (2010). Intrinsic and extrinsic motivation in early adolescents' friendship development: friendship selection, influence, and prospective friendship quality. *Journal of Adolescence*, 33(6), 837–51. doi:10.1016/j.adolescence.2010.08.004
- O'Neill, S.A. (1999). Flow theory and the development of musical performance skills. *Bulletin of the Council for Research in Music Education*, 141, 129-134.
- Pelletier, L. G., Tuson, K. M., Fortier, M. S., Vallerand, R. J., Brikre, N. M., Blais, M. R., & Montreuil, Q. B. (1995). Toward a New Measure of Intrinsic Motivation, Extrinsic Motivation, and Amotivation in Sports: The Sport Motivation Scale (SMS). *English*, 17, 35–53. Retrieved from <http://www.er.uqam.ca/nobel/r26710/LRCS/papers/72.pdf>
- Persson, R. (2001). The subjective world of the performer. In P.N. Juslin & J.A. Sloboda (eds), *Music and emotion: Theory and research* (pp. 275-289). Oxford: Oxford University Press.
- Reis, H. T. (1994). Domains of experience: Investigating relationship processes from three perspectives. In R. Erber & R. Gilmour (Eds.), *Theoretical frameworks for personal relationships* (pp. 87-110). Hillsdale, NJ: Erlbaum.
- Robins, G. (2013). A tutorial on methods for the modeling and analysis of social network data. *Journal of Mathematical Psychology*, 57, 261-274. <http://dx.doi.org/10.1016/j.jmp.2013.02.001>.
- Robins, G., Lusher, D. (2012). A simplified account of ERGMs as a statistical model. In: Lusher, D., Koskinen, J., Robins, G. (Eds.), *Exponential Random Graph Models for Social Networks: Theory, Methods, and Application*. Cambridge University Press, New York, pp. 16-28.
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78. doi:10.1037/0003-066X.55.1.68
- Ryan, R. M., & Deci, E. L. (2002). Overview of self-determination theory: An organismic dialectical perspective. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 3-33). Rochester, NY: University of Rochester Press.
- Ryan, R. M., Frederick, C. M., Lepes, D., Rubio, N., & Sheldon, K. M. (1997). Intrinsic motivation and exercise adherence. *International Journal of Sport Psychology*, 28, 335-354.

- Sichivitsa, V. O. (2003). College Choir Members' Motivation to Persist in Music: Application of the Tinto Model. *Journal of Research in Music Education*, 51(4), 330-341. doi:10.2307/3345659
- Siciliano, M. D. (2015). Advice Networks in Public Organizations: The Role of Structure, Internal Competition, and Individual Attributes. *Public Administration Review*, xx, 1–12. doi:10.1111/puar.12362.Advice
- Sloboda, J.A. (1998). Does music mean anything? *Musicae Scientiae*, 2, 21-31.
- Snijders, T.A.B. (2011). Statistical models for social networks. *Annual Review of Sociology*, 37, 131-153. <http://dx.doi.org/10.1146/annurev.soc.012809.102709>.
- Stebbins, R. A. (1992). *Amateurs, professionals and serious leisure*. McGill-Queen's University Press, Montreal, QC.
- Valente, T.W. (2010). *Social Networks and Health: Models, Methods, and Applications*. Oxford University Press, New York, NY.
- Vallerand, R. J. (1997). Toward a hierarchical model of intrinsic and extrinsic motivation. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 29, pp. 271-360). San Diego, CA: Academic Press.
- Vallerand, R. J. (2000). Deci and Ryan 's Self-Determination Theory: A View From the Hierarchical Model of Intrinsic and Extrinsic Motivation. *Psychological Inquiry*, 11(4), 312–318.
- Vallerand, R. J., & Bissonnette, R. (1992). Intrinsic, extrinsic, and amotivational styles as predictors of behavior: A prospective study. *Journal of Personality*, 60, 599-620.
- Vallerand, R. J., Pelletier, L. G., & Koestner, R. (2008). Reflections on self-determination theory. *Canadian Psychology/Psychologie Canadienne*, 49(3), 257–262. doi:10.1037/a0012804
- Vallerand, R.J. & Ratelle, C.F. (2002). Intrinsic and extrinsic motivation: A hierarchical model. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 37-64). Rochester, NY: University of Rochester Press.
- Vansteenkiste, M., Sierens, E., Soenens, B., Luyckx, K., & Lens, W. (2009). Motivational profiles from a self-determination perspective: The quality of motivation matters. *Journal of Educational Psychology*, 101(3), 671–688. doi:10.1037/a0015083

- Vlachopoulos, S. P., Karageorghis, C. I., & Terry, P. C. (2000). Motivation profiles in sport: a self-determination theory perspective. *Research Quarterly for Exercise and Sport*, 71(4), 387–397. doi:10.1080/02701367.2000.10608921
- Wasserman, S., Faust, K. (1994). *Social Network Analysis: Methods and Applications*. Cambridge University Press, Cambridge.
- Welch G. & Adam, P. (2003) *How is music learning celebrated and developed? A professional user review of UK and related international research undertaken by the British Educational Research Association*. Southwell, UK: British Educational Research Association.
- Werpy, S. F. (1996). Relationships between selected factors of motivation for participation in high school band and general motivation for musical experience 4608. *Dissertation Abstracts International Section A: Humanities and Social Sciences*.
- White, R. W. (1959). Motivation reconsidered: The concept of competence. *Psychological Review*, 66, 297-333.
- White, R. W. (1963). *Ego and reality in psychoanalytic theory*. New York: International Universities Press.
- Wild, T.C. & Enzle M.E. (2002). Social contagion of motivational orientations. In E. L. Deci & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 141-160). Rochester, NY: University of Rochester Press.

APPENDIX A

PARTICIPATORY MOTIVATION SCALES

Adapted from: *The Sports Motivation Scale (SMS-28)* (Pelletier et al., 1995)

Using the scale below, please indicate to what extent each of the following items corresponds to one of the reasons for which you are presently participating in marching band.

The 7-point rating scale is anchored by 1 (does not correspond at all), 4 (corresponds moderately), and 7 (corresponds exactly).

1. For the pleasure I feel in living exciting experiences.
2. For the pleasure it gives me to know more about marching band.
3. I used to have good reasons for doing marching band, but now I am asking myself if I should continue doing it.
4. For the pleasure of discovering new performance techniques.
5. I don't know anymore; I have the impression of being incapable of succeeding in marching band.
6. Because it allows me to be well regarded by people that I know.
7. Because, in my opinion, it is one of the best ways to meet people.
8. Because I feel a lot of personal satisfaction while mastering certain difficult performance techniques.
9. Because it is absolutely necessary to do marching band for ones well-being.
10. For the prestige of being a performer.
11. Because it is one of the best ways I have chosen to develop other aspects of myself.
12. For the pleasure I feel while improving some of my weak points.
13. For the excitement I feel when I am really involved in the activity.
14. Because I must do marching band to feel good myself.
15. For the satisfaction I experience while I am perfecting my abilities.
16. Because people around me think marching band is important to ones well-being.
17. Because it is a good way to learn lots of things which could be useful to me in other areas of my life.
18. For the intense emotions I feel doing an activity that I like.
19. It is not clear to me anymore; I don't really think my place is marching band.
20. For the pleasure that I feel while executing certain difficult movements.
21. Because I would feel bad if I was not taking time to do it.
22. To show others how good I am good at performing.
23. For the pleasure that I feel while learning performance techniques that I have never tried before.
24. Because it is one of the best ways to maintain good relationships with my friends.
25. Because I like the feeling of being totally immersed in the activity.
26. Because I must perform regularly.
27. For the pleasure of discovering new performance strategies.
28. I often ask myself; I can't seem to achieve the goals that I set for myself.

Adapted from: *Motives for Physical Activities Measure - Revised (MPAM-R) (19 items)*
(Ryan et al., 1997)


The following is a list of reasons why people engage in physical activity/sport, respond to each question (using the scale given), on the basis of how true that response is for you.

The 7-point rating scale is anchored by 1 (not at all very true for me) and 7 (true for me).

1. Because it's fun.
2. Because I like engaging in activities which physically challenge me.
3. Because I want to obtain new skills.
4. Because I want to be with my friends.
5. Because I like to do this activity.
6. Because I want to improve existing skills.
7. Because I like the challenge.
8. Because it makes me happy.
9. Because I want to keep up my current skill level.
10. Because I like activities which are physically challenging.
11. Because I like to be with others who are interested in this activity.
12. Because I think it's interesting.
13. Because I want to meet new people.
14. Because I enjoy this activity.
15. Because I want to get better at my activity.
16. Because I find this activity stimulating.
17. Because my friends want me to.
18. Because I like the excitement of participation.
19. Because I enjoy spending time with others doing this activity.

APPENDIX B
IRB APPROVAL LETTER

To: Douglas Granger

From: Carol Johnston, Chair
Biosci IRB 

Date: 08/20/2013

Committee Action: **Expedited Approval**

Approval Date: 08/20/2013

Review Type: Expedited F3 F7

IRB Protocol #: 1308009512

Study Title: Exploring Associations Among Salivary Biomarkers, Musical Engagement, and Formal and Informal Social Network Structures of a Musical Ensemble

Expiration Date: 08/19/2014

The above-referenced protocol was approved following expedited review by the Institutional Review Board.

It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date. You may not continue any research activity beyond the expiration date without approval by the Institutional Review Board.

Adverse Reactions: If any untoward incidents or severe reactions should develop as a result of this study, you are required to notify the Biosci IRB immediately. If necessary a member of the IRB will be assigned to look into the matter. If the problem is serious, approval may be withdrawn pending IRB review.

Amendments: If you wish to change any aspect of this study, such as the procedures, the consent forms, or the investigators, please communicate your requested changes to the Biosci IRB. The new procedure is not to be initiated until the IRB approval has been given.

Please retain a copy of this letter with your approved protocol.

BIOGRAPHICAL SKETCH

Serena Weren is completing her Doctor of Musical Arts in Wind Band Conducting at Arizona State University. She also holds a Master of Music in Instrumental Conducting and a Master of Music Education both from Arkansas State University as well as a Bachelor of Arts in Geology and Music from Franklin & Marshall College and a Bachelor of Music in Music Education from Temple University. She was the Director of Bands at Middletown High School South High School and River Plaza Elementary School in New Jersey. Her current research interests include investigating the association of instrumental music making, social networks, and biomarkers such as cortisol, testosterone, immunoglobulin-A, and oxytocin. The present research is one part of a larger study on the marching band which includes a more extensive biomarker and psychological data set. The larger study is a collaboration between Serena Weren and Gary W. Hill from the ASU School of Music as well as Dr. Doug Granger and Dr. Olga Korniekno from the Institute of Interdisciplinary Salivary Bioscience Research in the ASU Department of Psychology. Serena intends to continue the present research on motivation as well as expand the investigation of the marching band into other questions relating to biomarkers, social networks, stress, and leadership. These studies can aid in understanding our physiological relationship to music, as well as inform our personal musical choices, promote the development of viable musical therapeutic tools and methods, and lead to the evolution of evidence-based educational policies. It is my hope that this research will contribute to our understanding of the benefits and unique qualities that come from musical engagement.