Peer Influence on Weight Related Behaviors During the Transition to College

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Maṣallah

Abstract

The transition to college is an especially vulnerable time for young adults to gain weight. Peers are likely to be a source of influence when young adults begin to form habits concerning their eating and physical activity. This study examined social influences on weight related behaviors using dyadic growth curve analysis of data from 95 young adult roommates assessed 3 times during their freshman year of college. Initial after dinner snacking behavior was highly concordant when roommates first met but became less concordant as the semester progressed suggesting an impression management effect. Perceptions of partner's diet and exercise values predicted actor's change in after dinner snacking behavior controlling for the perceived norms of friends and other students on campus. This was also true for breakfast skipping indicating a significant effect of interpersonal socialization. Further, roommates tended to directly influence each other's sedentary behavior. TV watching and computer use became more concordant over time particularly for females and roommates who developed close relationships. Amount of actor exercise at baseline also predicted changes in partner's sedentary behavior over 10 weeks of living together. These effects were moderated by gender and relationship quality such that women were more likely to be motivated by impression management concerns and roommates with closer relationships were more likely to mutually influence each other through socialization. The results are some of the first to demonstrate social influence of eating behavior among young adult peers in real world settings without the confound of selection bias.

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Introduction

Obesity is one of the primary health threats facing Americans today. According to the 2007 estimates from the CDC, 36.7 % of the US population are overweight and an additional 26.3% are obese. Obesity is linked to many serious chronic health problems such as cardiovascular disease and diabetes. The greatest increases in obesity prevalence have been observed in the young adult population, especially those with some college education (Mokdad et al. 1999). College students have been found to be vulnerable to rapid increases in weight and typically gain twice as much as would be expected given national adult weight gain averages (Hill, Wyatt, Reed & Peters, 2003). A number of recent studies examining the "Freshman 15" phenomenon have shown that, although overstated, rapid weight gain does reliably occur for many young adults during the transition to college life. Students can expect to gain between 2-7 lbs. during their first year at college (Economos, Hildebrandt, & Hyatt, 2008; Hoffman, Policastro, Quick, & Lee, 2006; Holm-Denoma, Joiner, Vohs, & Heatherton, 2008; Levitsky, Halbmaier, & Mrdjenovic, 2004; Pliner, & Saunders, 2008; Racette, Deusinger, Strube, Highstein, & Deusinger, 2005). Freshman weight gain studies have linked increases in weight with decreases in fruit and vegetable consumption (Racette et al., 2005) increases in eating unhealthy items such as, soft-drinks and desserts (Pliner and Saunders, 2008), snacking after dinner (Levitsky et al. 2004) and decreases in physical exercise (Butler, Black, Blue, & Gretebeck, 2004).

Given that these tendencies might become more prevalent during the transition to college I propose that this new social environment plays a role in determining changes in unhealthy weight related behaviors. The need to develop social relationships and feel a sense of belonging should be particularly strong during this period that may in turn make

young adults especially vulnerable to the influence of their peers. The primary goal of this study is to examine the degree to which interpersonal relationships impact changes in behaviors associated with weight gain for college students during their freshman year.

Emerging Adulthood and the Transition to College: Implications for Weight Related Behavior

Freshman college students face significant changes in their environment as they transition from living under the supervision and care of parents to being on their own for the first time in their lives. A typical first year college student must quickly learn to navigate the demands of college as well as adapt to a new social network of peers. They must also assume greater responsibility for their personal behavior. Students often experience difficulty maintaining a healthy lifestyle due to the lack of family support and most have not yet developed for themselves, a stable routine for healthy eating and exercise (Clusky & Grobe, 2009). Frequent snacking and fast food consumption often become a convenient means to satisfy hunger. Access to all you can eat dining facilities may encourage students to indulge in unhealthy food choices on a regular basis (Levitsky et al 2004). Increased involvement in school work, socializing and electronic screen devices can also limit a student's ability to engage in regular physical activity (Rouse & Biddle, 2010). Both cross-sectional and prospective studies have found a positive relationship between television watching and adiposity during childhood (Andersen, Crespo, Bartlett, Cheskin & Pratt, 1998; Dietz & Gortmaker, 1985; Gortmaker et al., 1996). Watching TV along with other sedentary behaviors involving electronic screen time may contribute to weight gain by taking time away from more physically active behaviors (Epstein, 1995).

The numerous environmental and social changes that confront freshman students when beginning their college years can be overwhelming when one is expected to assume

greater personal responsibility for lifestyle decisions. With the reduced influence, guidance and support of parents and family members, a freshman student may increasingly look to their friends for information about appropriate behavior in their new role as young adults. For freshman students, roommates and other close friends may represent some of their most significant interpersonal relationships. Friendships play a key role in the adjustment to college life (Buote et al., 2007) and are an important reference group for guiding health related lifestyle decisions during the college years (Lau, Quadrel, & Hartman, 1990). During this developmental transition, young people explore and test attitudes, values and behaviors that may become part of their adult identity (Erikson, 1968). Friendships with peers are an important source of information as to which behaviors and attitudes hold the most social value. This developmental stage also marks a period when individuals are beginning to solidify behaviors that persist as enduring lifestyles. Behaviors related to weight gain and obesity are likely to develop more fully during this time and may prove difficult to change later in life (Steptoe et al., 2002).

Developing healthy eating and exercise habits at this early stage of adulthood may be particularly challenging for college students when such a lifestyle is perceived as incompatible with the behavior among his or her peers. Trends in the eating habits of college students have found that consumption of fast food, between meal snacks and soft drinks are at their highest levels and fruit and vegetable consumption significantly decline during the college years (Larson, Neumark-Sztainer, Hannan & Story, 2007; Malik, Schulze & Hu, 2006, Paeratakul et al., 2003, Zizza, Siega-Riz, & Popkin, 2001). Studies of the physical activity habits of college students have found TV viewing and computer use to be negatively correlated with physical activity and that substantial periods of the day (4-8 hours) are spent in some form of sedentary behavior (Buckworth & Nigg, 2004,

Rouse & Biddle, 2010). Frequently observing a lifestyle that is conducive to weight gain among one's peers may convey the social message that college students accept and even expect this type of behavior from their friends.

Eating and physical activity often involve social interaction yet very little is known about how close relationships, peers and group norms affect the attitudes, behaviors and goals people share toward maintaining a healthy weight. Some studies are beginning to examine how the social environment impacts eating behavior, food choice and the physical activity of young people through mechanisms such as modeling, reinforcement, social support and perceived norms (Eisenberg, Neumark-Sztainer, Story & Perry, 2004; Gorin et al., 2005; Herman, Roth & Polivy, 2003; McNeill, Kreuter, & Subramanian, 2006; Paxton, Schutz, Wertheim & Muir, 1999; Story, Neumark-Sztainer, & French, 2002). This line of research is in its earliest stages with only a few empirical studies scattered across a variety of disciplines such as public health, developmental and social psychology, nutrition and sociology. Based on social psychological theory, this dissertation will provide data to illustrate how the motivation to establish and maintain social relationships along with the perceptions students hold about friends can change the decisions students make about their own eating and sedentary behaviors.

The Task of Developing New Social Relationships During the Transition to College

A main anxiety/concern for freshman students is making friends and meeting new people (University of Minnesota Orientation and First Year Program Annual Report, 2008). As college freshmen summon the skills and motivation to establish and maintain a new friendship network, some may adjust their attitudes and behaviors to resemble those of their peers to facilitate a sense of social acceptance and belonging. Close partners and roommates tend to become more similar over time as attitudes, values and behaviors converge to become more concordant (Newcomb, 1961, Acitelli, Kenny &

Weiner, 2001). Concordance should promote a sense of agreement and reduce the potential for conflict. The adoption of the attitudes and behaviors of others within one's social network can be a rewarding social experience and can strengthen the perceptions of norms associated with the group.

This study aims to examine the degree to which peers influence each other to engage in behaviors associated with weight gain such as snacking after dinner, skipping breakfast and watching television. However, it is important to define what is exactly meant by peer influence. The term *peer* is often poorly defined in the literature and can represent a range of proximal and distal relationships from a person's best friend or one's social circle to a general cohort from a larger social context (Paek, 2009). This study examines peer relationships in the context of previously unacquainted same sex roommates. A peer in this case represents young adults who are of similar age, attending the same University and sharing a common living space. I am interested in the interpersonal relationship that develops between these peers to the extent that building a friendship with a partner involves influence and coordination of eating and physical activity. Roommates who did not know each other prior to living together provide an opportunity to examine interpersonal relationships as they develop over time from their earliest stages. A college roommate should function as a key relationship in a student's environment that will require daily interactions to accommodate each other's lifestyle.

Because of their close proximity, obligation toward maintaining a hospitable living situation and the novelty of living away from home for the first time, I expect that many college roommates will exert a measurable degree of influence over each other's attitudes and behaviors. By influence, I mean that some aspect of a student's behavior or beliefs is shown to predict change in his or her roommate's behavior at a later point in time. Previously unacquainted college roommates should experience changes in the

closeness of their interpersonal relationship as their time together increases. Therefore one of the primary goals of this study is to determine if changes in relationship quality give rise to changes in behaviors related to weight gain. Specifically, a student's relationship with his or her roommate will vary in quality based on a) changes in how close they feel to one another, b) the amount of perceived influence they have over each other, c) how frequently they spend time together in relevant activities (e.g. dining and TV watching) and d) how similar their values and behaviors are at baseline. This study is dyadic in nature in the sense that both roommate partners will participate and provide data on the same variables. Specifically, I have designed this study to examine if certain intrapersonal traits, values and behaviors of a student can predict changes in his or her roommates behavior and whether specific interpersonal qualities of the roommate relationship (e.g. closeness) affect the degree to which roommates influence each other's diet and sedentary behaviors.

Focusing on a Set of Weight Related Behaviors Likely to be Shared by Roommates

Tracking an exhaustive set of behaviors known to be associated with weight gain is beyond the scope of this study. To the extent that a person's eating behavior might influence his or her roommate should depend on the frequency with which those behaviors are done together. Behaviors such as snacking after dinner and engagement with sedentary screen devices are known to be associated with weight gain in young adults and may often occur within a dorm room when both students are present. Breakfast skipping can also put young adults at risk for weight gain and roommates may be particularly aware of each other's tendency to miss eating a morning meal.

All of these behaviors have been theorized to contribute to weight gain, yet more studies are needed to better understand the underlying causal mechanisms. Nationwide surveys have witnessed snacking behavior increase more than 30% in recent decades

which can typically contribute 25% of dietary energy (Jahns, Siega-Riz, & Popkin, 2001). Additional snacking after dinner has been shown to account for a significant portion of the variance in weight gain for freshman college students (Levitsky et al., 2004). Recent investigations of night eating syndrome have found that it is common among the obese population but the few epidemiological studies that have investigated the link between eating late at night and obesity have not been conclusive (Calugi, Grave & Marchesini, 2009).

Evening snacking is a particularly relevant and socially rewarding behavior that roommates may engage in together. Sharing a midnight snack of pizza, ice cream or cookies with a new roommate could become a friendly ritual that affirms trust, relaxation and comfort but could also become a habit that contributes to weight gain. An exploratory study assessing the food environment of college students living in dormitory rooms found an average of 47 food and beverage items in their rooms totaling nearly 23,000 calories (Nelson & Story, 2009). The study did not specify the degree to which students snacked together but the prevalence of multiple snack items supposes that snacking does frequently occur in the dorm room and that students are likely to be aware of how often their roommate snacks after dinner.

While frequently snacking late at night with one's roommate might be a socially rewarding behavior that contributes to weight gain, a student might influence his or her roommate's breakfast habits in a slightly different manner. Roommates are likely to become aware of each other's morning routine as they start each day during the course of their residence together. Roommates may or may not arrange to skip breakfast together but a student could perceive the benefits skipping breakfast affords his or her roommate. Many students might assume that skipping a meal would be an easy way to loose weight but some empirical studies have suggested that individuals who frequently skip breakfast

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tend are at greater risk for *gaining* weight (Niemeier et al.,2006) On the other hand, it is still unclear when regularly missing breakfast leads to weight gain. In a recent meta-analysis, only four of seven cross-sectional studies found a significant association between breakfast skipping and BMI (Rampersaud, et al., 2005). Other prospective studies have found similar mixed results. For example a large epidemiological study by Berkey et al., (2003) found that normal weight adolescents who never eat breakfast were more likely to *gain* weight the following year than peers who regularly ate breakfast. In contrast, overweight breakfast skippers tended to *lose* weight over time when compared to overweight breakfast eaters. If overweight people tend to loose weight by skipping breakfast then it is possible that young adults mistakenly generalize this occurrence to shedding a few extra pounds when at normal weight.

Students might also choose to postpone when they eat by having their first main meal closer to lunch and eating more meals later into the evening. Doing so may afford more morning sleep, later social activities and a greater variety of food choices. Whatever the reasons, research has shown that increasing numbers of young people choose to skip breakfast on a regular basis. Trends in adolescent eating habits have shown that breakfast consumption has been steadily declining from 1965 through 1991where more than a third of 15-18 year olds reported regularly skipping breakfast (Seiga-Riz, Popkin & Carson, 1998). The more prevalent breakfast skipping becomes among adolescents and young adults, the more likely it will appear normative and socially accepted.

Engagement in sedentary activities like watching TV and playing video games together could frequently occur in dormitory rooms and be an opportunity for bonding and social rewards for new roommates. Much of the screen-based entertainment that promotes sedentary behavior is available for use in the dorm rooms of college freshman. A recent survey of sedentary behavior patterns of college students revealed that 97% had

one or more computers in their dorm room with internet and TV access. Only 15 % of the sample had a video game console in their room, but 55 % had one or more video game consoles available to play in their residence hall (Rouse & Biddle, 2010). In a nationally representative sample of more than 13,000 US high school students, 40% of boys and girls watch between 2-3 hours of TV daily and approximately 20% watch 4 or more hours daily (Eisenman, Bartee, Smith, Welk & Fu, 2008). Additionally, 18 year olds who watched TV one hour or less had a 40% reduced risk of being overweight compared to those who watched 4 hours or more (Eisenman, Bartee & Wang, 2002).

Taken together these three weight related behaviors are likely to be prevalent and salient for students living with a roommate in campus housing. It might be the case that students who have a roommate who frequently snacks after dinner, skips breakfast or spends hours watching TV will be more likely to also engage in these behaviors than if assigned a roommate whose behavior is more healthy and active.

Synthesizing Social Psychological Theory to Understand How Relationships Impact Eating and Sedentary Behaviors

To make reasonable predictions concerning the influence peers may have on an individual's diet and sedentary habits requires guidance from a number of theoretical perspectives. Social Learning Theory (Bandura, 1977) provides an understanding for the process by which contact with others can directly influence and change behavior through imitation or modeling. I will draw together evidence from social psychological research that demonstrates how a) modeling the behaviors of others affords social benefits in terms of attraction and belonging, b) social norms provide information for appropriate behavior and c) how different classes of social norms influence people to change their behavior. Further, a social-normative model developed by Herman and colleagues will describe more specifically how eating behavior is influenced by the presence of others

(Herman, Roth & Polivy, 2003). Finally, Interdependence Theory (Kelly & Thibaut, 1978; Rusbult & Van Lange, 2003) provides guidance for taking a dyadic perspective on eating and sedentary behavior in the sense that each partner's perspective must be considered to understand the degree to which roommates influence each other.

Social Learning Theory and The Influence of Social Norms

According to social learning theory (Bandura, 1977) individuals model behaviors to the extent that they witness others gaining social approval from those behaviors. People also may choose to avoid behaviors that appear to have had negative consequences for individuals they have interacted with. The more people observe that a particular behavior commonly occurs and has the approval of his or her social network, the stronger and more influential the social norm for that behavior becomes. This effect was powerfully demonstrated in Crandall's (1988) classic study concerning the spread of bulimic symptoms within sorority houses. He found that women who adhered to a social norm about the appropriate amount binge-eating were the most popular women in their sorority. Crandall also discovered that as friendship groups within the sororities became closer, their binge-eating behavior became more similar. People are likely to adhere to social norms to the extent that they believe doing so comes with social benefits such as acceptance and popularity. People also pay attention to social norms as sources of information that describe appropriate behavior for the situation. Not abiding by valued norms risks the social cost of reduced popularity, rejection and embarrassment. As people spend more time together the value of certain social norms should become more salient and may exert pressure toward uniformity.

Eating often occurs in a social context and provides opportunities to enhance and build social relationships. Individuals learn about the costs and benefits associated with eating behaviors through observations of others and subsequently through the modeling

of the behavior. Imitating or modeling the behavior of others may be perceived as a rewarding experience that validates, supports and justifies the behavior. Modeling may also enhance perceptions of similarity within peer groups which in turn promotes attraction and the development of interpersonal relationships (Berscheid & Walster, 1983). Individuals who mimic the behavior of others (expressions, emotional displays, gestures) also tend to be liked more than those who do not mimic (Chartrand & Bargh, 1999).

Social learning and behavioral mimicry can also occur for self-interested reasons as individuals recognize the value in copying the behavior of others in their environment. For example, a student may be encouraged to skip breakfast more frequently if his roommate tends to skip often especially when the behavior seems to be benefiting the roommate. Indeed, a student may observe that his or her roommate can stay up later, sleep in and get still get to class when he or she skips breakfast. The student may also believe that skipping breakfast has helped his or her roommate loose weight. Mimicking the breakfast skipping habits of a roommate may not necessarily depend on the quality of the relationship but more on the perceived benefits that doing so affords. Sharing a room with someone who skips breakfast frequently should make this behavior more salient to a student and influence him or her to skip breakfast more frequently if the perceived benefits outweigh the costs.

Copying the behavior of a valued person in one's environment is the most direct way in which peers influence each other via social learning. Peers can also influence their friends in more subtle and indirect ways. The perceived diet and exercise values of one's peers may indirectly motivate students to change their behavior to comply with prevailing social norms. In fact many studies have found that that perceived peer behavior is a stronger predictor of risky health behavior in adolescents and young adults than actual

peer behavior (Urberg, Shyu & Liang, 1990; Iannotti & Bush, 1991; Fromme & Ruela, 1994; Prinstein & Wang, 2005; Gravener et al., 2008). To the extent that social influences guide decisions about risky health behaviors depends upon what a person *believes* others value and do rather than what they may actually value and do.

Such beliefs about others forms the basis for how individuals understand social norms. A social norm is a "rule or standard that that is understood by members of a group, and that guide and/or constrain social behavior without the force of laws" (Cialdini & Trost, 1998). Norms emerge from interpersonal interaction and may or may not be publicly stated. Norms can be made explicitly known through demonstration and instruction or more subtly through non verbal cues and imitation. They also may be inferred from the behaviors of those in our environment. The willingness to engage in a risky health behavior or modify a current health behavior may depend in part on the norms an individual perceives in their reference group.

Models of health behavior change such as the Theory of Reasoned Action (Ajzen & Fishbein, 1980) and the Theory of Planned Behavior (Ajzen, 1991) include subjective norms as a key predictor of intentions to carry out a behavior. Subjective norms in these models refer to what a person believes important others want them to do. For example, a woman may believe her husband wants her to loose weight. This form of social influence may be an important factor in predicting behavior change but in a recent meta-analysis subjective norms were found to be a relatively weak predictor of intentions (Armitage & Conner, 2001).

Subsequent research has attempted to redefine the normative aspect of social influence in these models to more precisely understand how they affect intentions to act. For example Cialdini and colleagues (e.g., Cialdini, Kallgren & Reno, 1991) have distinguished between different classes of norms that function either to inform people

about what behaviors are approved and disapproved (injunctive norms) and behaviors that are typical of a particular group (descriptive norms). Injunctive norms refer to how people ought to behave and are more closely aligned with coercion and control. The subjective norm component in the theories of reasoned action/planned behavior is an injunctive norm because this predictor involves the perceived social pressures from significant others to perform a behavior or achieve a goal. Descriptive norms derive from observations and perceptions of other people's behavior regardless of the social sanctions attached and can also influence behavior. These norms simply describe the typical or normal behavior in a given situation. A freshman student is perhaps most likely to be aware of the injunctive norms for diet and exercise behavior from their parents. It seems less likely that freshman would experience peer pressure from his or her roommate to change his or her weight related behaviors, at least not initially. Instead students may rely on descriptive norms to motivate their own behavior since they provide information as to the type of behavior that is likely to be appropriate or adaptive to the particular situation.

The values and behaviors regarding the diet and physical activity of one's peers may vary a great deal and a person is most likely to be influenced by the norms of a reference group that is an important and salient part of an individual's environment. From a social identity perspective, some theorists have argued that the theories of reasoned action/planned behavior do not account for the strength of identification with important others and groups (Terry & Hogg, 1996). Subjective norms should have a greater impact for those who identify strongly with the reference group. For example, Terry and Hogg found that the perceived norms of an important reference group (friends and peers at the university) predicted intentions to engage in regular exercise (Study 1) and females' intentions to engage in sun-protective behaviors (Study 2) but only for

individuals who identified strongly with the group. Likewise it seems reasonable to expect that students who feel closer to their roommate should be more influenced by the perceived norms or values of their of their roommate.

Descriptive norms have traditionally played a significant role when studying how young people come under the influence of their peers to adopt risky health behaviors. One of the most reliable predictors of adolescent engagement in a risky health behavior is the extent to which young people perceive their peers also engaging in similar behavior (Prinstein, & Dodge, 2008). Prospective research has linked the influence of peers to the uptake of risky health behaviors such as alcohol consumption (Borsari, & Carey, 2001; Werner, Walker & Greene, 1996) smoking (Hoffman et al., 2006; Sussman et al., 1994), drug use (Bauman & Ennett, 1996; Kandel, 1978) and disordered eating (Crandall, 1988) for adolescents and young adults. Most of these studies emphasize the point that young people are less likely to be directly encouraged to engage in these behaviors by their peers but that perceptions of peer behavior is a more likely mechanism of influence.

The nature of peer influence on risky health behavior may be more subtle than a direct effect resulting from "peer pressure." In her review of the theoretical and empirical findings associated with peer influence on smoking, Kobus (2003) finds that direct pressure to smoke from friends may not be as strong a factor as some have assumed. Instead youth experience self-pressure to smoke if others they associate with are also smoking. Peer influence to engage in risky health behavior may have a more indirect effect as young people attend to the values of their peers in an attempt to seek social approval, encourage social interaction and avoid exclusion from those friends who are highly valued.

Another form of indirect influence from peers to engage in risky heath behaviors derives from perceptions that their own behavioral choices and judgments are relatively

widespread and appropriate for their social group. According to social comparison theory (Festinger 1954), individuals are motivated to evaluate their beliefs and behaviors by comparing them with their peers. People tend to engage in a systematic bias by overestimating their agreement with peers in order to validate existing beliefs and to justify behavior. When individuals perceive that a particular behavior is more widespread among their peers than it actually is they may be more likely to engage in the behavior (Ross, Greene, & House, 1977).   Evidence for this false-consensus effect has been found for adolescents who engage in behaviors such as smoking, (Botvin et al., 1992) drinking (Werner et al., 1996) and unhealthy dieting practices (Austin, 2001). Young people may be more likely to smoke and experiment with other risky health behaviors to the degree that they perceive doing so will bring rewards such as increased social status and acceptance. With the rise of obesity and its detrimental long term effects on health, behaviors linked to weight gain should be more closely scrutinized as a class of risky health behaviors that may also be subject to similar social influences. A growing body of experimental studies has demonstrated that people *can* be influenced by social factors in the lab yet field studies that document the way social factors *do* in fact influence weight related behavior over time are lacking.

Freshman students arriving on campus for the first time should be motivated to choose behaviors that most effectively help them adapt to their new surroundings and social situation. A new student may not yet have a sense for how other college students in general tend to behave and they may not yet have formed a strong identity as a member of a larger student organization. A more available and salient source of information about social norms might come from a student's perceptions of those in his or her immediate environment which would naturally include his or her roommate. It may be the case that a student's perception of his or her roommate's values concerning diet and

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exercise will reliably predict changes in his or her own diet and sedentary behaviors more than the eating and physical activity norms that are perceived for other freshman on campus.

Normative Influences on Eating

Eating is a behavior intricately linked with social life. We often eat our meals in the presence of others. Although eating behavior may be partly regulated by internal factors such as taste preferences and satiety cues, Herman and colleagues (Clendenen, Herman & Polivy, 1994; Roth, Herman, Polivy & Pliner, 2001; Herman, Roth & Polivy, 2003) have demonstrated across multiple studies that social influences are powerful external determinants of how people regulate their food intake. Their social-normative model of eating posits that in situations with palatable food, people feel motivated to eat as much as possible provided they are not viewed as eating too much (Herman, Roth & Polivy, 2003). People tend to observe the eating behavior of others to establish maximum levels of intake that is socially acceptable. Doing so allows individuals to eat as much as they can while avoiding appearing like an excessive eater who consumes more than his or her fair share. Experimental modeling studies have demonstrated that an individual's consumption can be modified by the presence of another person. Participants consistently will eat more when confederates eat large amounts and will eat less when confederates eat minimally (Nisbett & Storms, 1974; Roth, Herman, Polivy, & Pliner, 2001; Hermans, Larsen, Herman & Engels 2008). This effect is robust enough to occur even when participants had previously eaten and were full (Herman, Polivy, Kauffman, & Roth, 2003) or under conditions of extreme hunger (Goldman, Herman, & Polivy, 1991). Interestingly people are not usually aware that the eating behavior of others influences their own eating behavior (Vartanian, Herman & Wasink, 2008).

Adhering to contextual social norms regarding eating communicates a statement about the self that creates a specific profile for an audience. In most social situations people feel motivated to make a positive impression on others (Leary & Kowalski, 1990) and eating behavior may serve to create a favorable impression of the self. In addition to conforming to the behavior of others, people can create a favorable social impression by eating very little. Specifically, women who eat minimally tend to be viewed more favorably than women who eat a lot (Chaiken & Pliner, 1987). Other studies have also shown that people tend to use different impression management strategies when eating with friends as opposed to strangers. People are generally more motivated to make a good impression when initially interacting with strangers than when interacting with someone they know well (Leary et al., 1994). People have been found to eat less dessert (Clendenen, Herman & Polivy, 1994), and fewer snacks (Salvy, Jarrin, Paluch, Irfan & Pliner, 2007) when eating with strangers than when eating with friends. This is important for these particular roommates since all students began the study as relative strangers and many will become friends by the end. A change in relationship quality might have an impact on eating behavior via impression management concerns. If roommates quickly discover that they are compatible and have similar values concerning diet and exercise, they may reinforce each other's weight related behaviors and become even more similar over time. It might also be the case that once roommates feel that they are sufficiently compatible, their motivation to affiliate and create a positive impression with their roommate will diminish somewhat and the motivation for autonomy and distinction might play a greater role. In this case, eating behavior might tend to become less similar just as previous studies have shown that people are less likely to mimic the eating behavior of others when they are with friends as opposed to strangers (Clendenen, Herman & Polivy, 1994). To the extent that roommates discover that they are not as

compatible as they may have initially hoped, roommates should feel that impression management efforts are futile and I would not expect any increase in concordance for behaviors associated with weight gain.

Taken together this social-normative model demonstrates that people can be influenced by the eating behavior of others and that social influences may in some situations override biological cues of hunger and satiety. The presence of others may increase eating when others are eating excessively. Eating can also be limited or tend toward social concordance when people are trying to create a favorable impression of themselves especially when dining with those who are less familiar.

Given that college roommates are likely to be motivated to make a favorable impression during the initial stages of their relationship, previously unacquainted roommates may refrain from eating excessively or monitor their eating habits more closely so as not to deviate too much from the eating habits of their partner. Paying attention to the prevailing social norms on campus and in the dorm could also be helpful for an incoming freshman toward feeling socially accepted. A student might like and accept her roommate more if she behaves in a manner that does not deviate noticeably from her own behavior or the established group norms. Given the strong need to belong and feel accepted by others (Baumeister and Leary, 1995) freshman college students should be motivated to not make the wrong impression with their new set of friends when they are dining and interacting together. After establishing a friendly relationship, roommates' impression management concerns might decrease and behave in a manner that aligns more with their own attitudes and desires. Tracking how both snacking behavior and relationship quality change and interact may provide some insight into how social norms and impression management concerns affect eating habits.

Interdependence Theory

Up to this point I have described experimental studies demonstrating how an individual's eating behavior can be affected by the presence of others. Yet much of this evidence involved isolated, one-time only situations and often with complete strangers. Little is known about how actual cohabitating partners' influence eating and sedentary behavior over time.

Relationship research in the interdependence theory tradition examines how the structure of interpersonal situations can affect the outcomes of the interacting individuals (Kelly & Thibaut, 1978). Assessment of the thoughts, feelings and behaviors of both partners is often necessary to disentangle intrapersonal and interpersonal effects on behavior. Interdependence is defined as the influence interacting partners have on each other's outcomes (Rusbult & Van Lang, 1996). For dyads who are interdependent, each partner's behavior is affected by the other. In some situations partners cooperate and coordinate their behaviors to afford a mutually satisfying outcome. In other situations partners desire different outcomes, which might make coordination difficult resulting in conflict or each individual seeking their own outcome without the partner. Interdependent partners are therefore expected to be in situations where their social activity requires active coordination and the success or failure of this coordination may affect the quality of the relationship as well as other factors such as self-regulation strength (Rusbult & Van Lange, 2003, Finkel et al., 2006).

Like most general social interaction theories, interdependence theory begins with the assumption that individuals will seek to maximize positive outcomes in a relationship (Kelly & Thibaut, 1978). Partners are more likely to repeat interactions that are rewarding and avoid interactions that produce unfavorable outcomes. To the extent that eating together or watching the same TV program together is a rewarding experience, roommates are likely to continue that behavior. It may also be the case that individuals

will modify their own eating behavior or television show preferences to be more congruent with their partner in order to increase the number of mutually beneficial experiences they have together. Mutually beneficial experiences tend to promote interdependence as roommates begin to rely on each other for rewards. For instance, dining together requires some coordination between partners and when roommates share food preferences and eating habits they will find it easier to coordinate eating together. The same is true for leisure sedentary activities such as watching TV. To the extent that their eating habits and leisure activity preferences are not similar would limit the potential for favorable interactions. If people are likely to adjust their eating behavior in the presence of others then it also seems likely that close roommates will adjust their eating and sedentary habits to become more similar. Behavioral convergence should afford more positive outcomes and further promote interdependence.

In terms of weight related behavior, most people might believe that decisions about whether to make healthy vs. unhealthy food choices, or to decide between an active vs. sedentary activity is primarily determined by one's own preferences and self-interest. People may fail to fully consider the degree to which others in their social network influence these choices. The choices and behaviors people make in public send an implicit signal concerning the values one has about healthy eating and regular exercise. Such decisions also convey information about the importance of pursuing specific health goals such as attempting to cut down on sweets and high fat snacks, eat more fruits and vegetables, watch less TV and get more vigorous exercise. When people are motivated to affiliate and seek acceptance from a particular social group, they should attempt to convey the sense that they share similar values. Copying the behaviors of others then sends an explicit signal that values and goals are shared.

When needs for affiliation are high, roommates may pay greater attention to the behaviors of potential friends and reflect on their own behavior in terms of how it might impact the relationship. According to interdependence theory this process of forgoing one's own preferred behavior to accommodate the needs and goals of one's partner is described as transformation of motivation. Essentially, interdependent partners who strive to maintain a positive and rewarding relationship will transform their motivation from behaving in a purely self-interested way to acting in a more communal way with his or her partner. For interdependent partners, choices concerning diet and physical activity may change on the basis of broader affiliation needs and interaction goals. The willingness to express and share common values and goals conveys the message that a partner can be trusted and is interested in promoting the long term success of the relationship.

Interdependent partners may be more likely to be influenced by each other's values, goals and behaviors when that partner is particularly salient, such as situation with a new roommate. To the extent that certain weight related behaviors and goals are salient in the situations where roommates interact would impact the likelihood that partners influence each other. It is therefore import to consider how often roommates are eating together; exercising or watching TV together. To the extent that they discuss and engage in these weight related behaviors when they are interacting should make these values and goals more chronically accessible and thus more likely to influence behavior. To be sure, the more interdependent the relationship is, the more these perceived shared values and goals will function as primes that in turn facilitate behavioral concordance.

Behavioral concordance might then be a consequence of a developing interdependent relationship, but many factors may also prevent partners from becoming concordant. For example, partners may have strong competing goals, values and habits

that are too important or too difficult to change. Beliefs about how important these competing values are to one's roommate should dictate the degree to which a student conforms and changes his or her behavior.

Some developing relationships might experience a shift from a need for affiliation to a greater need for autonomy. Newly formed relationships may need to establish and build interdependence initially but once partners trust that their relationship will flourish and endure, needs for autonomy may become more predominant. Roommates may feel more entitled to fall back on their own self-interests to guide their intentions and behaviors when interacting in secure situations with an interdependent partner.

Finally some behaviors may require more social coordination and effort and therefore may hold greater weight in signaling interdependence, trust and liking. It may be that physical activities such as exercise and sedentary behavior require more time and social coordination to function as behaviors that are diagnostic of affiliation and interdependence. Agreeing on what TV show to watch and committing to watching it together require time and perhaps some degree of self-sacrifice that is consistent with transformation of motivation. It may also be the case that engaging in sedentary behaviors provides more explicit information about a roommate's values and goals than eating and snacking behavior which can be more ambiguous.

To be sure, eating behaviors can be highly variable and subject to change given different situations and social contexts. Particular food choices may seem less diagnostic of overall health values and goals. While it may be quite likely that roommates will pay increased attention to what each other eat when they first meet out of impression management concerns, over time, once the relationship is established and roommates are more or less friends, striving for concordance of food choices and habits may afford more costs than benefits in terms of time and effort. To the extent that divergence in food

choices and habits does not produce conflict, then it seems less likely that interdependent partners would feel motivated to always coordinate their eating behavior with their roommate. Sharing a meal with a roommate may be sufficient to signal affiliation but adopting the specific food preferences and eating habits of one's roommate may not be necessary to maintain a close relationship.

The interdependence of two people in a relationship can be illustrated using a simple diagram. Figure 1 represents an overtime dyadic model that separates the different paths of influence individuals have on each other's behavior. This model is commonly known as the Actor-Partner Interdependance Model (APIM: Kenny Kashy & Cook, 2006). At a basic level, this model represents how well behavior at one point in time predicts behavior at later points in time for two people in a relationship. An *actor effect* describes how each member of the dyad influences his or her own outcomes. This path indicates the degree to which each partner is responsible for his or her own behavior and the likelihood that their past behavior will predict their future behavior. A *partner effect* refers to the possibility that an individual influences his or her partner's outcomes. This type of influence suggests that the behavior of an individual at one point in time will predict the behavior of their partner at a later point in time. This path is independent of the influence from the actor's own behavior. A joint effect describes when both actor and partner effects are present for an individual. For example, a person's own prior eating behavior (actor effect) and his partner's prior behavior (partner effect) influences his own behavior at a later point in time. Finally, *mutual joint effects* occur when both partners experience joint effects.

As two people grow closer and more interdependent they should become more likely to influence each other's behaviors, decisions, plans and goals. The strength of the influence due to one's relationship with another person can be inferred from the

magnitude of the coefficient defining the partner effect path in the APIM. The presence of a significant partner effect suggests that some type of influence due to the relationship has occurred because an individual's response depends on a particular characteristic of his or her partner. To the extent that partner effects are found in this study (e.g. dietary habits of an individual predict the same dietary habits of their partner at a later point in time) suggests that the behavior of an individual can directly affect the behaviors of his or her partner. Based on interdependence theory, I would expect that as roommates become more interdependent they should increase the amount of time they spend snacking, watching TV and playing video games together. Higher levels of interdependence should therefore predict greater convergence in weight related behaviors among freshman roommates.

A relationship becomes interdependent not only from the frequency of shared activities but by the diversity and duration of those activities (Kelly et al., 1983). The more roommates interact in a variety of activities during their first year of college together, the more they should become aware of each other's values and goals about maintaining a healthy lifestyle. Increases in closeness between roommates might also give rise to changes in attitudes and behaviors that would in turn enhance perceptions of similarity. Relationship scholars have posited that similarity between people on attitudes, values, physical appearance and behaviors is an essential determinant of interpersonal attraction (Berscheid & Walster, 1969). The more close roommates choose to dine and engage in various leisure activities together the greater the opportunities for weight related behaviors to be observed, internalized and possibly imitated. The degree to which roommates become closer over time should also depend on how similar their weight related behaviors were when they first met. Those whose diet and sedentary behaviors match at the start of the semester will require less negotiation and coordination to engage

in these behaviors together. If randomly assigned college roommates do not perceive they match on each other's values, behaviors and goals required to maintain a healthy lifestyle then they may choose to not become particularly close and thus limit the ability to influence each other's weight related behavior.

Social activities such as eating together, hanging out, watching TV or going for a bike ride together can function as a means toward feeling connected to another person. Given the strong motivation that students should have to establish and maintain satisfying relationships with others, it should be important that close friends understand one another and have a solid sense of relatedness (the feeling that the need to belong is being satisfied by one's social activities; Reis, Sheldon, Gable, Roscoe & Ryan, 2000). Feeling understood and appreciated should stem from the ability to accurately describe where one's partner stands on important values, beliefs and goals. To the extent that a student is able to accurately infer how much his or her roommate values a healthy diet and regular exercise might contribute to the degree roommates become close and are able to mutually influence each other along these domains.

Social Learning Theory and Interdependence Theory then provide the guiding framework that describes how social norms and the behavior of others can influence the weight related behaviors of an individual. The thesis that roommates would influence each other to the degree that their weight related behaviors would begin to become more similar over time can be further bolstered by findings from processes examined in peer influence studies found in social and development psychology as well as sociology.

Distinguishing Homophily From Peer Influence Effects: The Roles of Selection vs. Socialization

The old saying "birds of a feather flock together" describes the observation that relationships and social groups tend to share a number of traits, values and behaviors; a

phenomenon known as homophily. The principle of homophily describes how contact between similar people occurs more often than between dissimilar people. Social research typically finds homophily to occur for broad demographic categories such as race, gender, age and religion but some evidence exits for attitudes and behaviors (McPherson et al., 2001). In her seminal research examining peer influence on health risk behaviors Kandel (1978) described two tenets of homophily to explain the association between adolescents' and their peers' attitudes. Friends may appear similar due to *selection* in the sense that people actively seek out and choose friends based on pre-existing similarities. In addition, friends may become similar over time due to mutual influence through a process of *socialization*. Both processes are likely to occur as friends select each other based on similar characteristics and then socialize and mutually influence each other to enhance similarity.

Peers mutually socialize each other through interpersonal interactions, changing behavior to match the beliefs, expectations or behaviors of the social group (Hartup, 1999). Socialization is a process of learning that occurs through imitation, identification and internalization of the behaviors and attitudes of others. Provocative research using data from the Framingham Heart Study suggests that these processes may contribute to the rise of the obesity epidemic (Christakis & Fowler, 2007). Over a 32-year period, social network analysis revealed that connected social groups tend to cluster around body size. Having any friend who was obese increased a person's own risk of obesity by 45% and having an indirect connection to an obese person (through a friend of a friend, up to 3 degrees of separation) also increased one's risk of obesity. Having a sibling or a spouse who was obese increased risk of obesity but to a lesser degree. People who were not obese were similarly more likely to have nonobese social contacts up to three degrees of separation. Further analysis revealed that this is not fully explained by individuals

selecting friends based on body size. The study suggested that the spread of weight gain through social networks was facilitated by the nature of the friendship connection. Those who had a mutual same sex friend who became obese had their risk of also becoming obese themselves increase by 171%. Mutual friends were twice as influential as the friendships that were not reciprocated by both parties. Although this study cannot precisely identify the mechanism that facilitates the spreading of certain attitudes and behaviors related to weight gain from person to person, the researchers suggest that a same sex mutual friend might function as an important reference figure when determining what constitutes a normal body size for themselves (Chang & Christakis, 2003). Based on this evidence I would expect that roommates who become mutual friends will influence each other more than roommate who are not mutual friends.

Friends also tend to reinforce each other for behavior that is similar to their own (Hartup, 1983). Since selection of friends plays a significant role in the presence of homophily, the motivation of individuals to seek out and support common traits, values and behaviors in their friends and acquaintances cannot be ignored. Even though these roommates were randomly paired, any effort they make to become friends should be facilitated when common ground is found. Attraction between roommates likely begins with observing similarities on important behaviors, values and traits. A student is likely to choose to spend quality time with his or her roommate when he or she discovers that they both enjoy the same things. Capitalizing on initial similarities when roommates first meet function as potential selection effects.

Over time roommates should begin to evaluate whether he or she has been paired with someone who values a healthy lifestyle or someone with an unhealthy diet and sedentary habits. When roommates discover that they match on values and behaviors concerning diet and physical activity they should be more likely to reinforce each other to

maintain that lifestyle. Mismatched roommates might be less likely to influence each other's diet and sedentary behavior. One possible way for roommates to quickly gauge how well they match on diet and sedentary behavior is how similar they are in body size or BMI. Indeed, several studies suggest that friends are often selected by body size and attractiveness (Sprecher & Regan, 2002; Wang, Brownell, & Wadden, 2004; Crosnoe, Frank & Mueller, 2008; Valente, Fujimoto, Chou, & Spruijt-Metz, 2009; Bowker, Spencer & Salvy, 2010). Students should also vary in their ability to accurately understand how important good diet and exercise habits are to his or her roommate. Roommates who have a more accurate understanding of each other's diet and exercise values may feel an increased sense of relatedness and in turn may be more likely to influence each other's behaviors.

Experimental studies focused on eating patterns in groups have found that women may be more likely to model another person who is physically similar in terms of BMI than someone who dissimilar. De Luca and Spigelman (1979) found that obese women ate more when paired with an obese confederate who ate excessively than when paired with a normal weight confederate who ate excessively. Similar effects were found with pre-adolescent girls (Salvy, Romero, Paluch & Epstein, 2007). Using a more naturalistic setting, (e.g. a living room setting rather than an experimental taste test) Hermans, Larsen, Herman & Engels, (2008), found that normal weight women were more likely to model the eating behavior of a normal weight confederate rather than a slim confederate. It may be the case, particularly for female roommates who are similar in body size, to have an increased tendency to support and reinforce each other's eating habits.

Potential Moderators of Peer Influence: Individual Differences and Interpersonal Factors.

To more precisely understand the phenomenon of peer influence, Hartup (1999) suggests that future peer influence research make more of an effort to identify the boundary conditions that constrain peer influence effects as well as dispositional and interpersonal variables that might moderate any effect. For example, some individuals may have more influence than others, some may be more susceptible to being influenced and some relationships might better foster processes that encourage socialization.

Identifying who is more susceptible and who may be particularly resistant to peer influence has not been well established and susceptibility remains a poorly understood construct in the peer influence literature (Hartup, 2005). A more precise understanding of the factors that moderate peer influence affords potential targets for possible intervention efforts. Factors that maximize peer influence effects might be leveraged to encourage healthy behavior especially when targeted at those who wield strong influence within their social network (Kelly et al., 1991; Rogers, 2002). Other factors such as parental involvement might help some to resist pressure to conform to the unhealthy behavior of peers.

Described below are four classes of potential moderators that involve 1) differences in ability and motivation to exert social influence, 2) aspects of the relationship that may contribute to the likelihood that influence will occur between two people, 3) dispositional aspects of the person being influenced 4) the additional influence that parents and outside friends have beyond the roommate relationship.

Ability and Motivation to Exert Social Influence in Diet and Exercise Behavior: Examining Differences in Interpersonal Behavior Between Men and Women

Gender differences may exist in the ability and motivation roommates have in influencing each other's eating and physical activity habits. A substantial amount of empirical evidence has revealed that women tend to be more sensitive to their

relationship partners than men which may enhance the power of social interaction to change behavior. For example women tend to provide more social support to their same-sex friends than men (Fehr, 1996). Males score lower than females on measures of relationship intimacy (Buhrmeister & Furman, 1987; Bank & Hansford, 2000) and same-sex friendships have been found to be more intimate for adolescent girls than for boys (Maccoby, 1990). Men also expect to experience more negative consequences from self-disclosure of personal information than women (Petronio & Martin, 1986). Females have also been purported to possess greater empathic accuracy or the ability to decode the meaning of another person's behavior. This ability stems from research that has found women to possess more emotional insight and greater sensitivity to the feelings of others (Broverman, Vogel, Broverman, Clarkson & Rosenkrantz, 1972; Parkinson & Manstead, 1992).

The increased tendency for women to provide social support, seek intimacy and experience empathy with their same sex friends might enhance female friends' ability and motivation to influence each other's behavior. Women may tend to think about and devote more time and effort toward maintaining their relationships than men. The increased focus on relationships by women should enhance much of the interpersonal phenomenon tested in this study. For example, I would expect that women will become more concordant in their weight related behaviors over time than men.

Some gender differences also exist in the domain of diet and physical activity. Women are more aware and have better knowledge of nutrition than men and women typically consume more fruits and vegetables than men (Kiefer, Rathmanner, & Kunze, 2005). Women also tend to experience more food-related conflict than men to the extent that they enjoy eating high fat foods but perceive that they should refrain from eating them (Rolls, Fedoroff & Guthrie, 1991). Women's intentions to eat sweet snacks have

also been found to be more influenced by social pressure than men's (Grogan, Bell & Conner, 1997). Restrained eating, dieting and eating disorders are also much more common in adolescent and young adult females than males (Keel, Fulkerson, & Leon, 1997; Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002). Yet women and men may be equally susceptible to the influence of their friends in terms of dieting. Perceptions of peer dieting have been found to be predictive of college age women and men's desire to be thin (Gravener, Haedt, Heatherton & Keel, 2008).

In terms of physical activity, adolescent and college age males tend to be more physically active than females (Buckworth & Nigg, 2004; Gruber, 2008) Males also tend to be influenced by their peers to exercise (Wallace, Buckworth, Kirby, & Sherman, 2000). Adolescent and young adult males have also been found to engage in more sedentary activity such as watching TV (Gordon-Larsen, McMurray & Popkin, 1999) and leisure computer time (Buckworth & Nigg, 2004). Based on these gender differences found in the literature, I would predict that women will attend to and be more responsive to the eating behaviors of their same sex roommates and thus be more susceptible to peer influence in the eating domain. In contrast, men may be somewhat more involved with both exercise and sedentary behaviors and might be more susceptible to social influence in the physical activity domain rather than the eating behavior of their peers.

Interpersonal Factors that Determine Susceptibility to Social Influence: The Role of Social Status

Some have argued that a careful analysis of the interpersonal context in a given situation affords significant insight into how situations vary and affect behavior (Kelley, Holmes, Kerr, Reis, Rusbult, & van Lange, 2003; Reis, 2008). So what sort of interpersonal dynamics will transpire between two seemingly equal and unacquainted young adults who must share a room together for the next nine months? Relationship

science has suggested, to the extent that they influence each other equally or not at all, depends largely on their interdependence (Berscheid & Regan, 2004). It also seems probable that ability to influence one's partner or roommate develops asymmetrically within some relationships. Research regarding status and power in relationships has indicated that differences in power typically develop in most relationships (Anderson, et al., 2003) in terms of which individual has more influence over the other. Social status may be one factor that determines who has more power and influence in a developing relationship between college roommates. Those with higher amounts of social status receive more attention from others, are more respected by their social group and are more likely to possess the ability to influence others (Anderson, John, Keltner & Kring, 2001). Self-evaluations of one's subjective social status are likely derived from comparing the self to similar others as well as reflected appraisals or how well liked a person believes themselves to be (Singh-Manoux, Adler & Marmot, 2003).

It is plausible that young adults entering college should be more likely to emulate the behaviors of those friends they perceive to be well liked in their social group. Research on the prototype-willingness model (Gibbons & Gerard, 1997) has found that individuals are more likely to engage in risky health behavior to the extent that they perceive the behavior is typical of members of a high-status group. People may look to those with high status to determine which attitudes and behaviors are characteristics they would like for themselves (Cohen & Prinstein, 2006). In addition some may believe that emulation of high status individuals will improve their own standing in the social hierarchy (Bandura, 1977). Finally conforming to the behavior of a higher status partner may facilitate the need to get along (Anderson et al., 2003). It may be that within roommate pairs, those with more social status have increased power and influence. Those with less status and influence may be more likely to attend to the behaviors and

attitudes of their roommate. Achieving attitude and behavioral concordance with valued others should bolster a young adult's developing sense of identity and promote cohesion with others in their social group.

In sum, the difference in social status between roommates may be one way to predict who is likely to dictate relationship outcomes and who is susceptible to peer influence. A student with higher social status may be perceived by his or her roommate to embody the types of values and behaviors that they would like for themselves. Accepting and adopting those values and behaviors might enable a lower status student a chance to be accepted by a member of a higher status group. Therefore I would predict that within roommate relationships, the student with the lower social status will be more likely to change his or her weight related behaviors to be more concordant with his or her roommate. In contrast, the higher status roommate should be less motivated to change his or her behavior to match his or her roommate because doing so is less likely to afford any improvement in his or her ranking in the social hierarchy.

Interpersonal Power and Susceptibility to Social Influence

Given the growing literature conveying the importance of peer influence on health behaviors there is a surprising lack of empirical evidence directed at understanding who might be most susceptible to peer influence. Susceptibility to social influence is considered to be one of the oldest individual difference variables to be subject to empirical study by social psychologists and yet much of the literature is contradictory and inconclusive (McGuire 1968). Despite early efforts to measure individual difference variables that may moderate susceptibility to peer influence (Berndt, 1979; Santee & Maslach,1982) the notion of who is most vulnerable to peer influence remains an open question. Nevertheless, some constructs may play a role given the unique situation confronting college freshman.

In many ways, freshman roommates begin their relationship as equals. There should be little difference in the roles roommates take on when they set up their living environment together. Randomly assigned college roommates should at least start with the understanding that they have equal responsibility in determining the range of acceptable behaviors and together they should mutually settle on a lifestyle that is compatible and agreeable. Developmental theory suggests that adolescents and young adults are faced with two primary issues in terms of forming a sense of connectedness with others and establishing a sense of personal identity or independence (Erikson,1968). The need for affiliation and need for autonomy are often competing motivations that may differentially affect intentions and behaviors depending on the dynamics of the relationship. Therefore the interpersonal dynamics of freshman roommates are a unique situation that affords an opportunity for certain traits and dispositional constructs to emerge that give rise to asymmetries in interpersonal power, resulting in one person becoming more susceptible to peer influence than another.

Before any specific personality traits are identified it must be emphasized that the type of power that gives rise to one person influencing the other's diet and exercise behavior is fundamentally an interpersonal process. In other words, interpersonal power is a function of the dynamic of the social situation. A person may have a good deal of power when interacting with his or her roommate, but may have considerably less power when interacting with his or her romantic partner. A logical starting place for examining the interpersonal dynamic of influence begins with the attention a student devotes to his or her roommate's values and behaviors.

Just as a person must pay attention to and comprehend a persuasive message to be influenced by it, we might also assume that for one individual to be influenced by another he or she must at least attend to and understand the values and behaviors of the other.

The more a person feels committed to the relationship the more likely they should be influenced by their partner's values and goals. According to the principal of least interest (Waller & Hill, 1951) the partner who is least interested in the relationship is in a position of enhanced power since he or she will be most likely to dictate whether the relationship flourishes or dies. Interdependance theory further states that the partner who is least interested is also less dependant on the relationship for positive outcomes. People make this determination about the quality of their relationships when they compare the quality of outcomes with alternative partners. When a person has higher quality alternative relationships relative to his or her partner, then that person may be identified as the "weak link" in the relationship (Attridge, Berscheid & Simpson, 1995). In other words, the person who is most satisfied and dependant on the relationship is likely more susceptible to influence from his or her partner who is less satisfied and/or committed. The partner with the stronger commitment is more invested in maintaining the relationship and therefore more willing to transform selfish motives and goals for mutually agreed upon goals and outcomes that benefit the relationship.

Potential of Socially Based Personality Traits to Moderate the Effect of Peer Influence

From the set of Big 5 traits agreeableness and extraversion contain aspects associated with social interaction and may both be moderators of peer influence effects. Sub-components of agreeableness such as compliance or politeness might be related to the tendency to go along with the wishes of another person or the degree to which a person is susceptible to peer influence. Similarly, the social compassion dimension of agreeableness might be related to a person's tendency to empathize with their partner, assigning importance toward understanding and relating to the attitudes and behaviors of their partner (DeYoung, Quilty & Peterson, 2007). Agreeableness has been shown to

predict young adult alcohol consumption in social settings (van Schoor, Bot & Engels, 2008). The researchers found an interaction between agreeableness and peer drinking on observed drinking at a bar such that compared to individuals low in agreeableness, highly agreeable individuals drank more when peers were drinking heavily and drank less when peers were drinking moderately.

Extraversion might differentially predict conformity based on subcomponents of the construct. On the one hand the social, fun seeking aspect of extraversion related to enjoyment of social interaction might be associated with the degree to which a student conforms to the behavior of his or her roommate. An extraverted student might be eager to act in concordance with his or her roommate such as watching the same television program together or going out for a late night snack if the prospect of doing so involves increased social interaction. On the other hand the subcomponent of assertiveness might be associated with the tendency to control a situation to suit one's personal needs and the degree to which a person is capable of exerting influence on others.

Differences in the Tendency to Adjust One's Behavior to the Demands of the Situation: The Role of Self-Monitoring

If commitment to the relationship is one path toward determining the amount of attention a person devotes to his or her partner, are there specific personality traits that might facilitate the degree to which behavior changes within specific interpersonal contexts? Self-monitoring is an individual difference construct that taps into a person's sensitivity to social cues and willingness to adapt attitudes and behaviors to align with the expectations of the social situation. In situations where behaviors are perceived to be normative, high self-monitors are more likely to adapt their behavior to align with these norms. In contrast, low self-monitors are less responsive to situational cues and more likely to rely on their internal attitudes and values to guide behavior (Snyder, 1974). The

effect that self-monitoring has on close relationships has been primarily tested on dating relationships and less is known how self-monitoring affects the dynamics of same-sex friendships. Nevertheless, commitment to either a romantic partner or a friend likely involves similar constructs of investment, satisfaction and quality of alternatives (Rusbult, Martz & Agnew, 1998).

High self-monitors may on the one hand be more willing to change or adapt their attitudes and behaviors given the demands of the situation than low self monitors but on the other hand they may be in a position to hold more power in a relationship since they tend to be less committed in relationships and often seek out and engage in activities with alternative partners (Snyder & Simpson, 1984). Gangestad and Snyder (2000) have argued that high self-monitors are motivated to gain status and influence within social relationships and desire to influence others in order to be held in high regard. High self-monitors may not always be successful in influencing others but their tendency to actively manage the public perception of themselves and desire to impress others might in some situations afford a sense of enhanced interpersonal power.

Low self-monitors in contrast would be less likely to engage in such tactics and prefer to be true to themselves regardless of the dynamics of the situation. In addition low self-monitors tend to prefer being in relationships where the balance of power is symmetrical, where both partners have equal status and influence (Oyamot, Fuglestad & Snyder, 2010) whereas high self-monitors are more likely to perceive power differences in their relationships, accept that asymmetries are inevitable and are more comfortable playing either the role of a leader or a subordinate. As a measure of susceptibility to influence, low self-monitors are somewhat resistant to adjusting their behavior from the demands of the social situation and should be less vulnerable to peer influence. High self-monitors may be more susceptible to influence when they perceive they are in a

relationship with someone who is higher in status and may strive to wield their influence when they perceive they are interacting with someone of lower status.

In a set of studies, Cheng and Chartrand, (2003) demonstrated that high self-monitors were more likely to use non-conscious mimicry than low self-monitors in situations that contained cues for affiliation. To be sure, high self-monitors were found to be more likely to mimic a person who could be of value to them (e.g. a peer more than a nonpeer (Study 1), and someone with relatively more power more than another with relatively less power (Study 2). In a study with preadolescents, high self-monitors were shown to be three times more likely than low self-monitors to take up smoking after a year when they perceived smoking to be a normative behavior among their peers (Perrine & Aloise-Young, 2003). Observing a roommate engaging in behaviors like snacking late at night or skipping breakfast might be an important source of social information that individuals use to determine how common or socially acceptable the behavior is among one's peers. It is plausible that high self-monitors would be more likely to adjust their diet and physical activity habits to be concordant with their roommate than low self-monitors. Roommates should perceive the value in affiliating since they will see each other often and can potentially become good friends. High self-monitors might use mimicry as a quick, in the moment impression management technique for affiliation needs whereas low self-monitors may be less inclined to mimic or be influenced in the short term by a new roommate since they tend to prefer knowing a partner's true authentic self which would require a longer term strategy of building closeness, commitment and trust.

The Strength of Social Influences Beyond the Roommate Relationship

Children and adolescents are likely to acquire values and behaviors associated with weight gain from observing the eating and physical activity habits of their parents and

family members (Savage, Fisher & Birch, 2007). Recent reviews have found parental eating behaviors to be positively associated with both unhealthy (van der Horst et al., 2007) and healthy (Pearson, Biddle, & Gorely, 2008) dietary behaviors of children and adolescents.   For instance children who have more frequent family meals tend to have better diets during adolescence (Larson, Neumark-Sztainer, Hannan & Story, 2007). Other studies have shown that children with parents who had high fat diets also had high fat diets (Oliveria et al., 1992).

Some adolescents may have grown up in households where the injunctive and descriptive norms to eat healthy and exercise regularly were strong and ever present as parents encouraged the consumption of fruits and vegetables, engaged in regular family meals and enabled their children to be physically active rather than sedentary by being good role models. I would predict that students exposed to this type of normative influence as children from their parents might be less likely to degrade their healthy eating and exercise habits from the influence of their peers as they transition into adulthood.

It may also be the case that students exposed to unhealthier environments had parents who were ambivalent about healthy eating and exercise creating home environments where eating fast food and watching hours of television daily was the norm rather than the exception. On the one hand, those students could be dissatisfied with that lifestyle and be influenced positively by a roommate with healthier eating and exercise habits. On the other hand, poor eating and exercise habits are typically difficult to change for most people especially when the descriptive norms amongst one's peers encourages consumption of foods high in fats, sugar and salt (i.e. pizza, soda and fries) and the increasing use of sedentary electronic screen devices. Unless such a person is highly

motivated to change their unhealthy habits, he or she may subsequently influence his or her roommate to adopt or maintain similar behaviors that could lead to rapid weight gain.

As adolescents become more independent from their parents, they may turn to their peers for guidance and support concerning lifestyle decisions (Furman & Burmester, 1992). Teenagers and young adults transfer the attachment for parents on to close friends and romantic partners (Fraley & Davis, 1997) and peers become an important reference group especially when the relationship with parents is less secure (Nickerson & Nagle, 2005).

The diet and sedentary behavior of college students may then be most susceptible to social influence from peers during the first year of living away from parents. The more that snacking, missing breakfast and sedentary activities are perceived as common behaviors among young adults attending college the more likely a student will feel that this type of lifestyle is acceptable and perhaps adaptive to the demands of college.

Addressing the Challenges Associated With Studying Peer Influence

The interest social scientists have in understanding the nature of peer influence has not waned since the seminal works of Sherif's (1936) autokinetic lab studies and the "natural experiments" of Newcomb (1936, 1961) at Bennington college and the University of Michigan. A recent search on PsycINFO revealed more than 2000 peer reviewed journal articles have been published on the subject of peer influence over the last 40 years. Despite the robust interest in investigating how peers influence each other, the psychological factors associated with peer influence on health risk behaviors have proven to be a particularly difficult phenomenon to capture empirically. Many scholars have criticized the bulk of these studies as overstating the effect of peer influence (Bauman & Ennet, 1986; Kandel, 1996; Jaccard, Blanton & Dodge, 2005). Many studies claiming peer influence simply ask an individual how many of their friends have

performed the behavior and correlate the value with the respondent's own behavior. Critics have pointed to the false consensus effect and have argued that individuals may have a biased perception of their friend's behavior from projecting their own attitudes and behaviors on to their friends causing them to inflate reports of similarity.

Many peer influence studies use cross sectional data and therefore cannot disentangle selection effects from socialization effects. Individuals tend to select friends based on common values, interests and goals. This makes it difficult to determine if the observed similarity in risk behavior among peers occurred before the relationship began. The effects of selection suggest that the behavior could have been a reason that the friendship formed in the first place. A person might befriend another because they already share a common behavior such as smoking, drinking, playing basketball or eating pizza three nights a week. The effects of socialization suggest that the friendship caused the behavior to increase. A friend may adopt the behavior of an admired other as a form of ingratiation or two friends may encourage behaviors they both enjoy.

Kandel (1996) argues that longitudinal evidence is needed to separate socialization and selection effects such that an investigator can examine peer relationships in different stages of development. Others have attempted to control for selection effects by using randomly paired college roommates. Individuals in this particular living situation provide a unique opportunity for researchers to isolate socialization effects when roommates have not selected each other based on shared attributes.

Disentangling Socialization and Selection Effects

Assessing randomly paired dyads over time affords an effective means for observing how the behavior of an individual at a particular point in time covaries with that same behavior in their partner without the influence of selection. In addition,

longitudinal dyadic studies can model how changes in one particular variable (e.g. closeness) affect changes in other variables such as attitudes and behaviors related to weight gain. Overtime dyadic studies also afford the ability to separate the influence an actor has on his own behavior from the unique effect the partner has on his behavior. Studies that assess data from both relationship partners can reduce the false consensus bias that plagues many peer influence studies because the partner directly reports his or her data rather than assuming that the actor's estimation of their partner's behavior is accurate.

This study is based on existing theory ranging from eating behavior, social norms and relationship science in an attempt to predict how newly developing relationships affect key behaviors related to weight gain at a time when young adults are especially vulnerable to peer influence. The young adult population has experienced alarming increases in obesity prevalence in recent years and yet few investigators have a precise understanding of the social and interpersonal dynamics that encourage, magnify and maintain behaviors associated with weight gain. To address this gap in the literature and examine it in greater detail, I document below a field study designed to describe and assess some of the factors involved with how interpersonal relationships affect changes in diet and sedentary behavior over time.

The Proposed Study

The proposed study will examine the phenomenon of peer influence as it applies to behaviors related to weight gain. The focus of this study will be on college freshman since they have been shown to be a particular risk for rapid weight gain. The study's primary objective is to test the idea that behaviors known to increase the likelihood of weight gain change over time due in part to the social influence from one's cohabitating partner. Although behaviors linked to eating disorders such as bulimia are subject to

social influence (Crandall, 1988), the focus of this project will be on common eating behaviors that are associated with weight gain in non-clinical populations. Participants will include those who have been assigned a same sex roommate they did not know previously to live on the University of Minnesota campus during their freshman year. Since participants did not choose their roommate themselves, changes in their behavior that move toward concordance and the degree of similarity they display at the end of the assessment may be regarded as potential socialization effects.

Specifying Change in Weight Related Behaviors

To describe the process of social influence concerning diet and sedentary behaviors one must consider how and when the variables of interest are likely to change. This study was longitudinal in design based on the assumption that measurable changes were likely to occur in the weight related behaviors of freshman college students. It was expected that the focal weight related behaviors in this study would also change at a rapid rate during this first phase of independence from family based on recent evidence that freshman college students are vulnerable to weight gain and that changes in eating habits and sedentary behavior are typical among young people entering college (Edwards & Meiselman, 2003; Jung, Bray, Martin & Ginis, 2008; Levitsky et al., 2004; Rouse & Biddle, 2010; Vella-Zarb & Elgar, 2009). During their initial days and weeks on campus students will likely be making changes in their dietary and physical activity habits as they adjust to their new living situation and social environment. Change in these behaviors may therefore be most rapid at the beginning of the semester and then slow down as students settle into a lifestyle that is compatible with their new situation.

I would also expect changes in relationship quality between roommates as their experiences together increase and they become something more than mere acquaintances. Some students should discover that the person who has been selected to be their

roommate is a good match and they quickly become friends, developing an increasingly closer bond over time. Others will unfortunately discover that they have little in common with their new roommate and prefer to be with others. These roommates may start out friendly but the lack of interaction will cause the relationship to become non-existent. It also seems quite likely that roommates will be eager to begin their academic life with someone new, expecting to establish and encourage a new friendship, enjoying their first experiences together. Affiliation needs should be strong at the outset as students strive to fit in and make new friends. Over time, students may begin to notice annoying or troublesome behaviors in their roommate that were not apparent at the outset. These inevitable discoveries will require time and effort to reconcile and should result in changes or fluctuations in closeness over time.

A second issue when developing a model of change for these variables is the important role of time. This study observed students during the initial weeks and months after they transitioned from living away from home to living in various campus dormitories. The study spanned approximately 3 months, beginning the first week of the fall semester and concluded before the Thanksgiving break. This period represents the first significant block of time that the students were living together and should contain numerous opportunities for roommates to influence each other's weight related behaviors. Measurements were taken at 5 week intervals to estimate the trajectory of growth in each of the weight related behaviors and interdependence of the roommates. Decreasing the lag between measurement points and including more than three phases of data collection was considered in order to examine change at a finer degree of detail. Unfortunately there were limitations on the resources needed to pay participants beyond three data collection phases. There was also concern that more frequent data collection would put an unnecessary burden on participants, increase attrition rates and missing

data. Longitudinal studies with roommates have found significant effects with gathering data at just two or three time points (Anderson et al., 2003; Berg, 1984; Zalta & Keel, 2006).

Estimating appropriate time points for data collection in longitudinal studies can be difficult and somewhat arbitrary when there is little theoretical or empirical evidence to guide when changes in behavior are likely to occur. These time points are based on the assumption that measurable changes in weight related behaviors and relationship quality could happen within a range of a few weeks to a number of months and is largely dependant on the frequency of interaction between partners.

The study was also constrained by concerns that some randomly assigned roommates may want to separate if they discover they are incompatible. After consulting with the residence hall directors of the dormitories where a majority of these participants resided, we concluded that most roommates were likely to remain together during the study period. I also felt that the first ten weeks of the fall semester would be a reasonable period of time to assess changes in the focal variables. Participants should have had ample time to become acquainted, assess the status of their relationship and become familiar with each other's habits that are associated with diet and exercise. Relatively little is known concerning how college students are socially influenced to change their diet and sedentary behaviors. This dissertation project is field study designed to investigate in a new way how behaviors linked to weight gain and obesity can spread from person to person. This longitudinal dyadic study not only will test the hypotheses proposed below but also provides collected data that will guide the generation of new hypotheses for future studies.

Three weight related behaviors most likely to be influenced by a roommate (evening snacking, breakfast skipping and sedentary behavior) will be assessed at three

time points during the Fall semester. Time 1 will take place the first week of September just as the academic year begins. Time 2 will occur 4-5 weeks later in October. Time 3 will occur after an additional 5 weeks has passed just before the Thanksgiving break. Based on this set of concurrent measures from college roommates, the following set of predictions will be made.

H1: The Convergence Hypothesis

Change in roommates' weight related behaviors will converge to become increasingly similar over time, such that correlations between individuals within the roommate dyad for frequency of after dinner snacking, skipping breakfast and sedentary behaviors will be greater at time 2 than at time 1 and the strength of the correlation will increase from time 2 to time 3.

The next set of hypotheses qualify which roommates are predicted to have the strongest influence over each other's weight related behaviors due to factors unique to their relationship. These predictions will be measured by differences in the strength of partner effects in the APIM model and between-person covariances in the growth curve model. These techniques are detailed in an analysis strategy as part of the methods section below.

H2a: The Closeness Hypothesis:

Roommates who develop closer relationships by Time 3 will influence each other's weight related behavior more than roommates who do not develop a close relationship.

H2b: Gender Differences Hypothesis

Female roommates will influence each other more than male roommates.

H2c: The Frequency Hypothesis

Roommates who frequently dine and engage in sedentary behavior together will influence each more than roommates who infrequently dine and engage in sedentary behavior together.

H2d: Similarity Hypothesis

Roommates who are similar in body size (BMI) at baseline will influence each other more than roommates who differ in body size. In addition roommates whose diet and physical activity habits are similar at baseline will also influence each other more than roommates who are not similar.

H2e: Understanding Partner's Values Hypothesis

Roommates who are accurate in predicting each other's diet and exercise values will tend to be closer than roommates who are less accurate. Accurately understanding each other's diet and exercise values should also afford the increased ability to influence each other's weight related behaviors.

H3: Interpersonal Power Hypothesis

There will be a significant partner effect for the high status partner on the low status roommate at times 2 and 3 such that those with lower social status will change their weight related behaviors more to conform to their partner than the high status roommate.

H4a: Perception of Roommate's Diet and Exercise Value Hypothesis

A student's own diet and exercise values will not predict change in their own or their roommate's weight related behaviors. Personal values will predict the stability of behavior (actor effect) and may only weakly predict a roommate's behavior (partner effect) at later time points. Students' weight related behavior will change based on the beliefs about his or her roommate's diet and exercise values. Perceptions of a roommate's values concerning diet and exercise will predict a change in a student's own

weight related behavior (e.g. beliefs that one's roommate values eating healthy everyday will predict decreases in one's own after dinner snacking behavior).

Although a number of other factors such as the influence of parents, self-monitoring, and other personality constructs have been posited to moderate the degree to which roommates influence each other's weight related behaviors, I view them as secondary factors that play a smaller role in understanding the how this set of health behaviors are affected by social influence. These factors are not unimportant and will be the focus of future analyses but a thorough analysis of all of these variables may be beyond the scope of this dissertation. By focusing on a smaller set of moderators I will take an initial step at a parsimonious explanation of the key processes involved with the social influence of weight related behavior.

METHOD

Participants

Participants were required to be incoming freshman students who had been assigned a roommate by the University of Minnesota department of Housing and Residential Life. Participants were recruited through an email invitation to join the study along with their roommate one week after they received their room assignments in late July of 2009. Initial data collection began just after freshman orientation in September and continued during the first week of the Fall semester. A sample of 200 students (100 roommate pairs, 67% female) agreed to participate in the study. 89% of the original sample were 18 years old and the remaining 11% were 19. 84% were white, 6% Asian, 2% Hispanic, 2% specified an alternate ethnicity (e.g. middle eastern) and 6% did not respond. Students were compensated either $25.00 or extra credit points for participating in all three waves of data collection.

Procedure

This study required participants to attend an orientation session during the first week of the fall semester where they signed consent forms and were measured for height and weight. To participate in the study participants were informed that both they and their roommate would provide self-report data via an internet based questionnaire three times during the fall semester. The survey was comprised of questions regarding recent eating behavior, physical activity, assessments of relationship quality with one's roommate and other individual difference questions described below. Participants took approximately 30-45 minutes to complete the survey at each time point. 86% of the participants completed the baseline survey in the lab after their orientation visit. All others completed the survey within the next few days at a time that was convenient. The second survey was completed approximately 5 weeks after baseline and the third survey was completed 5 week after the 2nd survey. Surveys were sent for the second and third phases via email with a web link to access the survey online. Access to surveys was limited only to study participants who logged on using their X500 code and password.   Participants were sent regular reminders to complete their surveys in a timely manner during each phase of data collection. Each data collection phase lasted 1 week. All participants in the final data set completed surveys within this time period. Finally, students returned to the lab in November (time 3) for a final weigh in and height measurement.

Focal Dependant Measures Assessed at All Three Time Points

Snacking after dinner

After dinner snacking behavior was assessed by adapting a measure from Levitsky et al., (2004).   Three self-report items assessed (a) the average frequency of after dinner snacking during the past week, "Over the last week, how many times did you eat a snack after dinner?" (b) the typical portion size, "What was the average size of your after dinner snack?" and (c) in an open-ended format, participants described the type of

snacks they consumed after dinner. Frequency of snacking was measured using a Likert scale with response options ranging from 0=never to 7=every day last week. Response options for snack size were characterized as light, "just a taste to ½ serving, (e.g.½ apple, small cookie)," moderate, "approximately a normal serving (e.g.1-2 cups of chips, 1 regular candy bar)," and large, "more than one serving (e.g. large order of fries, more than two scoops of ice cream)." Serving sizes were coded as small=0.5, moderate=1.0 and large=2 to approximate average portion sizes of snacks consumed after dinner. Participants' frequency response was multiplied by the serving size to calculate an index of daily evening snacking.

Breakfast skipping

Breakfast skipping was assessed with a single item adopted from the National Longitudinal Study of Adolescent Health, "Over the last week, how many times did you skip breakfast?" (Niemeier et al., 2006). Response options ranged from 0=never to 7=every day last week.

Sedentary behavior

Participants indicated how much time (in hours and minutes) they spend on average during the week engaged in the following behaviors: (a) watching TV, (b) playing video games and (c) using a computer for something other than homework. The time spent engaging in these behaviors were summed to create a composite sedentary time variable.

Frequency of Interaction

Students were asked at each time point to report how often they did the following behaviors together in the past week: Snack after dinner, watch TV or play video games, eat breakfast, lunch and dinner. Frequency of interaction was measured using a Likert scale with response options ranging from 0=never to 7=every day last week.

Weight Related Food Consumption

At each time point participants described their average weekly intake of energy dense snacks, sugar sweetened beverages, fruits and vegetables and fast food consumption using the Food Habits Questionnaire, an instrument designed to target consumption of foods known to be associated with weight gain (French, Harnack, Toomey & Hannan, 2007). This screener has been validated to provide reasonable estimates of individual intake of food items when compared to the Diet History Questionnaire, a more comprehensive instrument developed by the National Cancer Institute (Thompson et al, 2002). The current measure was designed to take a snapshot of recent consumption of particular foods rather than capture total dietary intake. (see Appendix B). Participants first estimated the frequency with which they consumed each food over the past week and then with a separate item described the typical serving size that they would usually consume. Frequency items were on an 8 point scale and response options ranged from 0=never to 7= six or more times per day. Frequency items were recalculated as follows: 0 = 0=Never, 1.5 = (1-2 times/week), 3.5 = (3-4 times/week), 5.5 = (5-6 times/week), 7 = (once a day), 17.5 = (2-3 times/day), 31.5 = (4-5 times/day), 42 = (6 or more times/day). Serving size response options were tailored for each food item to represent a four point range of typical portion sizes from 1= ½ of a serving to 4 = 2 ½ servings. Each item was multiplied by the serving size response to get a value for servings per week.

Nine items assessed the consumption of foods high in caloric value, fat content and low in nutrition value (e.g. pastries, French fries, ice cream). An index of high fat snack consumption was calculated by summing the number of servings participants reported consuming in the past week of each of these items.

Physical Activity

Physical activity was measured using 3 items from the International Physical Activity Questionnaire (Craig et al., 2003). Participants reported the number of days they spent walking and engaging in vigorous and moderate levels of exercise over the previous seven days. They also reported the number of hours and minutes they typically spent doing those activities. The number of minutes for each type of exercise was multiplied by the number of days and then summed to provide a total minutes score for average weekly physical exercise (Appendix C). An index of physical activity was calculated by summing the total minutes per week students reported engaging in both moderate and vigorous physical activity (MV exercise).

Time 1 Similarity

Roommates will vary in the similarity of their weight related behavior and attributes at baseline. The absolute difference between roommates in baseline variables such as BMI, MV exercise and high fat snack consumption was calculated to assess relative similarity on weight related variables. Based on the distribution of these difference scores for the sample, roommates who differed more than 1 standard deviation from their roommate were classified as dissimilar.

Interpersonal Measures

Relationship quality was assessed using 2 standard measures of relationship closeness: the Inclusion of Other in the Self Scale (IOS; Aron, Aron & Smollan 1992) and the Relationship Closeness Inventory (RCI; Berscheid, Snyder & Omoto, 1989). The IOS scale primarily captures a sense of "feeling close" to one's partner whereas the RCI captures a "behaving close" dimension of relationship quality. Additional items were created to measure roommate satisfaction, "How satisfied are you with your roommate?" and estimates of future friendship "How likely is it that you will be friends with your

roommate next year?" The IOS and roommate satisfaction scales were assessed at all three time points.

The three subscales represent different constructs and scores on each were converted into a 10 point scale in order to compute a total closeness score. The frequency subscale measured how much time partners spend alone together and participants estimated the number of hours and minutes during the past week they were alone with their roommate. The time estimates were converted into total daily minutes and then rescaled to correspond to a 10 point scale. (e.g. 0-12 minutes =1, 13-48 minutes =2, etc.). The diversity subscale listed a wide variety of typical activities that partners are likely to engage in. Participants selected which of these activities they did alone with their roommate in the past week. The total number of activity domains selected were summed and then rescaled to a 10 point scale based on the RCI's scoring criteria (Berscheid, Snyder & Omoto, 1989). The strength of influence subscale measures the degree of influence a partner has on the participant. Sixteen items were included that were appropriate for roommate relationships such as "My roommate influences and contributes to my overall happiness", "My roommate influences how I spend my free time, and "My roommate influences my ability to eat a healthy diet." Using a 7-point scale (1= strongly disagree, 7 = strongly agree) participants indicated how much influence their partner has on his or her activities, plans and goals. Scores on all relationship strength of influence items were summed and converted to a 10 point scale by the RCI scoring criteria. Reliability for the 20–item strength of influence scale was high at both time points $\alpha = .88$, $\alpha = .89$ and the test-retest reliability was r= .72, p<.001. A total "behaving close" score was computed by summing the converted scores for each subscale. Higher values indicate higher levels of closeness, (see Appendix D).

All three subscales of the RCI were completed by participants at times 2 and 3 after the roommates had an opportunity to interact and establish a relationship.

The IOS is a single item pictorial scale comprised of a series of seven increasingly overlapping circles to represent people's interconnectedness with others or a subjective sense of "feeling close," (see Appendix E). To measure the degree to which roommate pairs had established a close relationship, all closeness measures for each member of the dyad taken at each time point were standardized and aggregated to create an index of overall closeness.

Subjective Social Status

The social rank of each participant was measured using 4 pictorial self-report indicators. (see Appendix F). Participants also estimated the social status of their roommate. All social status assessments occurred at time 2. A modified version of the MacArthur Scale of Subjective Social Status applicable to college students was used to assess self-reported social status, (Goodman et al., 2001). The instrument consists of an image of a ladder. The ladder has ten rungs and participants were asked to place themselves on the rung that best represents their social position. Each rung represented a point on a scale ranging from 1= lowest status to 10 = highest status. The first ladder assessed the placement of the participant's family in US society. This ladder is a measure of subjective SES. The second ladder assessed personal placement in the college community. This ladder is a measure of subjective social status. For the third ladder participants indicated where their position is likely to be on the ladder at the end their first year of college. This is a measure of expected social status.

Participants also rated their roommate's subjective social status in terms of the amount of prominence, respect and influence their roommate has in the residence hall using the same ladder as in the previous self assessments. The three self-report items

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along with the roommate's assessment were summed to provide an index of subjective social status for each member of the roommate dyad. The reliability of the 4 status items together was low α = .46 and improved to α = .67 when the partner rating of self-status was dropped.

Individual Difference Measures

Individual differences measures associated with peer influence were included in the baseline survey. Participants completed the 25-item self-monitoring scale (Snyder, 1974), Rosenberg's 10-item self-esteem scale (Rosenberg, 1965) and a 42-item version measuring Big 5 personality (John & Srivastava,1999). (Appendices G-I)

Contextual Variables Associated With Parents, Friends and Romantic Partner

Contextual variables may affect the influence roommates have on each other, specifically the influence from parents and other friends or romantic partners. Nine items assessed the participants' relationship with his or her parents and the home eating environment. Sample items included, "Overall, I am satisfied with my relationship with my mother," How important is it to your father that you eat healthy everyday?" and "When you were living at home how often did your parents provide healthy meals that you enjoyed?" All items were self-report using a 7 point Likert scale (1= strongly disagree, 7 = strongly agree; not at all, very much; never, everyday) and were assessed once at baseline (Appendix J).

Descriptive Norms For Healthy Eating And Exercise

To assess perceived group norms regarding healthy eating and engaging in regular moderate exercise participants estimated the percentage of their fellow students who would (a) eat healthily in the next two weeks and (b) engage in 30 minutes of moderate exercise 5 or more days a week.

Participants also estimated how important healthy eating was for their friends, roommate and romantic partner. A parallel set of questions assessed the value of 30 minutes of moderate exercise 5 or more days a week. Each of these items was on a 7 point scale ranging from 1=not at all to 7=very much. Participant's who were involved in a romantic relationship also reported their partner's level of influence on their food choices and exercise time with a single item each (e.g. "How much does your romantic partner value eating healthy everyday).

Scores were combined at each time point to create a single variable representing the degree to which students valued eating healthy everyday and getting at least 30 minutes of moderate to vigorous exercise 5 or more days a week (DE value). This score was then aggregated over all three waves to represent a total diet and exercise value score (Total DE value). To determine how well roommates understood each other in terms of diet and exercise values, I assessed the accuracy of judgments for how important these values were to his or her roommate. Accuracy scores were determined by calculating the absolute value of the difference between estimate scores and actual scores. For example:

|R A's estimate of how much R B values eating healthy – how much R B actually values eating healthy|

Based on the distribution of these difference scores for the whole sample, roommates who were less than 1 standard deviation different from their roommate were categorized as accurate and roommates who were more than 1 SD different were classified as inaccurate.

ANALYSIS STRATEGY

The analysis of dyadic longitudinal data involves a number of different strategies depending on the hypothesis that is being tested. Analysis of data from interacting roommates presents statistical problems because the data from individuals within the roommate dyad are not independent. Fortunately there are analysis techniques available

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that can model this form of nonindependance and provide a means for quantifying the nature of the social interaction between roommates and its effect on behaviors related to weight gain. This study's focus is to test a set of intrapersonal and interpersonal variables that are associated with change in weight related behaviors. In other words are there specific individual traits or relationship qualities that predict change? In addition are there certain aspects or qualities of the roommate relationship that predict change?

Analysis will therefore be guided by research questions at both an individual level and dyadic level. For example a question at an individual level might be "Do students change their sedentary behavior when paired with a roommate who reports very little sedentary behavior at baseline?" A dyadic level question would be "Do roommates who are closer influence each other's snacking behavior more than non close roommates?" In addition there may be moderating variables that qualify these questions in meaningful ways. Modeling longitudinal data from indistinguishable dyads using multiple covariates therefore can become quite complex. Below I describe the analysis strategy broken down by particular research question.

Using the Intraclass Correlation to Measure Similarity for Indistinguishable Dyads

A first step when considering the analysis of dyadic data is to determine how members of a dyad can be distinguished from one another. For instance romantic partners are often distinguished by their gender. In contrast, same-sex couples or identical twins are considered to be *indistinguishable* because organizing the two members of each dyad in a data set would be purely arbitrary. This is a critical issue when it comes to data analysis since changes in the ordering of dyads in a data set produces different correlation coefficients (Kenny, Kashy & Cook, 2006). When assessing the similarity of *distinguishable* dyad members, one can simply compute a Pearson correlation to determine for example the similarity between husbands and wives responses. However, if

members of the dyad are indistinguishable, then the appropriate way to estimate similarity is to utilize the intraclass correlation (Griffin & Gonzalez, 1995).

In this study the intraclass correlation (ICC) measures the degree of behavioral homophily or similarity found among freshman roommates. An increase in the magnitude of positive correlations between roommates' behavior would indicate that behaviors are becoming more concordant or similar. The ICC is a statistic that is often applied to data that is organized in groups. Its value describes how strongly members nested in groups resemble each other. Whereas the Pearson correlation measures the relationship between two variables that are from two distinct measurement classes and don't share variance (e.g. height and weight) the ICC is designed to measure the relationship between variables that are from the same class and share variance (McGraw & Wong, 1996). The ICC can be interpreted in a similar manner as the Pearson correlation in the sense that if one member of the dyad has a high score on a variable and the correlation is positive then the other member also has a relatively high score. This means that as ICC values grow larger the scores for individuals within a roommate dyad are more similar to one another than are two scores from two people who are not members of that dyad.

The first basic question to be tested using the ICC is, "Do the weight related behaviors of freshman students tend to become similar to their roommate over time?" For previously unacquainted roommates it was assumed that weight related behaviors would be relatively uncorrelated at baseline. The Convergence Hypothesis (H1) predicts that over time roommates' weight related behaviors will become more similar such that correlations will become positively signed and grow in magnitude by time 3. The change in magnitude of the correlations from time 1 to time 3 can be tested using the Fisher r-to-z transformation. A z score greater than 1.96 indicates a significant difference in similarity between time points and provides support for the hypothesis that students will

change their behavior significantly in order to become more similar to their roommate over time.

Determining if Dyads Can be Distinguished by Interpersonal Power

The interpersonal power hypothesis: H3, is a prediction at the individual level of analysis in the sense that I wish to confirm that a high power student's behavior influences his or her roommate's behavior and by contrast that the lower power roommate is more susceptible to that influence. In other words when comparing high and low power students I would expect that the high power student to have stronger partner effects and the low power student to have weaker actor effects. To test this prediction with this dyadic data set it is necessary to test the assumption that interpersonal power will produce a statistically meaningful distinction between roommate partners.

Distinguishing Roommate Dyads

Gender and age are two objective variables that researchers often use to distinguish members of a dyad. Since the roommates in this study do not differ on these variables, other subjective variables related to social status and interpersonal power were considered to distinguish roommates. The social status of individual roommates could differ by the social standing of their parents, their own perceived popularity or by the attention and respect given by others. Unfortunately, none of the 4 subjective status measures assessed in this study either individually or in combination were able to completely distinguish all the dyads in the sample. In other words, many individuals had the same subjective status score as their roommate.

Fortunately, a more direct measure of interpersonal power, the strength of influence scale measure from the RCI, was able to distinguish individuals in each roommate pair. This scale measures a type of social power that is typically operationalized as reflecting the perceived ability of an individual to influence his or her

partner's everyday behaviors, decisions, plans and goals (Berscheid, Snyder & Omoto, 1989; Langer & Keltner, 2007). The aggregated scores from the strength of influence measures at times 2 and 3 provided an index of perceived interpersonal influence. Scores on this index from each individual in a roommate pair were subtracted to determine which individual was perceived to have the most influence. This index of interpersonal power (IP) was associated with a student's perception of their roommate's social status, $r(190)=.21$, $p=.003$. This suggests that the more a student believed his or her roommate had the ability to influence his or her decisions, behaviors, plans and goals, the more he or she tended to rate the roommate as having higher social status. IP was also found to be negatively correlated with self-esteem, $r(190)= -.16$, $p=.03$ and conscientiousness, albeit marginally, $r(190)= -.14$, $p=.06$ (See Table 1)

The assumption that roommates can be distinguished in terms of interpersonal power was tested empirically using the omnibus test for distinguishability (Olsen & Kenny, 2006). If differences in social influence produce systematic differences between the two roommates on the each of focal variables related to weight gain, then the dyads can be treated as distinguishable and modeled as such. For instance, the omnibus test of distinguishability would provide evidence that supports the question; "Are individuals who have less interpersonal influence than their roommate more likely to be sedentary?" When roommates are distinguished by a common variable such as interpersonal influence, it becomes possible answer research questions at the individual level by testing which partner in the relationship changes more based on the others' behavior.

The omnibus test for distinguishability was used to test whether there were meaningful differences between dyad members on the focal weight related variables as a function of their interpersonal influence. Dyads were considered *indistinguishable* by interpersonal influence when the means and variances for the focal behaviors are equal

across time points and their intra and interpersonal correlations are also equal (Kenny et al., 2006). Structural equation modeling (SEM) affords the ability to test all of these conditions simultaneously using a saturated model with a series of equality constraints on the means, variances and covariances for the two dyad members, (Figure 2).   A well fitting model with a low χ^2 value indicates a degree of equality between the means, variances and correlations across time points for members of each dyad and are consequently considered indistinguishable for the tested outcome variable.   In contrast a high χ^2 value with a significant test statistic indicates that means, variances and correlations across time points for the outcome variable differ between members of a dyad and provide evidence of distiguishability.

If the omnibus test of distinguishability does not produce meaningful differences on the focal variables then the dyads will be treated as indistinguishable. The indistinguishable model trades specificity for statistical power since the variances within each dyad are pooled to calculate estimates and therefore can enhance the ability to find between-dyad effects.

Measuring Stability and Partner Influence Using the Longitudinal APIM

The longitudinal version of the APIM has enabled researchers to separate out the variance in behavior change that is due to factors attributable to the individual from factors that are shared by the dyad (Cook & Kenny, 2005; Popp et al., 2008). Using this model affords the ability to separate the strong tendency of a person's prior behavior to predict future behavior (actor effect) from the unique influence that a partner's behavior has on one's future behavior (partner effect).   The overtime APIM is similar in design to a cross-lagged panel technique and in this case I have created a three-wave, two-variable panel where the two variables represent the same weight related behavior from each member of the dyad (Figure 1).

Effects in the APIM are modeled simultaneously which partials out each of the other effects. Stability of the behavior is estimated across the actor effects (a1 & a2). The influence a partner has on the actor's behavior is estimated by the partner effects (p1 & p2). Time 1 similarity is equal to the intraclass correlation between roommates represented in the model as c1. Residual similarity at times 2 (c2) and 3(c3) represent the remaining nonindependence in the dyad after partialing out actor and partner effects. The source of variance in the residual terms is composed of both error and the confounding effect of unobserved variables. Intraclass correlations were computed for all APIM models to assess time 2 and time 3 similarity. These correlations are somewhat inflated because they include stability and partner influence effects but provide a common metric to evaluate change in similarity over time (Popp et al. 2008).

Not all roommates are expected to influence each other to the same degree. Variables such as gender, closeness and initial similarity (e.g. BMI) may moderate the strength of the partner influence as well as the likelihood of concordance in this model. Recent advances in structural equation modeling (SEM) include procedures that allow for comparisons of specific paths between subgroups of a particular sample. All SEM analyses were done using the statistical software AMOS 16. Using multiple group analysis has two advantages over performing separate analyses for each group. First, AMOS provides a test for the significance of any differences found between the paths of different groups (the critical ratio). The critical ratio (CR) represents the difference between two model parameters divided by the standard error of the difference and tests the hypothesis that two model parameters are equal. To show a significant difference at $\alpha = .05$ between model parameters the CR would need to be greater than 1.96 for a two-tailed test. Second, if there are no differences between roommate groups or if only a few parameters differ, the simultaneous analysis of both groups provides more accurate

parameter estimates than would be obtained from two separate analyses (Arbuckle, 2003).

This multiple group analysis method will test hypotheses H2a-e concerning modifications to the strength of partner effects due to relationship closeness, gender differences, frequency of interaction, time 1 similarity and perceptual accuracy. Additional analyses will be done when appropriate to determine whether the pattern of effects were unique to the roommate relationship. To accomplish this, an alternative data set was created that arbitraily paired students of the same gender with someone who was not their roommate. Comparing the models from actual roommates to models that contain arbitrarily paired students provides an additional check to ensure that any significant effects found were due to the nature of the roommate relationship rather than to chance. Finally to determine how much the concordance among roommates is due to unobservable variables and error, I calculated an APIM correlation proportion score to represent the part of the Time 2 and Time 3 interclass correlations that was accounted for by partner influence and individual stability using a procedure from Kenny et al. (2006).

Measuring the Trajectory of Change in Weight Related Behaviors Using Growth Models

The next set of questions involve the degree to which intrapersonal and interpersonal factors predict change in weight related behavior. To examine the degree to which a student's behavior predicts change in her roommate's behavior requires a more sophisticated analysis that estimates change over time for both roommate partners. Growth curve models have been successfully used to analyze longitudinal data sets and have recently been applied to longitudinal dyadic research (Kashy & Donnellan, 2008). Growth curve modeling is primarily used to test whether a particular variable changes in a systematic way as a function of time. In addition, these models can be used to test

whether other variables moderate either the level of a particular focal variable at a given

time point or the degree to which that variable changes over time. Dyadic growth curve

modeling is particularly suited to evaluate such questions as whether the rate of change

for one member of a dyad is related to the rate of change in the other member.

Defining the Estimated Parameters in Growth Curve Models.

Dyadic growth curve models evaluate the repeated measures of both partners by

estimating unobserved latent factors for each person that give rise to the relationship

among the observed variables. The latent constructs produced by growth models are 1)

the latent intercept that represents an estimation of the true average within-person level of

an outcome variable at a particular time point in the study and 2) the latent slope that

estimates the true average rate of change in the outcome variable. One of the primary

advantages of growth curve models when distinguishing between observed and

unobserved variables is its ability to model and estimate measurement error. Modeling

error vectors affords the ability to estimate the amount of within-person noise that

attenuates the values of the latent variables. (Byrne, 2001).

Figure 3 describes a dyadic growth model with latent intercepts and slopes for

both members of the dyad. All paths leading from the latent intercept are fixed to a value

of 1. This is done to ensure that the intercept value remains the same over time for all

individuals. The paths leading from the latent slope are assigned values of 0,1 and 2 and

represent the three data collection points in the study in September, October and

November. The labeling defines the latent slope as the change in a focal variable for

each 1-month increase in time. Fixing the path that points to the September data

collection point to zero has the effect of defining the intercept variable as the average

value at baseline. Doing so affords the ability to evaluate the degree to which the level of

behavior at baseline affects overall change. Alternative models could be designed that

change time zero to represent the midpoint of the study or the end of the study if there was reason to believe that behavior levels at these points in time had a different relationship to the overall rate of change.

The model provides point estimates of the intercepts and slopes, (e.g. what is the level of the behavior at time 0 and how much did it change?). Variance estimates are also provided to evaluate whether the level at time zero and rate of change in the focal behavior is the same for all participants in the sample. The existence of a significant amount of variability indicates that there may be individual difference variables that would moderate these estimates and help explain why these behaviors change at different rates for certain individuals or dyads.

The dyadic growth curve model also provides estimates that test how relationship partners influence the rate of change in each other's behavior. These covariance estimates measure the relationship between the latent constructs in the model. Two between-person covariance estimates are of particular interest because they test relational phenomenon. First is the covariance or relationship between each roommate's slopes (ss). This estimate measures how much roommates' behavior changes at a similar rate. Second is the relationship between a student's intercept and her roommate's slope (BI-S). This measures the degree to which a student's initial level of behavior is associated with the rate of change in her partner's behavior. An estimate with a positive sign in this model indicates that students with higher scores on a focal variable at time zero tend to be paired with roommates who increase their behavior more quickly than students with lower scores. A negative estimate, in contrast indicates that it is students with lower scores at time zero who tend to be paired with roommates who change more quickly than students with higher scores (Kashy & Donnellan, 2008). The variations of strength of influence hypotheses: H2a-d, predict that between-person covariances will be strongest

for female roommates, those who frequently dine together, those who are similar in body size and other key behaviors at baseline and those who are in close relationships.

Considering Additional Estimates From Growth Curve Models to Describe Differential Change Between High and Low Power Roommates.

If roommates can be distinguished by interpersonal power then additional estimates from the growth curve model can be examined to describe differences in the way a low power roommate changes his or her behavior relative to the high power roommate.   Support for the interpersonal power hypotheses: H3 will stem from a specific pattern of estimates described below.

1) To the extent that high power roommates exert more influence over their lower power roommate partner, low power roommates are predicted to change more rapidly than high power roommates. Therefore it is expected that the low power roommate will have a mean slope estimate that is larger than the high power roommate.

2) Correlations between the slopes of each roommate indicate the degree to which they are accelerating or slowing down their behavior at similar rates. A high correlation would suggest that some aspect of their shared environment is responsible for causing them to both change at the same rate. In contrast, a lower correlation indicates that change in behavior is different between roommate pairs and suggests that high and low power roommates are differentially affected by environmental pressures to change their behavior. H3 predicts that the lower power roommate should be more affected by the influence of his or her higher power roommate and thus should produce a slope-slope correlation that is relatively small to non significant.

3) The within intercept-slope (WI-S) correlation indicates the degree to which individuals' initial level of the behavior is related to their own rate of change. Low power

roommates are predicted to change more than high power roommates. Therefore the low power roommate should have larger WI-S correlations than the high power roommate.

4) High power roommates should be able to exert greater influence over low power roommates. Therefore the level of the high power roommates' behavior at baseline (latent intercept) should have a stronger association to the rate of change (latent slope) in the low power roommates' behavior than vice versa. This means that the BI-S correlation will be stronger between the high power roommates' intercept and the low power roommates' slope, than the BI-S correlation between the low power roommates' intercept and the high power roommates' slope.

Testing Additional Variables Associated With Change in Weight Related Behaviors and Interpersonal Closeness

A number of continuous variables assessed in this study could plausibly be associated with changes in weight related behaviors. For instance it may be that growth in sedentary behavior is associated with decline in physical activity. What is interesting about adding additional predictor variables to dyadic growth curve models is that they can be used to estimate actor and partner effects. This affords the ability to observe how strongly a person's own beliefs, traits and behaviors predict change in his or her own behavior (actor effects). It also affords the ability to assess the interdependence between dyad members from the strength of the partner effects; the effect of a person's predictors on his or her partner's outcomes. For instance a student's level of extraversion might predict how often roommates snack together and thus be associated with change in his or her roommate's after dinner snacking. As is typical of standard multiple regression analysis, many of the predictors can be added to the model simultaneously as covariates to determine which variable explains the most variance in the degree to which the

outcome variables change. In addition, interaction terms can be computed that describe additional levels of moderation.

Estimating the Degree of Nonlinearity in Growth Models

The type of growth or change described so far by these models involves estimating a linear growth function. Outcome variables can also change in a nonlinear manner and it is necessary to examine the assumption of linear growth with all of the focal variables. Estimating curvilinear growth patterns can be difficult with less than four data collection points to clearly reveal how a trajectory may peak and possibly asymtote (Kenny et al., 2006). Nevertheless some techniques exist to capture nonlinear growth with three data points by allowing the data to determine the shape of the trajectory. Kashy et al., (2008) describe a method of estimating a non-linear growth model using SEM which provides information on whether growth occurs primarily between the first and second wave, between the second and third wave or remains approximately linear.   To accomplish this using SEM the fixed loadings for the latent slope factor are modified. Keeping the initial assessment fixed to zero, the time 3 loading was fixed to 1 and the time 2 loading left free to vary. On the one hand, if the unstandardized loading for time 2 is close to .5 then the trajectory is linear. If on the other hand, the loading is greater than .5 it suggests that more growth occurs between the first and second wave than between the second and third waves. It is quite possible that non-linear growth in the focal weight related behaviors will occur since freshman students may tend to change these behaviors most at the beginning of the fall semester as they adapt to their new surroundings.

RESULTS

Sample Attrition

Of the 200 participants participating in this study, 5 individuals were dropped because they either moved away from the dormitory during the study or did not complete the full set of measurements at all three time points. Consequently the data from their roommate was also eliminated from the final analysis. Nevertheless, attrition was low (5%) with 190 students (130 females) completing all waves of the study.

Descriptive Statistics for Focal Variables

The following analysis will concentrate on how the three focal variables change over the first semester of college as a function of influence from a new roommate. Means, variances and reliability coefficients of these variables are listed in Table 2a. Sedentary time is a composite of the reported time participants spent watching television, playing video games and leisure time spent on the computer (excluding school work) in the past week. Distributions of the sedentary behavior variables tended to be positively skewed with modal responses at or near zero. In addition there was one participant who reported extreme scores (5-9 SDs away from the mean) on amount of time watching TV and leisure computer time. Including these scores would increase error variance and reduce the power of statistical tests. Extreme outliers can also increase the likelihood of making Type I and Type II errors and limit a researcher's ability to accurately describe any of the data (Judd, McClelland, & Culhane, 1995).

Rather than drop this case from the data set and loose important information from an entire dyad, I decided to Winsorize the extreme scores (>4 SDs from the mean) so that they were similar to high values from other participants in the sample (Erceg-Hurn & Mirosevich, 2008). For example, Winsorization changed the original report of watching TV from 8 hours a day to 3.5 hours a day. All subsequent reports of sedentary time for this study will use the Winsorized scores for that particular individual.

Changes in Body Weight

As a starting point it is informative to reveal the degree to which weight changed for participants during the course of the study. According to the BMI classifications established by the World Health Organization, a majority of the sample, (78.5%) were in the normal range for weight status (18.5-24.99). Six percent of the sample were underweight, 11% were classified as over weight (25-25.9) and 4.5% were in the obese range (>30). Mean BMI at T1 was 22.21, SD= 3.67. On average there was a net weight gain of 2.1 pounds over 10 weeks across the sample, although there was a high degree of variability with a maximum weight gain of 15.4 lbs and maximum weight loss of 14.6 lbs. Overall, there was a significant increase in both weight and BMI by time 3, t(188)=6.17, p<.001 and t(188)=6.20, p=.001. See Table 2b for descriptives of weight variables broken down by gender. Changes in weight and BMI did not differ by gender.

Focal variables and their association with weight gain

Given that there was an overall increase in BMI for students in this study, it was necessary to test the effect this study's focal variables had on actual weight gain within the sample over the 10 week study period. Change in after dinner snacking and sedentary behavior from time 1 to time 3 did not predict BMI change or weight change at time 3. However change in breakfast skipping did predict weight loss at time 3, *b*= -.23, *p*=.017. In other words when students increased their breakfast skipping and reported missing approximately two more breakfasts a week in November then when they began school in September, BMI was predicted to decrease by .23 standard deviations (.84 BMI units).

Overall levels of each of the focal weight related behaviors did a somewhat better job of predicting change in weight at time 3. Grand mean levels of each focal variable were entered into separate regression equations along with Time 1 BMI and gender in the first step, all 2-way interaction terms in the second step and a three way interaction term with T1 BMI, gender and focal variable to predict change in BMI at time 3. The average

weekly frequency with which participants snacked after dinner predicted an increase in BMI, $b=.18$, $p=.05$. In other words, when after dinner snacking increases weekly by 1 standard deviation (1.57 times/week) BMI is predicted to increase by .18 SDs (.66 BMI units) after 10 weeks. Gender and Time 1 BMI were not associated with change in BMI for after dinner snacking frequency.

The average number of times a student skipped breakfast did not predict change in BMI but Time 1 BMI did predict the average amount of reported breakfast skipping over 10 weeks, $b= -.21$, $p=.009$. In other words, when Time 1 BMI increased by 1 standard deviation (3.69 BMI units) breakfast skipping was predicted to decrease by .21 SDs (.39 times per week) after 10 weeks. In effect, individuals who were classified as overweight ate breakfast approximately 4 more times over 10 weeks than normal weight individuals. There was also a significant gender by breakfast skipping interaction effect such that men were more likely to gain weight with increases in breakfast consumption, whereas there were no differences in weight gain for women based on frequency of eating breakfast, $b= .17$, $p=.05$ (see Figure 4).

Total sedentary time predicted change in BMI, $b=.20$, $p=.03$. There was also a significant three way interaction such that active overweight men lost weight whereas active underweight men gained weight. Both under and overweight men who engaged in more sedentary behavior than average tended to gain similar amounts of weight. In contrast, over and underweight women both tended to gain similar amounts of weight with sedentary underweight women gaining slightly more, $b=.23$, $p=.004$, (Figures 5a-b).

Do Roommates' Weight Related Behaviors Become More Concordant Over Time? (H1)

Table 3 summarizes the ICCs over the three waves of data collection for the focal variables. Overall the pattern of behavioral concordance between roommate partners

was inconsistent. Amount of sedentary behavior per week showed the predicted increase in similarity within roommate pairs, changing from $r(100) = .08$, at time 1 to $r(95) = .22, p=.02$. The difference between T1 r and T3 r was not significant, $z=1.31, p=.19$. Breakfast skipping and after dinner snacking were significantly correlated at baseline yet concordance remained relatively stable only for breakfast skipping while after dinner snacking frequency became progressively non significant by time 3. The strong baseline concordance for these eating behaviors suggests that impression management concerns could have motivated students to match their snacking and breakfast skipping habits to their roommate. It is also possible that since most students' baseline reports recalled behavior that occurred during Welcome Week, the constraints of the highly scheduled orientation activities could have could have caused eating habits to appear to be more similar than under more normative circumstances during the school year. An alternative data set using arbitrarily paired same sex roommates was created to verify that the observed effects with the actual roommate pairs were not occurring from some unobserved variable or by chance. Results from the arbitrary pairings indicates that concordance effects were not found for any of the focal variables at any time points.

Testing Whether Roommates Can be Distinguished by Interpersonal Power

Using the omnibus test of distiguishability, the model tested if there were meaningful differences between high and low power roommates when examining the 3 focal weight related variables in this study. A well fitting model with a low χ^2 value would indicate that the means, variances and correlations across time points for members of each dyad do not differ substantially and the dyads should be considered indistinguishable for the tested outcome variable. Roommates were found to be indistinguishable when considering the two variables related to diet: After dinner snacking frequency, $\chi^2= 14.52, p=.27$ and breakfast skipping, $\chi^2= 10.47, p=.58$.

Roommates were found to be distinguishable when considering a composite score of variables measuring time spent in sedentary activities. χ^2=33.38, p<.001.

These tests indicate that the sample models testing after dinner snacking and breakfast skipping should treat roommates as indistinguishable. Doing so will require the model to pool estimates both within and between dyad members in effect increasing estimate precision and statistical power (Kashy et al., 2008). When testing sedentary behavior, the appropriate model will be to treat the dyad as distinguishable by interpersonal power. This method will afford a more detailed view of how high and low power roommates influence each other over time.

Testing the degree to which concordance in weight related behaviors is due to the interdependence of roommates using the longitudinal APIM

Separate models were estimated for the entire sample assessing three concurrent waves of each of focal weight related behavior. All three models fit the data well: After Dinner Snacking, $\chi^2(14)$ =23.77, p=.05 (CFI= .927; RMSEA = .086; pclose = .153);Breakfast Skipping, $\chi^2(14)$ =14.19, p=.44 (CFI= .999; RMSEA = .012; pclose = .652); and Sedentary Behavior, $\chi^2(4)$ =4.62, p=.33 (CFI= .998; RMSEA = .040; pclose = .447).

Figures 6-8 depict APIM results for the three focal variables. All three models depict actor effects that were significant at the level of p<.001 and describe strong individual stability in these behaviors (*rs* = .48 to .82). Statistically significant partner effects emerged only for the sedentary model where the low power roommate influenced his or her roommate at Time 2 and the high power roommate was influential at Time 3. The difference between the partner effects at Times 2 and 3 were significant (*CRs* = 2.54 & 2.26). The APIM proportion score suggested that partner influence and stability

account for only 8% of the concordance at Time 2 and 22% at Time 3. This suggests that in the earliest stages of the roommate relationship the low power roommate's initial level of sedentary behavior has a slight effect on his or her roommate's subsequent sedentary behavior but the high power roommate becomes influential once they have spent time living together. Comparisons to models that contained arbitrary (random) roommate pairings revealed no concordance between concurrent assessments and no significant partner effects.

The next set of tests compare separate groups of roommates based on different characteristics of their relationship. These tests utilize the multiple groups method to test differences between specific paths in the models. Of primary interest is how stability and partner influence effects as well as concordance differ between groups.

Testing the Closeness Hypothesis

The sample was divided into two groups representing roommates who had developed a close relationship by Time 3 (n=47) and those who had not (n=48). To confirm that closeness was an accurate indicator of friendship an additional assessment was made at the midpoint of the study where students were asked to name five of their closest friends on campus. Roommates were subsequently classified as *mutual friends* if they both named each other as one of their five closest companions, *nascent friends* if only one of the students named his or her roommate as a close friend and *not friends* if neither student listed the other as a friend. Among close roommates 58% of the dyads indicated that they were mutual friends and 42% were nascent friends. Among non-close roommates 52% of the dyads did not list each other as a close friend (not friends) and 48% were classified as nascent friends.

Table 4a-c lists the intraclass correlations and presence of partner effects for the models that test hypotheses 2a-e. Close roommates appeared to influence each other's

sedentary behavior and breakfast skipping where the APIM proportion score suggested that partner influences and individual stability accounted for 43% and 21% of the concordance measured at Time 3. Close and non-close roommates were significantly concordant at Time 1 in their frequency of after dinner snacking but both groups were not concordant by Time 3. Figure 9 depicts the distinguishable model for close roommates' sedentary behavior and reveals the emergence of a significant partner effect for high IP roommates on Time 3 behavior. No significant partner effects emerged for breakfast skipping and after dinner snacking. There were no significant differences in weight gain when comparing close roommates to those who were less close.

Taken together, the findings indicate that a substantial amount of sedentary behavior homophily is accounted for by the similarities that arise when roommates become close companions. Further the findings indicate that by Time 2 the high IP roommate's sedentary behavior had a direct effect on the low IP roommate's behavior at Time 3.

Gender Differences

Females showed a significant degree of after dinner snacking homophily at Time 1 whereas males did not, although the difference in concordance was not significant. Men and women both became less concordant over time in after dinner snacking frequency. Table 4d provides a more detailed set of ICC's for individual food items that were tracked over the same time span. Women were much more likely than men to show an impression management effect with several food items such as salad, French fries and sweet snacks like ice cream and cookies showing significant concordance at baseline and becoming uncorrelated at later time points. Salad was strongly correlated at baseline for both men and women suggesting that salad consumption may be a particularly salient indicator for revealing to others one's values about healthy eating.

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Breakfast skipping homophily was weak and remained relatively stable for both men and women. Women became significantly more concordant by Time 3 for sedentary behavior and the APIM proportion score suggested that partner influences and individual stability accounted for 25% of the concordance measured at Time 3 whereas partner influence and stability accounted for 10% among men. Figure 10 depicts the distinguishable model for female roommates' sedentary behavior and reveals the emergence of a significant partner effect. At Time 2, the high IP roommate's sedentary behavior had a direct effect on the low IP roommate's behavior at Time 3. There were no differences in weight gain when comparing men and women.

Taken together, the findings indicate that a small amount of sedentary behavior time homophily is accounted for by the individual stability and partner influence that occur for female roommates. Comparisons to models separated by gender that contained arbitrary roommate pairings revealed no concordance between concurrent assessments and no significant partner effects.

Dining Together Frequency

Students reported, at each wave of data collection, how frequently they ate all their meals and after dinner snacks together. The sample was divided into two groups using a median split representing roommates who ate together frequently (n=47) and those who ate together occasionally (n=48). Roommates who frequently dined together declined less in their after dinner snacking concordance than those who occasionally dined together although there were no significant differences in concordance for either group at Time 3. Dining frequency did not change the pattern of concordance for after dinner snacking that was previously described when comparing close roommates and men and women. This suggests that the rate with which a student snacks after dinner has little direct influence on the after dinner snacking frequency of his or her roommate

beyond the initial time point of the study. Breakfast skipping did not differ substantially when comparing how often roommates dine together. This suggests that the motivation to copy a roommate's tendency to skip breakfast is unrelated to the factors associated with roommates getting together to share a meal.

Figure 11 depicts the distinguishable model for roommates who dined together often. This model reveals the emergence of a significant partner effect for high IP roommates on Time 3 behavior. No significant partner effects emerged for roommates who dined together only occasionally. The APIM proportion score suggested that partner influences and individual stability accounted for 30% of the concordance measured at Time 3 for roommates who dined together often, whereas partner influence and stability accounted for a mere 4% of the sedentary homophily among those who occasionally dine together. The consequences of dining together more frequently appeared to affect the high IP roommates more than the low IP roommates in terms of weight gain. High IP roommates who frequently dined with their roommate gained more weight (M=3.33, SD= 4.42) than those who dined only occasionally (M=.75, SD=4.89) $F(93)= 7.26$, $p=.008$. Low IP roommates tended to gain more when they ate with their roommate only occasionally but the difference from those who dined frequently were not significant. Taken together, the findings indicate that a modest amount of sedentary behavior time homophily is accounted for by the similarities that arise when roommates dine together frequently. This pattern of results resembles the findings for close roommates and it may be the case that roommates who dine together often become closer over time.

Testing Time 1 Similarities

Even though roommates in this sample were randomly assigned, it is quite possible that some roommates ended up together with similar traits, behaviors and values associated with diet and physical activity. Observed initial similarities might function as

potential selection effects in the sense that a student might find it easier to get along with a roommate who has diet and physical activities in common. To test whether these initial similarities afforded more concordance and partner influence between roommates, group comparisons were made contrasting those who were similar on factors such as BMI, MV exercise and preference for high fat snacks with roommates who differed on these dimensions.

The results indicated that comparisons on these Time 1 similarity dimensions did not change the pattern of results found in the after dinner snacking models. This suggests that initial similarity on factors associated with diet and exercise (potential selection effects) do not seem to increase the tendency of a student's after dinner snacking frequency to directly influence his or her roommate's after dinner snacking over the duration of this study.

Unexpectedly, students who were noticeably different at Time 1 in factors associated with diet and exercise tended to become more concordant in breakfast skipping. Students who *differed* at Time 1 in BMI, amount of MV exercise, consumption of high fat snacks and diet and exercise values tended to become more concordant in breakfast skipping frequency over time. Roommates who were similar on those same factors showed little or no breakfast skipping homophily by Time 3. Further, the percentage of concordance that was explained by the dissimilar dyads ranged from 28% to 36%. This suggests differences between roommates in factors associated with diet and exercise might motivate roommates to explore alternative dietary habits that they can agree on, perhaps as a means for loosing weight. Dissimilarities in Time 1 diet and physical activity factors also tended to produce larger percentages of observed homophily in sedentary behavior than roommates who were more similar at Time 1, but to a much smaller degree (see Table 4 c). High IP students who were similar to their roommate in

terms of sedentary behavior tended to gain more weight (M=2.83, SD=5.06) than those who differed initially in the amount of sedentary behavior (M=.93, SD= 4.28) $F(93) = 3.64$, $p=.06$. No other Time 1 similarities revealed a significant difference in weight gain from those who were less similar.

Taken together the results from these longitudinal APIM tests and the multiple group comparisons of gender, closeness and baseline similarity shed some light on which roommate relationships are most likely to experience increasing levels of weight related homophily and partner influence. It is clear from these models that sedentary behavior is one domain where interpersonal influences can account for the growing concordance between roommates especially when comparing close relationships to non-close relationships. In contrast, after dinner snacking seems to be particularly immune to interpersonal influence as relationships develop and the strong Time 1 concordance may be a product of impression management concerns. The students in this sample were all relative strangers at baseline, were motivated to affiliate with their new roommate and shared a many structured activities during Welcome Week. These factors likely contributed to concordance being strong at baseline and weaker later in the semester when situations became more normative and affiliation motives less salient. Finally, motivation for concordance in breakfast skipping might be enhanced by observed differences with one's roommate in factors associated with diet and physical activity.

Do Roommates Who Understand Each Other's Diet and Exercise Values Influence Each Other More? Hypothesis H2e

Comparing roommates who were accurate in judging each other's diet and exercise values to roommates who did not understand each other's values quite as well produced some unexpected results. Figure 12 depicts the after dinner snacking model for roommates who were *inaccurate* judges of each other's values where the Time 3 partner

effect was significantly larger than what occurred for accurate roommates, $b=.23$, $p=.01$, $CR=2.89$.   Assessing sedentary behavior, partner effects for high IP roommates emerged for both accurate and inaccurate groups but individual stability and partner influence explained twice as much of the concordance at time 3 for the inaccurate roommates: 28% and 14%. Breakfast skipping was the only behavior to reveal significant partner effects in the hypothesized direction. A significant partner effect emerged at Time 2 for accurate roommates and was significantly larger than the partner influence effect for inaccurate roommates; $b=.22$, $p=.003$, $CR=2.18$. In addition, low IP students gained more weight (M=3.16, SD= 4.62) and increased in BMI (M=.48, SD=.71) when their perceptions of their partner's values were accurate then when they were inaccurate (M=.96, SD=4.27 lbs; M=.14, SD=.64 BMI; $F(93)=5.76$, $p =.02$. High IP roommates who were good judges of their roommates' diet and exercise values also tended to gain weight but were not significantly different from high IP roommates who were less accurate. Taken together it appears that when roommates have an accurate perception of each other's diet and exercise values it may make the interpersonal environment more conducive for socialization of managing dietary intake. Perhaps accurate roommates are more likely to discuss their values with each other which in turn affords greater accuracy and influence. Unfortunately, this may make it harder for low IP roommates to avoid weight gain. In contrast, socialization of after dinner snacking and sedentary behavior seems to be more likely when roommates do not have a precise understanding of each other's values. This suggests that perhaps roommates are more vulnerable to socialization of these particular behaviors when they are unaware of how each other actually values the importance of healthy dietary and physical activity habits.

Using Growth Curve Models to Test Factors That Predict Change in Weight Related Variables

The longitudinal APIM provided a first test of how roommates could directly

influence each other's weight related behavior. Differences in concordance levels across

the waves of data collection suggest that meaningful change is occurring in behaviors that

may have a significant impact on a student's weight status if they become habitual. In

this next section, growth curve models will be used to test hypothesized predictors of

behavior change in a dyadic context. First I will examine a basic model without

additional predictors to examine if the behaviors of a student are directly associated with

change in the same behavior of his or her roommate. Then additional predictors will be

added to the model to test if behavior changes through more indirect processes.

The Interpersonal Power Hypothesis. Using the Distinguishable Dyad Model to

Test Differential Influences in Sedentary Behavior. Hypothesis H3

The longitudinal APIM demonstrated that the sedentary behavior of a high IP

student can predict the sedentary behavior of his or her low power roommate at a later

point in time. Dyadic growth curve models provide a more rigorous test of whether the

behavior of one student can predict change in his or her roommate's behavior over time.

Differential levels of change within a dyad can only be modeled with distinguishable

dyads. I will focus on sedentary behavior to test H3 since previous testing demonstrated

that of the three weight related variables in this study, only sedentary behavior produced

meaningful differences in which to distinguish roommate dyads.

Figure 13 depicts the basic distinguishable dyadic model with constraints on the

residual variances and covariances. The model did not fit the data well, $\chi^2(10) = 41.72$,

$p<.001$. To determine whether model misfit was due to non-linear growth in sedentary

behavior, I allowed the time 2 slope paths to vary as specified in Kashy et al., (2008).

Model fit was improved from the original basic model $\chi^2_{(8)}=25.83$, $p=.001$, RMSEA $=.15$.

The beta weights for the freed slope paths revealed, that change in sedentary behavior

occurred more rapidly for both high and low power roommates between times 1 and 2 than between times 2 and 3. Despite the improvement, the model still did not fit the data well. The SEM software package AMOS suggests using the Modification Indices function for improving model fit. Three additional correlation paths were suggested by including 1) a correlation between Time 1 and Time 2 residual terms for low IP roommates, 2) a correlation between the Time 3 low IP residual and the high IP intercept latent construct & 3) a correlation between the Time 2 residual and the low IP slope. The residual terms represent variability in the observed sedentary scores that is not due to variation in the latent intercept and slope terms. It is plausible that these variables should be correlated because the observed sedentary scores stem from measurements using the same instrument at different times. Including these three correlations substantially improved model fit, $\chi^2(5) = 6.09$, p=.30; CFI= .996; RMSEA = .048, pclose =.428.

Table 5 displays the results for the sedentary time model. High and low power roommates did not differ in mean levels of sedentary time at baseline. Low IP roommates tended to increase their sedentary behavior more rapidly than high IP roommates but these differences failed to reach significance (CR=1.52). The slopes of each roommate were not correlated. The most noticeable difference between roommates was the relationship between the intercept of one student and the slope of his or her roommate (BI-S correlation). Low IP roommates' rate of change in sedentary behavior was marginally predicted by high IP roommates with *lower* levels of sedentary behavior at baseline, $r = -.37$, $p = .08$. In contrast high IP roommates' rate of change was marginally predicted by low IP roommates with *higher* levels of sedentary behavior, $r = .47$, $p = .06$. The difference between the BI-S correlations for high and low IP roommates was significant (CR= 2.73).

Taken together these results suggest that high and low power roommates change their sedentary behavior at different rates and may be differentially affected depending on the initial behavior of his or her roommate. The growth curve results add additional information to the general findings from the longitudinal APIM that describes the small influence low IP students have initially and the stronger influence high IP students have later on. The significant difference in the magnitude and sign of the B-IS correlations suggests that low IP students are especially susceptible to influence when paired with a roommate who was *less sedentary* than average. In contrast high IP students were susceptible to influence when paired with a roommate who was *more sedentary* than average. The lack of a correlation between their slopes suggests that external forces do not appear to be causing them to change at the same rate (e.g. access to free cable and internet in the dorm).

Measuring Change in After Dinner Snacking and Breakfast Skipping Using the Indistinguishable Growth Curve Model

The degree of change in after dinner snacking and breakfast skipping was assessed by creating new dyadic models where roommates were classified as indistinguishable and constraining similar variance paths to be equal within the dyad. Both indistinguishable models fit the data well: breakfast skipping, $\chi^2(16)=14.28$, p=.58; CFI=1.00; RMSEA =.000, pclose=.779, and after dinner snacking, $\chi^2(16)=20.39$, p=.20; CFI=.967; RMSEA =.054, pclose=.420. Similar to the sedentary model, Time 2 slope paths were allowed to freely vary and in both cases the unstandardized loadings exceeded 0.5 indicating that change was most rapid for both variables between Time 1 and Time 2: After dinner snacking, *B*=.90, breakfast skipping, *B*=1.02.

Since the variances are pooled across dyad members in the indistinguishable model differences in baseline level and rate of change will have the same estimates.

Table 6 provides the estimates for the after dinner snacking model. Examining the covariances between the intercepts and slopes for after dinner snacking revealed that roommates were significantly concordant at baseline, $r= .57, p=.002$. This confirmed what the APIM analysis had found above. Slopes were also correlated indicating that perhaps some common factor was causing them to change at similar rates, $r= .64, p=.04$. Students who snacked less than average at baseline tended to increase their after dinner snacking over time (WI-S correlation: $r= -.53, p=.007$). Students also tended to increase their after dinner snacking more when paired with a roommate who snacked less at baseline (BI-S correlation: $r= -.62, p=.002$). Running a model with arbitrarily paired roommates only produced a significant WI-S correlation, $r= -.52, p=.007$. All other covariances that were found to be significant with actual roommate pairs were reduced to non-significance indicating that these effects were driven by the dynamics within the roommate relationship and were less likely to be caused by chance or shared environmental factors. Taken together these results suggest that when roommates first meet they tended to closely match each others after dinner snacking habits and that those who snack less frequently initially might be the most vulnerable to snacking more later on.

An examination of the covariances in the breakfast skipping model revealed no significant relationships between the intercepts and slopes between close and non-close roommates. Since earlier analysis revealed a more robust effect for men regarding frequency of breakfast consumption an additional growth curve analysis was performed comparing males and females. Males tended to change the frequency of their breakfast consumption more rapidly $r= .83, p=.004$ than women $r= .27, p=.08$ but the striking difference between sexes was the slope-slope correlations. Male roommates tended to change to change their breakfast skipping habits in the same direction (either both

increased or both decreased) at similar rates $r= .56, p=.11$ whereas women tended to change in opposite directions $r= -.48, p=.05$ and the difference between these rates of change was significant, $CR =2.56, p=.01$ (see Table 7). This supports the previous finding from the longitudinal APIM analysis that men were more likely to become concordant in breakfast consumption frequency and women were likely to become less concordant.

These basic growth models, from a social learning or modeling perspective, tested the degree to which a student's behavior can directly affect change in the same behavior of his or her roommate. The models suggest that change in sedentary behavior and after dinner snacking may be directly affected by how frequently or infrequently a student's roommate engages in that behavior when they first begin to live together. This is consistent with the idea that students will adjust their diet and sedentary habits to adapt to their new environment but the rate of change depends on the behavior of his or her roommate.

Testing the Degree to Which Partner Values Predict Change in Weight Related Variables

Three variables measuring the value of eating healthy everyday were used to predict changes in after dinner snacking, breakfast skipping and sedentary behavior. The first was the importance the student placed on healthy eating (own diet value). Second was the estimation of how much the student's friends valued healthy eating (friend descriptive norm). Third was the estimation of how much the student's roommate valued healthy eating (perception of roommate's values). These variables were assessed at each time point but for this initial analysis the Time 1 assessments were used as predictors to determine how well baseline values and beliefs predicted change in behavior. Each of these variables along with a roommate healthy eating value X own healthy eating value

interaction term were added to the model for indistinguishable dyads as a covariate in order to measure which variable uniquely predicts changes in after dinner snacking.

The actor effect, specifying the effect of the student's perceptions of his or her roommate's diet value on change in after dinner snacking habits was $b= -.36, p=.01$. This effect remained significant when assessed at Time 2, $b= -.30, p=.05$.   Actor and partner effects specifying the effect of the student's own diet values did not predict change. Similarly, the descriptive norms of students' friends did not predict change over and above the effect of the perception of roommates' values. Figure 14 depicts plot lines of three groups, a) those who were 1 SD above the mean (believed their roommate highly valued eating healthy every day) b) those with beliefs about their roommate that were at the mean and c) 1 SD below the mean (believed their roommate did not value eating healthy). The plot depicts changes in after dinner snacking over time for these three groups. Taken together, these effects demonstrate that when a student initially believes his or her roommate values eating healthy, then he or she will decrease snacking after dinner over time. In contrast when a student initially believes that his or her roommate does not value eating healthy, then after dinner snacking was predicted to increase. This effect was also moderated by gender such that females were more likely to reduce their after dinner snacking based on perceptions of their roommates diet attitude $b=-66, p >.001$ than males $b=-.04, p =.86, CR= 2.36, p=.02$.

Similar effects were found when assessing values about exercise at Time 2. Changes in after dinner snacking were also predicted by a roommate by self interaction effect, $b=-25, p =.02$.   Figures 15 (a-b) show the different effects for when a student believes his or her roommate values regular exercise at high vs. low level. When a student values regular moderate exercise highly and believes his roommate also values exercise, the student's own after dinner snacking declines over time. In contrast when a

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student values exercise but he perceives that his roommate does not, snacking after dinner increases.   This interaction effect was significant for women b=-26, p =.06 but not for men b=-17, p =.27. It is likely that there was not enough power to detect a significant effect for the male group and that men and women are equally effected by mismatches between their own values about exercise and their beliefs about their roommates. Gender also moderated the actor effect from a student's own attitude about regular exercise such that men's own exercise attitudes predict a reduction in after dinner snacking b=-47, p =.008 and women's own attitudes did not b=18, p =.26, CR= 2.96, p=.003.

Predicting changes in breakfast skipping with normative beliefs and values

Actor and partner effects from the three diet value variables assessed at Time 1 did not predict change for breakfast skipping but perceptions of roommates' diet values assessed at Time 2 did produce a significant actor effect, b= .38, p =.001. Figure 16 depicts changes in breakfast skipping when comparing groups who differ in their perceptions of the importance their roommate places on eating healthy everyday.   The plot shows that when a student believes his or her roommate values a healthy diet, he or she tends to increase breakfast skipping over time, missing breakfast twice as often in November than when they started college in September. This effect was somewhat stronger for women b=.36, p =.07 than for men b=.17, p =.16, CR= 1.00, p=.32.   This finding is somewhat counterintuitive in the sense that when a student believes her roommate values eating healthy, she tends to skip breakfast more than when she believes her roommate does not value eating everyday. This suggests either a lack of awareness about the importance of breakfast or a perception that breakfast is typically an unhealthy meal and skipping it might be an effective weight loss strategy.

When testing values about exercise, a roommate by self interaction predicted change in breakfast skipping, b=.17, p =.04. When a student highly values exercise and

believes his or her roommate does not, then the student's breakfast skipping is predicted to decline (Figure 17a). When a student believes her roommate does value exercise the model predicts a main effect for the student's own belief such that those who value exercise are predicted to skip breakfast less than those who don't value exercise (Figure 17b). This interaction remained significant for women, $b=.31, p =.006$ but not for men, $b= -.02, p =.91, CR= 1.38, p=.17$.

Predicting changes in sedentary behavior with normative beliefs and values

When modeling sedentary behavior, the actor effect, specifying the effect of high IP student's *own* diet value on change in sedentary behavior was $b= -.35, p=.05$. The effect remained significant at Time 2, $b= -.47, p=.03$. In other words when a high IP student highly values a healthy diet, he or she is less likely to engage in sedentary behavior. Beliefs about one's roommate diet value and descriptive norms about friends did not predict changes in sedentary behavior. Values concerning exercise were not found to be predictive of change in sedentary behaviors.

Unlike breakfast skipping and after dinner snacking, sedentary behavior remained relatively unaffected by the beliefs a student has about his or her roommate's diet and exercise values. Instead, the exercise behavior of a student's roommate was found to predict changes in sedentary behavior. Levels of low power roommates' weekly estimation of moderate exercise at Time 1 predicted change in the high power roommate's sedentary behavior. Specifically there was a partner effect specifying the effect of the low power roommate's *actual* reported weekly moderate exercise minutes at Time 1 on change in the high power roommate's sedentary behavior $b= -.83, p =.001$ (See Figure 18). This partner effect remained significant when perceptions of roommate's exercise value were entered into the model as a covariate. The effect was not moderated by gender.

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Thus, when low power roommates do not exercise frequently, high power roommates' sedentary behavior is predicted to increase. When low power roommates exercise frequently high power roommates' sedentary behavior is predicted to remain relatively stable. The influence of the high power roommate's weekly moderate exercise at time 1 did not predict change in the low power roommate. This was somewhat unexpected since high power students' sedentary behavior tended to influence his or her roommates' sedentary behavior. These results suggest that an active low power student may have little influence on his or her roommate but when a low power student is not very active, high power roommates may experience less social pressure to increase their physical activity and in turn find it easier to increase their sedentary behavior.

In sum, the descriptive norms and values about diet and exercise have differential effects in predicting change in weight related behaviors. The results indicate that with the exception of sedentary behavior, a student's personal values about diet and exercise did not predict change. The results also indicated that the descriptive norms about the values of a student's friends did not uniquely predict change in any of the focal behaviors when beliefs about the roommate's values were part of the models. When considering breakfast skipping and after dinner snacking, perceptions of how much one's roommate valued a healthy diet and exercise consistently predicted change in the students' own behavior. Although these beliefs did not predict change in sedentary behavior, high power roommates' sedentary behavior tended to be affected by how much their low power roommates exercised. Together these results suggest that it may be important for students to change their behavior in a manner that is compatible with the values and behaviors of their roommate.   Moreover these results highlight a number of ways that weight related behaviors can be indirectly affected by a student's relationship with his or her roommate.

Discussion

The specific aim of this dissertation study was to determine if same sex college roommates influence each others' behaviors that are associated with weight gain. Two different longitudinal dyadic models were utilized to test whether influence occurred directly through behavioral imitation or indirectly through perceptions of a roommate's diet and exercise values or descriptive norms of a larger social group. The APIM models tested interpersonal influence by measuring the effect of the partner behavior on the actor's behavior at a later time point. The growth curve models provided latent factors of change and various psychological factors were found to predict change among the three focal weight related behaviors. Overall, these models were utilized to determine if different qualities of the roommate relationship facilitated the amount of change that occurred in each student's diet and sedentary behaviors depending on the beliefs and behaviors of both the actor and partner.

On the basis of social learning theory, I hypothesized that students would directly influence each other's weight related behaviors through a process of modeling and in turn would become more similar over time. While there was some evidence for convergence of sedentary behavior especially among females and roommates with a close relationship, after dinner snacking and breakfast skipping showed different patterns of convergence. In general, after dinner snacking was most similar for roommates at the very beginning of the study suggesting that this behavior was more closely monitored when roommates first started living together in order to make a good first impression. Similarity in breakfast skipping tended to remain stable for most roommates over time yet roommates who differed in body size and weight related behaviors such as exercise and high fat snack consumption tended to become more similar in the breakfast consumption habits over time.

The longitudinal APIM models were able to show specifically when or for which particular set of roommates, socialization of key weight related behaviors was likely to occur. In addition, growth curve models measured the effect of specific beliefs and behaviors on the rate of change in the focal behaviors. Perhaps the most remarkable finding in this study was the tendency for a student's beliefs about his or her roommate's values concerning diet and exercise to predict change in after dinner snacking and breakfast skipping. Even after controlling for a student's own values, values of close friends and beliefs about the normative behavior on campus, what a student believed his or her roommate valued in terms of diet and exercise predicted significant change in after dinner snacking and breakfast skipping. The actual values of the roommate did not predict change in the student's behavior which suggests that socialization might be motivated more by what a student *believes* their roommate values rather than the roommate's actual behavior or what he or she really values in terms of diet and exercise.

Widely used health models such as the theory of planned behavior posit that subjective norms should in part predict intentions to change behavior, yet these constructs are typically found to be weak predictors of intentions with little effect on actual behavior change. What is novel about the findings in this study are that these students are motivated to change eating behaviors based simply on what they perceive is valued by their roommate. It appears that roommates may be altering their weight related behaviors not because they feel direct pressure from their roommates to do so but because they want their own behavior to more closely align with what they feel their roommate values. Changes in weight related behavior for students who believe their roommate is particularly healthy may be motivated indirectly from the need to get along with their roommate which in turn inspires other health related goals related to weight maintenance and physical fitness. It may also be the case that students feel less motivated to regulate

unhealthy habits such as snacking after dinner when they perceive their roommate does not value healthy eating and regular exercise. Feeling that one's roommate is less health conscious might make it more difficult to avoid snacking late at night when there is less risk of being judged as unhealthy by a close partner.

The Social Value of Sedentary Behavior

Results from longitudinal APIM analysis for sedentary time revealed support for the hypothesis that roommates would be influenced directly from each other's behavior. Roommates generally became increasingly similar in the amount of time they devoted to sedentary behaviors over three months. Intraclass correlations between concurrent assessments of sedentary behavior revealed that roommates were not very similar in the amount of time they spent engaged in sedentary screen activities at the beginning of the school year but their behavior became significantly correlated 10 weeks later. Running the same analyses with arbitrarily paired same sex roommates revealed no evidence of concordance or partner influence from shared environmental or chance effects suggesting that the observed homophily in sedentary behavior likely occurred due to factors from the roommate relationship.

Concordance in sedentary behavior was especially likely for roommates who developed a close relationship with each other, suggesting that close roommates tended to be in agreement with each other about the appropriate amount of time to spend engaging in these behaviors than roommates who were less close. Close roommates may have discovered that they enjoyed watching TV, playing video games together or had a common fascination with online computer activities such as Facebook.

Roommates who became close during this time also tended to dine together more frequently which also was likely to be a mutually enjoyable behavior that enhanced the relationship. Comparing roommates who dined together frequently to those who dined

together less often reveals a similar pattern of correlations when comparing close to non-close relationships. Roommates who are dining together more often are spending more time together and the strength of their interdependence predicts growing similarity in their leisure activities. Closer roommates also perceived that they shared values about physical activity with their roommate somewhat more than roommates who were not as close. To the extent that sedentary activities were coordinated and enjoyed by both roommates and regulated in a way that matched their values about physical activity would likely create an interpersonal situation conducive for behavioral concordance.

Leveraging Interpersonal Power to Influence Sedentary Behavior

Because there was evidence that roommates could be distinguished by interpersonal power when considering sedentary behavior, I was able to test the degree to which high and low power roommates influence each other in these particular sedentary activities. The person with greater interpersonal power should, by definition, be able to exert greater influence on his or her partner, yet these data suggest that those with higher power may not exert influence early in a developing relationship. Instead it was the roommates who were relatively *lower* in interpersonal power (IP) who tended to influence their roommate to a small degree during this time. It was only later that the high IP roommate exerted the expected amount of influence where his or her level of sedentary behavior at Time 2 significantly predicted the low IP roommate's sedentary behavior at Time 3.

It may have been that in the initial month of the relationship, power, influence and dependence on the relationship was less clearly defined as activities were being coordinated and negotiated. Various sedentary behaviors such as watching television and playing video games may have been the kinds of social activities that roommates engaged in together to determine their compatibility and mutual interests. Low power

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roommates may have on occasion had opportunities to suggest an activity that the high

power roommate was willing to try. High IP roommates may have been somewhat more

likely to be influenced by his or her roommate at Time 2 than at later time points because

needs to affiliate and establish a compatible relationship were still strong. In order to

influence another person, a relationship bond must be established and it may have been

necessary for high IP roommates to ingratiate themselves with their roommates initially

to establish closeness and trust. After a month or so of living together, roommates likely

had a clearer sense of the quality of their relationship and the amount of power available

at each other's disposal to determine mutual outcomes.

By Time 3 it was clear that High IP roommates were most likely to determine the

amount of sedentary behavior that the roommates engaged in. Since low power

roommates tended to be more dependant on this relationship, they would be more

motivated to accommodate the sedentary behaviors of their roommate. This study did not

collect data beyond the ten week time frame so I could not determine if the high IP

roommates' influence would be maintained over a longer period of time or that further

shifts in influence would occur. Future studies could examine the degree to which high

IP individuals tend to maintain their influence over their roommate and if the

establishment of sedentary norms predict weight changes in low IP roommates.

When examining changes in sedentary behavior over time for these roommates,

growth curve analysis revealed differences in how the initial behavior of a student

affected the rate of change in his or her roommate's behavior. Overall, students increased

their amount of sedentary behavior by nearly 4 hours/week after living on campus for 10

weeks. So the normative trend was to watch TV and play on the computer more as the

semester went on.   High IP students were somewhat more likely to increase their

sedentary behavior when paired with a roommate who was *more sedentary* than average.

This makes sense since having a roommate who watched TV or played video games often would create a living situation that would facilitate the general trend of increased sedentary behavior when living on one's own for the first time.

Low IP students in contrast were found to change their sedentary behavior somewhat more rapidly when paired with a roommate who was *less sedentary* than average. Having a high power roommate who is not particularly sedentary might possibly motivate a low IP student to reduce his or her sedentary behavior to be more aligned with his or her active roommate. Yet this is not what we find in this sample. This unexpected result is difficult to interpret. It may be that low power roommates increase their sedentary behavior when their roommate is engaged in other activities perhaps as a means for avoiding boredom when his or her roommate is not around. It may be that because of their reduced status in the relationship, low power roommates may be more likely to be engaging in sedentary behaviors alone than with their roommate. Future studies should be designed to measure the difference between how much time students engage in sedentary activities with others as opposed to alone to determine if increased sedentary behavior among roommates is due to the tendency to engage in social activities that are leisurely or as an activity that is done when social interaction is not available. Overall it appears that as two roommates become closer friends concordance in sedentary behavior tends to increase in part due to socialization processes where one student's sedentary behavior directly influences his or her roommate's sedentary behavior at a later time point.

Changes in sedentary behavior were not predicted by perceptions of a roommate's diet and exercise values as was the case for after dinner snacking and breakfast skipping. Instead changes in a student's sedentary behavior were predicted by the level of physical activity reported by the student's roommate at Time 1. Specifically

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when low IP students engaged in relatively little physical activity, high IP roommates tended to increase their sedentary activity. To the extent that power differences exist between roommates, a high IP roommate might not be as motivated to keep his or her sedentary behavior in check when his or her roommate is often engaging in sedentary behaviors. Sedentary time and physical activity may be a class of behaviors that are somewhat more salient than eating habits and people tend to respond to and perhaps coordinate their own physical activity and sedentary behavior based on the actual behaviors of their close companions especially if those activities afford benefits to the relationship.

When a high IP student's roommate reported being more active than average, his or her sedentary behavior remained stable and showed a small tendency to decline. It may have been particularly important for a high IP roommate to not appear too sedentary in the presence of a more active roommate. Being physically active might convey a degree of social status on the low IP student and increasing sedentary behavior might convey declining social status that would threaten a high IP student's role in the relationship. To preserve a power differential in a relationship a high IP student would need to regulate his or her sedentary behavior when paired with a roommate who was particularly active. When paired with a roommate who was much less active the pressure for the high IP students to regulate sedentary activity might not have been as strong.

The Social Value Of Making A Good First Impression While Eating

A different pattern of results occurred when considering a student's breakfast skipping and after dinner snacking behavior. Both behaviors were correlated at baseline suggesting that the tendency to engage in these behaviors might have been relatively similar for most incoming freshman regardless of any influence from a roommate. Because I did not have data on these participants prior to the beginning of the school

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year, I was not able to directly test how influential roommates would be on each other's behavior at their first point of contact. Nevertheless, the null findings from the arbitrarily paired dyads suggests that shared environmental effects had little effect on the observed homophily of after dinner snacking and breakfast skipping for actual roommates at time 1.

When considering after dinner snacking it seems more likely that roommates influenced each other's behavior when they first met but that influence quickly waned once they began living together and started building a relationship. This fits well with previous research that finds eating behavior is often affected by impression management concerns for how others may judge them (Herman et al., 2003; 1987; Pliner & Chaiken, 1990). People should tend to be motivated to convey a good impression during their initial interactions with a stranger than with someone who they know well (Leary et al., 1994). While eating with friends can have a social facilitation affect on the amount of food people are likely to consume (deCastro, 1994) eating with strangers typically activates ingratiation strategies in the participants and experimental studies have found greater matching in the amount of food consumed depending on the social context (Salvy, Jarrin, Paluch, Irfan, & Pliner, 2007; Salvy, Vartanian, Coelho, Jarrin, & Pliner; 2008; Hermans, Engels, Larsen, & Herman, 2009). The strength of this effect was further demonstrated by the larger Time 1 correlations for non-close compared to close roommates. If snacking after dinner was regulated in part by impression management concerns early in the relationship, it makes sense that roommates who felt close to each other at the outset would be less likely to monitor their snacking habits to closely resemble each other's behavior. In situations where friendship is uncertain and the relationship tenuous, there may have been increased pressure to conform during their initial interactions.

It should be noted that just prior to the collection of baseline data, all incoming freshman at the University of Minnesota participated in a weeklong orientation program on campus called Welcome Week. Freshman, including all the participants in this study took part in a number of fast paced, structured events that consumed most of their waking hours. Students were fed prepackaged meals and offered numerous snacks and candy throughout the day's activities. Given that the shared environment was quite similar during the first week, it might have been expected that weight related behaviors would be highly correlated at baseline even when testing associations between arbitrarily paired roommates. Correlations from arbitrarily paired roommates have consistently shown that this was not the case and suggests that similarity at baseline depended on who participants were paired with as a roommate.

If interpersonal influence on after dinner snacking is strongest during the initial encounters a student has with his or her roommate, then the decreasing levels of concordance and influence observed in this study over time suggest that as roommates become more familiar with each other they may become less concerned about making a good impression with their eating habits and shift to making more autonomous decisions about food. Choices that a student makes in a group setting can convey an image to themselves and others (Belk, 1988). The start of a college education can be an impressionable time when students form and express their identity and need others to validate the way they see themselves (Swann, 1983). Students may be motivated to seek common ground with their peers at the outset but also feel compelled to be perceived as a unique individual and not as a mindless clone devoid of any distinct characteristics. In situations among friends when unique choices can be used as positive self-presentation cues, behavior may become more variable (Ariely & Levav, 2000). It also may be the case that the frequency with which a student snacks after dinner does not carry the same

degree of social value as one's decisions about watching TV or sitting in front of the computer. Increasing closeness or familiarity with another individual may dampen impression management concerns about eating behavior and students may feel less motivated to monitor their eating habits to conform to perceived norms. In contrast, the choices one makes about which television programs to watch and how often one must check in with Facebook would convey more salient information about the self. The degree to which choices about sedentary behavior were harmonious with a roommate would likely have more impact on the quality of the relationship than after dinner snacking habits as enjoyable as they might be.

Roommates may also discover that they have many other characteristics in common that outweigh any tension caused from the discrepancies in snacking behaviors whereas differences in what TV programs are watched and when could be more problematic. It therefore may be less threatening to allow oneself to differ in snacking habits especially as roommates get to know each other better. Common academic and career interests, music and movie preferences as well as shared spiritual and political ideology may cause any differences in snacking habits to seem trivial. Students are motivated to strike a balance between similarity and differentiation from their peers ideally to achieve an optimal amount of assimilation and distinction within their close relationships (Brewer, 2003).   In order to maintain a sense of autonomy and distinctiveness, some people may choose to deviate from some normative behaviors of their social group while conforming to others (Blanton & Christie, 2003).

When examining change in after dinner snacking, I have argued that the after dinner snacking behavior of a student is associated with his or her roommate at the very beginning of the relationship due to the students' desire to make a good first impression. Roommates did not grow more similar in this particular behavior during the course of

the study although results from the growth curve analysis revealed that close roommates tended to increase the rate at which they snacked after dinner and non close roommates tended to decrease their after dinner snacking. The differences in snacking trajectories between close and non close roommates is notable since it is occurring without the tendency for roommates to become increasingly concordant. This suggests that perhaps some other variable associated with the quality of the roommate relationship such as the tendency to stock up on snacks and or share snacks is causing students to alter the frequency with which they eat snacks after dinner but at a different rate from their roommate. Future studies would need to more closely evaluate the situations that snacking is likely to occur. The results from this study suggest that snacking after dinner may be a positive form of social interaction that is done more frequently when roommates are close than when they are not close.

The interesting thing with after dinner snacking is it appears that roommates may have believed that they were becoming more similar over time. When beliefs about how much one's roommate values eating healthy everyday were added to the growth curve model to predict change in after dinner snacking we see evidence that what may be motivating students to alter their snacking behavior might have less to do with what his or her roommate actually does or values and associated more with conforming to the perceived values of one's roommate. When a student believed that his or her roommate valued eating healthy everyday more than average then his or her after dinner snacking tended to decline. In contrast when a student believed his or her roommate valued eating healthy everyday less than average, his or her snacking tended to increase. These perceptions of what a roommate valued were the kinds of impressions that indirectly motivated students to change their behavior perhaps in an attempt to fit in or maintain a certain sense of compatibility. Even though roommates were not actually becoming more

similar over time in the rate with which they snacked after dinner, the perceptions of each other's diet and exercise values may have unconsciously motivated students to change their snacking behavior.

One way of conceptualizing the social influence roommates have on each other in terms of after dinner snacking behavior is that students use their observations of their roommate's behavior as well as their perceptions of their roommates health values as a source of information for appropriate behavior. Students may use this information as a kind of heuristic that informs future decisions about snacking after dinner. Specifically the findings here suggest that students are engaging in an anchoring and adjusting process by closely observing their roommate's behavior at the earliest point in their relationship to form a reference point or "anchor" from which to make adjustments to that reference point based on additional information. The additional information might consist, in part, from the perceptions students have about their roommates' health values. Students then adjust their behavior from the anchor to more closely match the perceived values of their roommate. Changing one's behavior to align with the values of another might be a subtle way of validating the behavior and affirming compatibility within the relationship. This study is novel by providing evidence suggesting there may be different routes that social influence takes in changing behavior, one direct at the outset and another indirect over time.

These beliefs likely had a regulating effect on snacking behavior. Given the freshman student's new sense of personal freedom and increased access to food from the dining halls, it may have been quite easy for students to indulge in snacks late at night. If a student believes that his or her roommate does not value eating healthy everyday, then he or she might not feel as guilty about polishing off a pint of Haagen Daz at midnight since the threat of being harshly judged is less likely from a roommate who might also do

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the same. Having a roommate who seems to not value eating healthy should contribute to creating situations where late night snacks are accepted and difficult to avoid. On the other hand, students who believe they are living with someone who highly values a healthy diet might worry more about being judged in a negative way if their own after dinner snacking became too excessive. This indirect form of social pressure might contribute to the cognitions that help students resist too many late night snacks.

Similar changes in after dinner snacking behavior were predicted by beliefs about how much a student's roommate valued regular exercise although they were found to be moderated by the student's own beliefs about exercise. Specifically when a student believed that his or her values about exercise matched his or her roommate's values about exercise then change in after dinner snacking tended to occur. For example, when a student who values regular exercise believed her roommate also valued exercise then her after dinner snacking tended to decrease. In contrast, for students who do not value exercise and believe their roommate feels the same way, then after dinner snacking tended to increase. There is no effect on snacking change when a student believes her values about exercise do not match with her roommate's. It could be that beliefs about exercise increase social pressure to regulate snacking only when a student perceives that she values exercise to the same extent as her roommate since exercise values are not as directly associated with snacking in the way values about healthy eating would be.

Overall it seems that some type of normative social pressure is involved in how students regulate the frequency with which they snack after dinner and put themselves at risk for future weight gain. When students first meet, they have little information about their new roommate's dietary habits and rely on descriptive norms during their interactions to determine what level of snacking is appropriate. In order to create a positive impression, students are likely to be motivated to carefully observe their

roommates eating habits and make sure their own habits do not deviate too noticeably. Therefore, it is the observed snacking behaviors of a roommate that are directly associated with snacking homophily at the beginning of the roommates relationship.

It is also likely that this type of vigilance is difficult to maintain for very long and once roommates start to feel comfortable with one another they may tend to relax their need to closely conform to each others' eating habits. This study presents evidence suggesting that social influence might continue for snacking behavior but in a more indirect manner. Students appear to be influenced by the perceived diet and exercise values of their roommate and the fact that these values predict behavior change is evidence that students are still in some way compelled to conform to their roommate. Since it is the perceptions of a roommate's values and not the actual values reported by the roommate that predict change in part explain why roommates do not tend to converge in their after dinner snacking behavior over time. A roommate's actual values were not predictive of change in a student's after dinner snacking behavior and were only weakly correlated with perceived values. A student could be completely wrong about how much her roommate values healthy eating, yet it makes sense that another person's actual beliefs are not likely to be influential if they are misperceived. Of course it is quite likely that over a longer period of time, roommates might become more aware of each other's actual beliefs and it would be interesting to test in future studies the degree to which a partner's values about diet and exercise continue to motivate change and perhaps concordance in after dinner snacking habits.

Making Up Differences With Breakfast Skipping

Breakfast skipping followed a pattern that was more stable during the early development of these roommate relationships. Roommates became somewhat more concordant a month after they first began to live together but overall did not increase in

similarity in the final month of the study. The decision to skip breakfast with the same frequency as one's roommate may not have been motivated by the same impression management factors that were likely guiding after dinner snacking behavior such as concern over feeling negatively judged by one's roommate. It also seems unlikely that students would choose to mimic each other's decision to skip breakfast from a need to coordinate this activity with their roommate in order to maximize mutually beneficial experiences in the way students might have been doing with various sedentary behaviors. Choosing to skip breakfast did not follow the predicted patterns suggested by social learning or impression management but the decision to eat breakfast or not may have still been motivated to service the developing relationship between roommates.

Although breakfast skipping is known to be associated with weight gain among health professionals, missing breakfast may instead be thought of as an effective means for loosing weight among young adults and adolescents, (Nowak, 1998; Shaw, 1998; Song, et al., 2005, Neumark-Sztainer, Wall, Haines, Story, Eisenberg, 2007). Some roommates may quickly realize that there are real differences between themselves and their roommate in terms of their body size and the weight related behaviors they each engage in. To the extent that students would be strongly motivated to get along with their roommate, especially when they first meet, it is likely that some would attempt to make an effort to reduce salient differences in behavior and perhaps even appearance.

Although roommates who were close showed a small tendency to move toward concordance compared to roommates who were not close, an interesting trend was observed between roommates who differed in BMI and weight related behaviors at Time 1. Roommates who were relatively different in body size, amount of exercise and high fat snack consumption, showed a strong tendency toward concordance in their breakfast

skipping behavior compared to roommates who were similar on those variables at baseline.

Perhaps when roommates discover they have been paired with someone who is noticeably different in body size and eating and exercise habits, they are motivated to reduce this discrepancy by adopting similar behaviors concerning breakfast consumption. Changing one's eating and exercise habits not to mention reducing BMI are difficult factors to modify. Choosing to eat breakfast or not might be an easier behavior to modify for students who feel somewhat out of sync with their roommate in terms of factors related to weight gain and body size. Roommates might also discover that a pattern of missing breakfast over the course of a typical week affords certain benefits such as increased sleep and shared perceptions of weight maintenance. When a student begins to copy the frequency with which his or her roommate eats breakfast, he or she is sending a subtle signal validating that behavior. The consequences of doing so may also reduce some of the pre-existing weight related discrepancies that exist between roommates; all of which would serve to increase similarity and possibly enhance the relationship. Indeed, becoming increasingly similar in terms of breakfast consumption frequency as a means of "closing the gap" between a student and his or her roommate may be a strategy that close roommates are more likely to consider since doing so might enhance an already positive relationship. Not only were closer roommates somewhat more likely to influence each other's tendency to miss breakfast, but analysis comparing roommates who were accurate in judging each other's diet and exercise values were much more likely to become concordant in breakfast consumption frequency. This suggests that roommates who are somewhat more motivated to pay attention to and understand each other's values pertaining to diet and exercise might be more likely to adopt similar weight management strategies. When a roommate relationship affords an accurate

understanding of each other's values regarding diet and exercise, students are perhaps more motivated to adopt a common behavior that bridges the weight-related differences between them.

Like after dinner snacking, the beliefs a student has about how much his or her roommate values healthy eating and regular exercise were found to predict changes in breakfast skipping but in an unexpected way. Given the findings with after dinner snacking we might predict that when a student believes his roommate values healthy eating then their interactions might produce situations infused with subtle perhaps even unconscious indirect social pressure to eat healthy himself which should include starting his day with a healthy breakfast. The data in this study showed that students who believed their roommate valued eating healthy tended to *increase* the number of days they missed breakfast. This unexpected finding might make more sense if we knew precisely how students felt about the quality of the breakfast they were getting in the dormitory cafeteria. Unfortunately, this study did not gather such data and I can only infer the students attitudes based on previous studies examining breakfast consumption among adolescents and young adults. If students believe that breakfast is either a relatively unhealthy meal or that skipping it regularly is an effective means for weight loss, then it seems reasonable that conforming to a roommate's values about healthy eating would including avoiding breakfast. Men in this study were more likely to gain weight when they ate breakfast everyday and perhaps this contributed to the perception, at least for men, that skipping breakfast might lead to weight loss. Yet women are more likely to think about and engage in dieting behavior and are perhaps more sensitive to differences between themselves and their friends in terms of body size and weight related behaviors. The tendency for female roommates to change their breakfast consuming

habits in opposite directions suggests that this might be an available strategy for reducing the differences in more salient factors such as body size.

Explaining Differences in the Focal Behavior Outcomes

Sedentary behavior differs from snacking and breakfast consumption in the amount of time devoted to each.   Snacking and breakfast consumption could be considered momentary behaviors that often occur sporadically without a consistent pattern for college students. In contrast sedentary behaviors typically last longer and it is not uncommon for people to watch television or sit at the computer for many hours at a stretch. This type of chronic behavior modeled by a roommate should have more direct influence on a student than snacking or breakfast consumption which are more episodic and ephemeral. This difference in the duration of the behaviors in part explains why we see stronger evidence of concordance and partner influence for sedentary behavior and less for after dinner snacking and breakfast consumption. Beliefs about a roommate's diet and exercise values may have little effect in shaping a student's own sedentary behavior when his or her roommate's behavior is frequent and enduring.   To the extent that students are motivated to appeal to their roommate, they may regulate their own personal choices about snacking and breakfast consumption based in part on what they believe their roommate values since it may be more difficult to account for what his or her roommate actually does in terms of snacking and breakfast skipping. It is possible that after longer periods of time, roommates would become more familiar with each other's snacking and breakfast consumption habits and we might expect close roommates to become convergent in those behaviors as well.   Future studies should examine changes in these behaviors over longer periods of time to determine when and if eating behaviors shows signs of convergence and what may be the limits to convergence for sedentary behaviors.

Gender Differences in Weight Related Concordance

Gender differences might be expected to arise in the degree of concordance observed in the three weight related behaviors examined in this study due to differences in the tendencies for men and women to be motivated by a need for affiliation and relatedness vs. a need for autonomy and distinction. This study clearly revealed gender differences when comparing the tendency to become concordant in these three weight-related related behaviors. Female roommates tended to become increasingly similar in their sedentary behavior over time whereas men did not.   Female roommates also were much more similar in their Time 1 after dinner snacking behavior than men. Women also were much more likely to show an impression management effect for individual food items such as salad and various other high fat snack items than men. Men did appear to be somewhat more concordant in term of breakfast consumption than women but similarity remained relatively stable for both sexes and there was little evidence for partner influence for either male or female roommates.

Gender differences in the tendency to become similar in certain weight related behaviors may in part be explained by noted differences in how women and men perceive themselves and others as well as the social roles they are expected to play. In terms of the self, women may be more likely to have an interdependent self-construal and men a more independent self-construal (Cross & Madson, 1997). Although both male and female roommates might be initially motivated to affiliate by trying to make a good first impression with their roommate and to establish a positive relationship, women over time may continue to be motivated by affiliation and interdependant concerns while men may be more likely to motivated by asserting autonomy, power and independence. Additional evidence suggests that women may tend to value and identify with dyadic relationships such as friends and romantic partners whereas men tend to value and identify with larger

social groups. Men are likely keen on demonstrating the possession of unique traits and abilities that might make him more attractive and indispensible to the group (Baumeister and Sommer, 1997). In other words, "Women are more focused on the close relationships they are a part of, whereas men are more focused on the groups to which they belong (Gabriel & Gardner 1999, p. 652). It should follow then that women will be more susceptible to interpersonal influence but men will be susceptible to group level influence, especially to groups that he identifies with. Future research should examine the extent to which group norms are interpreted differentially between men and women. It is possible that when group norms are framed in terms of interpersonal relationships then women will be more sensitive to their influence than men.

Implications for Health Behavior Change Research

The results from this study are some of the first to examine the eating and sedentary habits of people in situations where most of his or her companions are unfamiliar with each other at the outset and develop a relationship over time. This study not only sheds light on how interpersonal relationships might influence changes in diet and sedentary behavior but also suggests how different relationship dynamics might affect changes in these behaviors. Although much research has attempted to indentify the psychological factors associated with changing behaviors related to weight gain (Parsons, Power, Logan & Summerbell, 1999; Stice, Presnell, Shaw & Rohde, 2005; Viner & Cole, 2006), very little empirical research has been done examining how people's behavior changes depending on the behaviors and values of a significant peer relationship. The evidence from this study suggests that there is variability in who is susceptible to weight related peer influence and which types of relationships will influence each other more than others and that social influence operates differently depending on which behavior is examined. The social need to belong and to get along with others, particularly one's

roommate may be the kind of mechanisms that drive weight related behavior change for young adults.

Although there certainly are many reasons why freshman students tend to gain weight, this study reveals that the decisions to regulate diet and sedentary behavior may not derive only from a student's own personal choice. When the behaviors and values of key relationship partners are included in the analysis, we may get a clearer picture of the social situation that a student must accommodate. This study represents a first step at describing how a class of behaviors associated with weight gain can change for students depending on the behaviors and values of a roommate. Further, for social influence to have any impact in interpersonal situations, it seems that relationship partners must be motivated to pay attention to each other's behavior and understand each other's values regarding diet and physical activity.

Future studies should test the implications dyads have on variables from models such as the theory of planned behavior to determine the degree to which *partner* attitudes, values, self-efficacy and intentions predict an *actor's* behavior. Although the current study was descriptive in nature and assumed that weight behaviors would change during the transition to college, future studies could ask students to state their health related goals and track the success and support of these goals within an interpersonal context.

It may also be the case that roommates begin to develop a shared identity around certain health behaviors. Recent research investigating enhancements to the theory of planned behavior have increasingly described the importance of social identity as adding to the predictive value of the model (White, Smith, Terry, Greenslade & McKimmie, 2009). A more precise understanding of an individual's and his or her partner's health-related identity may afford insight into how and why

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individuals attempt to regulate the self in the context of close partners who they frequently interact with. Forming strong identities related to health enhancing behaviors such as healthy eating and exercise might not only enhance motivation to maintain these behaviors but might also be shaped and supported by close relationship partners (Strachan & Brawley, 2008).

The implications of the findings from this research may offer a new lens through which health behavior is studied. If researchers are seriously interested in identifying the factors that motivate and maintain behavior change over time, then more effort must be made to measure the effects of the social environment. Social situations afford opportunities for people to interact, to influence and be influenced by others. Much of our time is spent in the presence of others and it is this social dynamic that allows particular thoughts, feelings and behaviors to arise depending on the nature of the situation. When others are present we can choose to ignore or interact, when others need our assistance, we can be helpful or hurtful, when our goals and preferences conflict with others, we can be cooperative or selfish. The social environment thus contains properties that provide a framework for individuals to express their motives, values and goals (Kelley et al., 2003).

Accounting for the social environment in research acknowledges that certain individual differences known to moderate behavior will only be revealed in specific situations. A person x situation interaction is likely to occur in many social environments due to the nature and quality of the interpersonal relationships between the people in the environment. Most people conceptualize environmental factors as the quality of lighting in a room, the level of the background noise or the comfort of the seating. These factors may at times play a role in behavior but more often they are negligible compared to the interpersonal context. Social information can at times

powerfully change behavior and people devote a great deal of cognitive resources to understanding the values, goals and motives of other interacting partners (Reis, 2008). Relationships are often tenuous, uncertain and emotionally charged. As we try to manage the impressions we make on others, we also make attributions for the social behavior we observe. Navigating the social environment requires high level skills to sort out shared thoughts and emotions in order to feel connected and accepted by one's social group.

The way people interact in the social environment therefore is key to how the situation is experienced, remembered and acted upon. We might expect different behavioral outcomes when given advice about how to effectively loose weight when that information comes from a spouse, a doctor, a friend, a coworker or a complete stranger. For researchers to best predict behavior, it seems essential to include some measurement of the social environment. According to Interdependence theory, social situations can be characterized by 1) how much a person's outcomes depend on the qualities and behaviors of others; 2) the amount of influence or control individuals have over each other's outcomes; 3) the degree to which a person's outcomes agree, compliment or conflict with others and 4) the extent that partners must coordinate their actions to achieve satisfying outcomes.

Although this study in no way claims to have measured all the important factors of the social environment of these freshman roommates, tracking the behaviors of cohabiting dyads has revealed how a student's weight related behaviors depend in part on the behaviors and perceived values of his or her roommate. By measuring interpersonal power I was able to show that some asymmetry exists in who is able to influence outcomes related to sedentary behavior. I was also able to show that when roommates' exercise values correspond, snacking and breakfast consumption behavior tends to change to reflect those values. Finally, I present evidence to show that when roommates

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coordinate activities like having meals together and engaging in leisure activities like watching TV, they tend to become closer over time. These attempts to account for an individual's behavior within a particular interpersonal context is a first step toward understanding the person X situation context that shapes behavior associated with weight. To the extent that health researchers underestimate the factors involved with the social environment, then we will remain blind to such key variables as the true nature of social support, how information travels through social connections and how the quality of interpersonal relationships impact the degree to which we pay attention to and understand the values and behaviors of those closest to us.

Perhaps as we advance as a social science and add the understanding of genetics, culture, social networks, family, and close relationships to our toolbox we will begin to see the limits of understanding human behavior simply from a logical, conscious and individualistic point of view. Now that being overweight has become the norm for adults in this country and obesity a major health threat we must seriously examine how the social environment promotes values and behaviors surrounding diet and physical activity. Social normative pressure within an increasingly obsengenic enviroment that provides consumers with instant gratification of inexpensive energy dense food 24 hours a day make it increasingly difficult to maintain a healthy lifestyle. To the extent that people surround themselves with others who are sedentary and eat poorly should make it that much more difficult to sustain a healthy weight over their lifetime.   It is also plausible that if greater numbers of people valued whole meals, smaller portions and regular physical activity, that a new social norm would be created that might tip the balance back toward healthier weight levels.

Strengths and Limitations

The current study had numerous strengths and contributes to the literature by

describing how interpersonal relationships can influence health behavior change. To my knowledge this is the first study to investigate changes in weight related behavior through an interpersonal context using a longitudinal dyadic design. Not only does this afford the ability to examine how behavior changes over time but the dyadic nature of the study allows a precise estimate of partner influences on these behaviors. The sample also consisted of randomly paired roommates which made it possible to examine socialization effects among peers without the confound of selection effects that biases much of the peer influence literature. In addition, having data on both roommate partners for the same variables enables one to evaluate the differences between perceptions of partner values and actual partner values, the discrepancy of which becomes a measure of accuracy in interpersonal perception.

This study also represents some of the first attempts to show how after dinner snacking may be influenced by impression management concerns in real world situations with developing friendships. Given the paucity of research that supports a link between after dinner snack rates and weight gain, these findings add value not only on when snaking behavior is likely to be highly concordant among roommates but how this behavior might be expected to change due to beliefs about the partner's diet and exercise values. This study is also the first to show how these meta perceptions are associated with change in other weight related behaviors such as skipping breakfast. Finally the current study is the first to present evidence that sedentary behavior can quickly become concordant among same sex friends who choose to live together.

The unique nature of this data set and its novel findings are not without certain methodological limitations. Longitudinal dyadic studies assessing changes in health behavior are still relatively rare and definitive conclusions cannot be made from the findings of a single study. Therefore interpretations of these findings must be made with some caution until appropriate replications are done. The last section of this dissertation will be to address some of these limitations in order to plan and prepare future studies that build a program of research investigating how relationships affect and influence health behavior.

Issues associated with the sample

This study relied on a sample of freshman college students from a single university which makes it difficult to generalize results to the wider student population. In addition, the sample was predominately Caucasians and Asians. Hispanics and African Americans were under represented in relationship to the ethnic distribution in Minnesota, and this could have influenced the results of the study. For example, obesity rates are higher among many minority groups than among White Americans (Blocker & Freudenberg, 2001), and the social influence factors among these populations might be substantively different, making it less likely that the current results will generalize to other ethnic groups.

The current study also did not include a comparison or control group to contrast with the findings from the randomly paired roommates. Future studies may want to include roommates who had an existing friendship before coming to college to see if there were meaningful differences between the two groups due to selection effects. There may also have been environmental effects that could have been identified by comparing young adults living with roommates off campus or not

going to college but nonetheless experiencing similar developmental changes (e.g. moving away from parents). Such comparisons would have afforded the opportunity to investigate whether changes in weight related behavior and weight gain are limited to the college experience or to other developmental processes associated with young adulthood such as physical and cognitive maturation, changes in living environments and other factors such as economics and motivation and ability to prepare healthy meals.

Issues Associated with measurement

Nearly all the measures in this study involved self-report surveys. Only height and weight were measured objectively at the beginning and end of the study. Self-report surveys are subject to error in part due to factors such as social desirability bias and errors in recall. It is likely that since this study involved salient social behavior many students might have been motivated to supply answers that cast themselves in a favorable light. This study also may have been subject to some self-selection bias in the sense that volunteers for the study were limited to those who already had an interest in maintaining their weights, or even those students who wanted to compete among themselves to see who would not gain weight. The fact that there were relatively few obese participants in the study suggests that some selection bias did occur.   It is possible that students with very low or high body weights chose not to volunteer and perhaps among those who were included in the study, we measured only those students who felt comfortable enough with their weight to be measured both time points. Although attrition was minimal in this study, students who returned for follow-up weight assessments might have

been students whose weight increased the least, which may have biased our results toward smaller weight gains.

Little if any lasting concordance with consuming specific food and beverage items was found in this study. This may have occurred due to the imprecise way eating and drinking was measured. Eating behavior and beverage consumption was assessed retroactively by using a food frequency questionnaire (FFQ). Limitations of FFQ's have been well documented (Subar et al., 2001; Dwyer, Picciano & Raiten, 2003) and more accurate assessments of eating behavior can be accomplished by utilizing multiple dietary assessment methods such as third party observation, 24- hour dietary recall and doubly labeled water. Our diet questionnaires also asked about behaviors during the previous week only, which may not have represented participants' dietary patterns throughout the semester.

Exercise behavior also did not show any tendency to move toward concordance among these roommates and estimations of time engaging in various levels of physical activity might have been marred by a number of biases that affect subjective self-report surveys. Whereas objective measures of eating behavior can be costly, complex and time consuming, objective measures of physical activity are becoming more common as technology becomes more affordable to researchers. Pedometers can be used to count steps and can provide information about total walking and/or running activity. Accelerometry is another emerging technology that can provide information about the total amount, the frequency, the intensity, and the duration of physical activity in daily life (Plasqui, & Westerterp, 2007).

One of the advantages of this study stemmed from the prospective design which afforded the ability to measure changes in weight related behavior over time.

Although many changes in behavior were observed for this sample, it would have been informative if participants would have provided follow up data at later time points. Many of the effects reported here could have been expected due to the myriad of changes and adjustments freshman students would need to make as they transition to a new living environment. The limited time span of this study prevents us from knowing how or if these behaviors will continue to change over the next 6 months or year. Future studies should be designed to track students not only over the course of their freshman year, but over their entire college career to determine if their early experiences with friends and roommates affects health behaviors when other relationships become more salient such as with coworkers or a spouse in later stages of adulthood. We still know very little concerning how these behaviors fluctuate over time and longer longitudinal studies are necessary to determine when, for what reasons and for whom the trajectory of health behaviors increase, decrease or stabilize.

Even though this was a longitudinal study and inferences can be made about the temporal precedence of actor and partner influence on behavior, we still cannot draw firm conclusions about the causal relationship between the roommate relationship experience and factors associated with weight gain. Nonetheless, given the paucity of research on how close relationships influence diet and physical activity, this study represents an important step towards increasing our understanding of factors that contribute to the motivating health behavior change within an interpersonal context during young adulthood. I have tried to draw upon the experimental evidence, especially from the social eating literature, to support my hypotheses about after dinner snacking behavior. To the extent that similar

studies could be done experimentally with physical activity would be an important next step toward validating these findings.

Specific Issues with the Focal Behaviors

While measuring eating behavior is challenging and rife with potential for error, snacking presents its own specific problems. Under reporting of snacking behavior is a common problem and snacks consumed are more likely to be forgotten than food eaten at main meals (Tooze et al., 2004). Improving the accurate counts of snacks could be done through interviewing participants with more detailed questions and memory prompts (Buzzard, 1998). Even so, the results reported here may be difficult to compare with other snacking studies since there is not a consensus in the literature for what constitutes a snack. For instance we do not have agreed upon criteria to classify snacks as healthy vs. unhealthy, there is confusion about how to determine portion sizes and at what volume does a snack become considered a meal? (Sjoberg, et al. 2003). In addition to being poorly defined, after dinner snacking might be confused with an emerging area of research known as night eating syndrome.   Within both literatures it is not clear if time of eating, the number of "meals" consumed per day, or eating after the 3rd meal of the day is the critical factor that defines the behavior and its relationship to weight gain.

Sedentary behavior also suffers from similar definitional problems although recent attention has been devoted to resolving these issues. For example, self – reported sedentary behavior is often under-estimated when compared with accelerometry (Matton et al., 2007). One of the increasing types of sedentary behavior involves computer use and yet the relationship between computer use and social and physical activities among young adults is complex and may depend

on the types of activities that computers are used for.   One study revealed that among males who used the computer primarily for surfing, communication and homework had higher levels of physical activity than boys who used the computer mainly for playing games (Ho & Lee, 2001). Future studies should assess the purpose of computer use as well as availability and number of computers in the participant's environment.

Among the focal behaviors assessed in this study, breakfast skipping was the most problematic in terms of the interpretability of the findings. Often times a behavior that is operationalized by the absence of doing something can yield specific problems associated with the feature positive effect in terms of learning and decision making (Newman, Wolff & Hearst, 1980). The findings that healthy diet and exercise values predicted decreases in after dinner snacking but increases in breakfast skipping were counterintuitive. Since we did not assess attitudes about breakfast consumption, it was unclear whether this sample of freshman students considered breakfast a healthy or unhealthy meal. Like the other focal behaviors in this study, there is little agreement in how breakfast is defined and measured in the literature and what constitutes a healthy breakfast (Pearson, Biddle & Gorely, 2008).

Issues with behavioral concordance

One of the specific aims of this study was to determine the degree to which weight related behaviors would become concordant among college roommates. Although the findings from this study suggest that relationship closeness is associated with concordance for sedentary behavior and that women might be more likely to pay attention to and imitate the behaviors of their roommate, more work

needs to be done to understand the motivations and mechanisms underlying alignment of weight related behavior in interpersonal relationships and among members of social groups. We report strong initial concordance for certain eating behaviors suggesting a need for impression management especially among women. Yet it is still unclear why concordance declined over time. We suggest that roommates are less motivated to engage in impression management over time as they become better acquainted. A likely alternative explanation could be that over time the students' sphere of influence is expanding as they get to know other peers in the dorms and on campus and this might dilute the roommate's ability to be influential. We also suggest that concordance of sedentary behaviors might function as a means for improving social interaction with one's roommate. Future studies using more qualitative measures such as video taped interactions might be required to gain a more precise understanding of the different pathways social influence operates. Similar methods could be utilized to test whether breakfast skipping was used a means to narrow weight related differences between dissimilar roommates.

Future longitudinal dyadic studies should also include assessments of other health related behaviors such as dieting, drinking, smoking, unsafe sexual practices and drug use all of which might be subject to peer influence. Specifically it is well established that smoking is associated with weight loss (Williamson et al., 1991, Klesges et al., 1998). In contrast heavy drinking is associated with weight gain due to the additive caloric intake and the tendency for alcohol to produce additional eating, whereas light to moderate alcohol consumption has been found to protect against weight gain especially in women (Yeomans, 2010; Suter, 2005). An

emerging literature in relationship science is also finding concordance with goal

directed behavior, self- regulation and self-efficacy and that these abilities are often

influenced through implicit social cognitive mechanisms (Fitzsimons & Bargh, 2003;

Shah, 2003; Fitzsimons & Finkel 2010; van Dellen & Hoyle, 2010). Future studies

should investigate whether weight related goals and self-regulatory efforts can be

enhanced experimentally by priming relationship partners who share similar goals.

Finally there is a growing literature demonstrating concordance of emotions such as

happiness, optimism and depression among developing relationships and social

networks (Anderson et al., 2003; Butterworth & Rodgers, 2005; Fowler & Christakis,

2008). Since depression (Goodman & Whitaker, 2002) anxiety (Anderson, Cohen,

Naumova, & Mustare, 2006; Strine et al., 2008) and optimism (Kavussanu &

McAuley, 1995; Taylor et al., 2004) are related to weight gain future studies should

investigate the link between emotional contagion, relationship development and

healthy weight maintenance.

Issues with Individual Differences

Individual differences factors such as personality, self-monitoring and social

status were assessed in this study but their associations with weight related

behavior and relationship development were beyond the scope of this dissertation

and will be discussed in subsequent papers to address who may be most susceptible

to peer influence. Gender differences were assessed and many of the significant

findings reported here were true for females but not males. Female roommates

made up 67% of the sample and the lack of significant effects for male roommates

may have been simply due to lack of power. Nevertheless, this study focused on a

particular relationship with a roommate and perhaps the gender difference found in

this study were due in part to how women and men differentially respond to interpersonal relationships and social pressure from peer groups. Men are more likely than women to develop friendships through shared activities than through intimate, verbal interactions (Wood & Inman 1993) and men may also be more likely to interact in a group than they are to interact with only one other man (Baumeister & Sommer 1997). It is unclear from these findings whether men were simply not as responsive to their roommate as women and paid more attention to the weight related norms of their social group. Future studies should include an assessment of weight related behaviors of larger networks of friends to determine the degree to which men and women are differentially affected by group norms as opposed to interpersonal influences.

There are a number of individual difference variables that were not assessed in this study that have been shown to be associated with weight gain and could plausibly be subject to social influences. Future longitudinal dyadic studies may want to assess factors associated with hunger, cognitive control and emotional eating, (Stunkard & Messick, 1985), restrained eating (Herman & Polivy, 1980), body dissatisfaction and drive for thinness (Garner, Olmstead, & Polivy, 1983), enjoyment of healthy eating and physical exercise (Norman, Carlson, Sallis, Wagner, Calfas & Patrick, 2010) and barriers to eating healthy and regular exercise, (Silliman, Rodas-Fortier, & Neyman, 2004; Kearney & McElhone, 1999; Yeh et al., 2010, Greaney, et al., 2009). Assessment of these and related factors should provide a deeper understanding for the degree to which the psychological variables associated with weight gain are influenced by interpersonal relationships and social norms.

Issues with the Nature of the Roommate Relationship

The roommate relationship was examined in this study because it afforded an opportunity to observe socialization of weight related behaviors in relationships that were not based on choosing or selecting a partner with similar behaviors. Although these types of friendship dynamics may generalize to other important relationships across the lifespan such as work related relationships, friendships in college may differ in important ways from older adults whose friendship experiences are shaped by different values, motivations, and opportunities (Hays, 1988). The findings that young adults engage in impression management and are influenced by the perceived diet and exercise values of their friends may not generalize to older adults whose friendships often span many years.

It was also not clear from the findings in this study why interpersonal power and perceived social status were not correlated. Theories concerning interpersonal power and status posit that power creates status and status creates power (Keltner, Gruenfeld, Anderson, 2003; Thye, Willer, & Markovsky, 2006). The subjective measure of social status used in this study may have been biased in the sense that it relied on the participant to evaluate his or her own social status. Other studies have gathered multiple measures of status derived mostly from reports of others on an individual's status level based on the theory that status is awarded by peers and not taken by individuals. Status is also contextual and a person's social status can change in different social situations (Anderson, John, Keltner & Kring & 2001). Status therefore can be a difficult construct to measure and may require multiple assessments in different contexts to accurately assess its true nature and its relationship to interpersonal power.

Among this sample of freshman roommates, power and status dynamics may have been especially fluid since students were frequently trying out and developing new friendships. Power was only assessed at 2 time points and social status was only measured once so accurate assessments of changes in power could not be measured. Measured differences varied among roommates and it was not clear what constituted a significant difference in interpersonal power between roommates. Future studies may want to include multiple measures of interpersonal power such as peer evaluations of social status, personality constructs such as dominance/submissiveness and more objective measures such as auditory frequency accommodation during interpersonal communication (Gregory & Webster, 1996; Gregory & Gallagher, 2002).

Measuring the dynamics of the developing relationship in this study was limited to constructs associated with closeness. Even though some evidence emerged that closer partners were more likely to engage in sedentary behavior, this study lacked more detailed information about the interpersonal behaviors that may have mediated the path between closeness and concordance of or change in weight related behavior. Future studies may want to incorporate measures of social support for physical activity and healthy eating (Sallis et al., 1987), capitalization (Gable, Reis, Impett & Asher, 2004) and communication strategies, (Overall, Fletcher, Simpson, & Sibley, 2009) to investigate the way roommates interact, discuss plans and goals and experiences related to weight maintenance. It would be informative to understand the degree to which students discuss dieting and exercise goals and strategies and discover how do young adults effectively support and validate the behavior of their friends. What are the verbal and non-verbal cues that

signal agreement and support? How do partners deal with of conflicting values and behaviors?

Feeling connected to others has such a powerful impact on health that future studies should focus on developing links to the key constructs that deepen interpersonal relationships and the variables known to initiate and maintain health behavior change. Social resilience has been identified as a multidimensional construct that defines the ability to foster, engage in, and sustain positive social relationships and to endure and recover from stressors and social isolation (Cacioppo, Reis, & Zautra, 2011). Much of relationship science is based on theory and research empahasizing the importance of feeling secure and positively regarded from our relationship partners. Varying levels of trust, relationship conflict and self-disclosure (Rempel, Holmes, & Zanna, 1985; Simpson, Rholes, & Phillips, 1996; Reis, Collins, & Berscheid, 2000; Simpson, 2007) would likely moderate the degree to which relationship partners feel connected and secure enough to foster the conditions necessary for health behavior to change in ways that benefit the relationship. Future research that examines social influence of health behavior in romantic relationships should investigate the underlying factors associated with longer term commitment and attachment (Mikulincer & Nachshon, 1991; Rusbult, Martz & Agnew, 1998). Although theories are being developed on how married couples are motivated to engage in health enhancing behaviors (Lewis, McBride, Pollak, Puleo, Butterfield & Emmons, 2005), efforts to control the partner's behaviors may encounter resistance and undermine the felt security in the relationship (Overall & Fletcher, 2010). The encouraging news is that after decades of research investigating the factors associated with the initiation and maintenance

of romantic relationships, relationship science is now poised to move solidly into a new frontier of describing and leveraging the interpersonal processes that give rise to health and wellbeing.

Forming a Clearer Understanding of How Perceived Partner Values Motivate Behavior

Perhaps one of the most interesting findings to emerge from this study involves the predictive utility of perceived partner values when tracking behavior change. New relationship partners who are interested in forming a close friendship should be motivated to understand the values that they commonly share. To the extent that people want to maintain these relationships, they ought to engage in behaviors that demonstrate they validate and support those values. This study used only a single item to assess perceived partner values and yet little is known how these perceptions are formed in the minds of young adults. Future studies might develop additional measures to investigate whether there are specific cues such as body size, mannerisms or specific behaviors that give rise to meta perceptions of values. It would be informative to understand how soon these perceptions are formed in new relationships and how resistant they are to change. Additionally, what intrapersonal and relationship factors contribute to their accuracy? Understanding how perceptions of partner values are formed and maintained might provide critical insight into developing effective interventions for maintaining healthy weight as a college student. If meta-perceptions are formed early and are resistant to change then it would be critical for intervention programs to implement strategies when interpersonal perceptions are still forming. It is still unclear if interventions should be designed to enhance the accuracy of these perceptions or

encourage positive assumptions about relationship partners. Recent research

suggests that in some circumstances it may be necessary to hold   positive biases

about a partner's health beliefs and values which are beneficial for relationships in

the sense that they bolster a sense of felt security (Gagne & Lydon, 2004).

Qualitative studies in this area may prove useful in revealing the thought processes

through which young adults form their estimates of their friends values.

The Hidden Role of Stress

Stress may have played an important role in the thoughts, feelings and

behaviors of these freshman students as they attempted to adapt to the pressures of

living on their own, adjusting to a new social environment and the increasing

demands of school work. Unfortunately this study did not include any measures of

stress and therefore could not account for its effect on relationship development

and weight related behavior change. Stress is associated with both relationship

quality (Karney & Bradbury, 1995) and health outcomes (DeLongis, Folkman &

Lazarus, 1988) and is specifically linked to health behaviors such as eating (Greeno

& Wing, 1994), obesity (Dallman et al. 2003) and physical activity (Biddle, 1995).

Despite the common thread that binds both relationship functioning and health

behavior, the effects of stress have for the most part been studied in separate

literatures (Ryff & Singer, 2000). Some research has shown that dieters who are

high in restraint eat more when stressed and those low in restraint eat less or show

no change (Cartwright et al., 2003). Some of the students in this sample could have

been exposed to more stress than students living at home or commuting to campus

due to the increased social demands of dormitory living. Future studies

investigating systematic changes in eating behavior as a function of interpersonal

relationships should focus on the role interpersonal stress plays in how diets and other weight loss strategies are maintained.

Conclusion

Considering that rising obesity rates disproportionally threatens the health and wellbeing of young adults, it is especially important that health researchers understand the multiple pathways involved with weight gain in this population. The social influence of weight related behavior is not necessarily a cause of overweight and obesity but perhaps acts more as a potent mechanism that amplifies the behaviors and values it is seeded with. Understanding the way interpersonal relationships affect health protective behavior is valuable in developing preventative programs that focus on high risk weight gain periods such as the freshman year of college. Fascinating and important work has been focused on the micro aspects of the intersection of relationships and health such as understanding the physiological responses of the autonomic nervous system of couples under stress and the effects interpersonal interactions can have on the immune system (Uchino, Cacioppo, & Kiecolt-Glaser, 1996; Cohen, 2004; Kiecolt-Glaser, Gouin & Hantsoo 2010). Equally important work at the macro end of the scale has revealed how relationships play a significant role in health outcomes, buffer against the risk of morbidity and mortality and how risky heath outcomes cluster and spread throughout social networks (Berkman & Syme, 1979; House, Landis & Umberson 1988; Kiecolt-Glaser & Newton, 2001; Christakis & Fowler, 2007; Christakis & Fowler, 2008). Given that the leading causes of death in the United States involve modifiable behavioral risk factors (Mokdad, Marks, Stroup & Gerberding, 2004) more work needs to be done to understand how relationships directly and indirectly

affect behaviors that can increase the risk for illness and death.

Work by Joe Allen and colleagues (e.g. Allen, Weissberg, & Hawkins, 1989; Allen, Porter & McFarland, Marsh, & McElhaney, 2005) has demonstrated that adolescents are strongly influenced by the values of their peer group and are especially vulnerable to engage in risky and deviant behaviors when those behaviors are perceived to be endorsed by their friends. Similar processes are likely at work with young adults especially when they are in new social situations that demand the development of trusted friendships and supportive social networks. Although this is the first study of its kind to directly examine changes in weight related behavior in a dyadic context some tentative conclusions can be made about when and how behavior might be expected to change for young adults transitioning from the comfort and safety of the parent's home. This study demonstrates that students may be highly motivated to monitor their intake of unhealthy food items such as high fat snacks and sweets to convey a positive impression to their new friends on campus. Students also may be directly influenced by the leisure activities of their roommate which often involve sedentary screen time possibly as a means for developing a closer relationship and as a process for discovering each others preferences and values. As young adults begin to believe they understand what is important and valued by their friends, these perceptions may indirectly motivate students to change their behavior in the direction that would validate their friend's values. It can be depressing to realize that motivating the self to engage in a health behavior change is a difficult process that can run out of steam when self-regulation fails. Yet humans are strongly motivated by needs larger than the self (Baumeister & Leary, 1995) and it is likely that we are subtly nudged by our relationship

partners day by day to engage in behaviors that would validate and support their

values. To the extent that we have surrounded ourselves with friends and family

who value healthy eating and physical activity may help us achieve a long and

healthy life.

Table 1
Correlations of RCI Influence Scale, Social Status and Individual Difference Constructs

	1	2	3	4	5	6	7	8
1. RCI strength of influence	-							
2. Family subjective SES	.03	-						
3. Self rating: subjective social status	.01	.24**	-					
4. Future self rating: expected social status	-.12	.25**	.69**	-				
5. Rating of roommate's subjective social status	.21**	.11	.42**	.28**	-			
6. Roommate's rating of student's status	.04	.13	.27**	.23**	.56**	-		
7. Extraversion	-.04	.01	.23**	.21**	.02	.03	-	
8. Conscientiousness	-.14	.01	.01	-.01	.03	-.03	.26**	-
9. Self-Esteem	-.16*	.14	.35**	.28**	.13	.02	.24**	.35**

*p <.05.   **p<.01

Table 2a
Means, Standard Deviations in Parentheses and Reliability Coefficients (Time 1 -3) for Set of Focal Variables at Each Wave of Data Collection.

Behavior	Time 1	Time 2	Time 3	alpha
Snacking After Dinner (frequency/week)	M=3.42, (2.07)	M=3.58, (1.87)	M=3.21, (1.92)	.723
Breakfast Skipping (frequency/week)	M=1.89, (1.97)	M=2.33, (2.18)	M=2.33, (2.18)	.844
Sedentary Time Composite (Minutes/week)	M=530.79, (383.01)	M=693.80, (534.98)	M=754.51, (568.26)	.843
TV Time (Minutes/week)	M=113.58, (118.9)	M=170.70, (222.76)	M=176.26, (222.53)	.692
Computer Time (Minutes/week)	M=388.05, (315.50)	M=481.44, (433.35)	M=525.85, (453.38)	.840
Video Game Playing (Minutes/week)	M=29.16, (79.26)	M=41.66, (120.84)	M=52.39, (150.71)	.653

Table 2b

Means, Standard Deviations in Parentheses and t statistics for significant of weight and BMI change from baseline to Time 3

	Weight T1	Weight T3	BMI T1	BMI T3	Weight Change	BMI Change	t stat. weight	t stat BMI
Male	159.72 (23.15)	162.01 (22.03)	22.27 (2.72)	22.59 (2.57)	2.29 (5.40)	.32 (.74)	3.28 p=.002	3.35 p=.001
Female	136.86 (27.46)	138.88 (26.74)	22.16 (4.07)	22.51 (3.95)	2.02 (4.33)	.33 (.71)	5.29 p<.001	5.30 (p<.001)

Table 3
Intraclass Correlations for the Focal Behaviors Over Three Waves of Data Collection

	Time 1		Time 2		Time 3	
Item	r	p	r	p	r	p
Sedentary composite	.08	ns	.10	ns	.21	.02
Snack after dinner	.38	<.001	.13	ns	.04	ns
Skip breakfast	.17	.04	.26	.004	.18	.04
Arbitrary Sedentary	-.10	ns	-.12	ns	-.13	ns
Arbitrary AD snack	-.07	ns	.06	ns	-.06	ns
Arbitrary Breakfast skip	-.07	ns	-.12	ns	-.13	ns

Table 4a
Intraclass Correlation Comparisons, Partner Effects and Percentage of Concordance Explained for Sedentary Behavior

Sedentary Behavior					
Comparison Group	Time 1 r	Time 2 r	Time 3 r	Partner effects	% Concordence explained
Close	.13	.09	.30*	Yes	43
Non-close	-.02	.11	.09	yes	5
Female	.09	.18	.28*	yes	25
Male	-.05	-.01	.07	yes	10
Frequently Dine	.08	.24	.32*	yes	30
Occasionally Dine	-.27	.02	.11	yes	4
Similar (S) BMI	-.08	.05	.19	yes	22
Dissimilar (D) BMI	.16	.14	.20	yes	15
MV exercise (S)	.09	.21	.25*	yes	22
MV exercise (D)	.-02	.02	.19	yes	25
High Fat Snack consumption (S)	.21	.00	.09	yes	18
High Fat Snack consumption (D)	-.17	.20	.29	yes	24
Sedentary Behavior (S)	.72**	.25*	.11	yes	15
Sedentary Behavior (D)	-.35	-.05	-.09	yes	24
Diet and Exercise Values (S)	.14	.24	.11	yes	10
Diet and Exercise Values (D)	.00	.05	.24	yes	31
Accurate in judging D & E values	.08	.01	.14	yes	14
Inaccurate in judging D & E values	.02	.25*	.31*	yes	28

*p <.05. **p<.01

Table 4b
Intraclass Correlation Comparisons for Breakfast Skipping

Breakfast Skipping					
Comparison Group	Time 1 r	Time 2 r	Time 3 r	Partner effects	% Concordance explained
Close	.19	.29*	.23	Yes @T2	21
Non-close	.18	.20	.14	no	
Female	.16	.16	.11	no	
Male	.24	.32	.32	no	
Frequently Dine	.31*	.29*	.21	no	
Occasionally Dine	.06	.20	.16	no	
Similar (S) BMI	.13	.18	.15	no	
Dissimilar (D) BMI	.23	.33*	.23	Yes @T2	28
MV exercise (S)	.17	.07	.01	no	
MV exercise (D)	.17	.41*	.44**	yes	36
High Fat Snack consumption (S)	.12	.09	.09	no	
High Fat Snack consumption (D)	.25	.42**	.28	yes	31
Sedentary Behavior (S)	.18	.31*	.18	no	
Sedentary Behavior (D)	.19	.14	.15	no	
Diet and Exercise Values (S)	.25	.17	.003	no	
Diet and Exercise Values (D)	.12	.29*	.31*	no	
Accurate in judging D & E values	.22	.42**	.30*	Yes @T2	35
Inaccurate in judging D & E values	.13	.08	.06	no	

Table 4c
Intraclass Correlation Comparisons for After Dinner Snacking

After Dinner Snacking					
Comparison Group	Time 1 r	Time 2 r	Time 3 r	Partner effects	% Concordance explained
Close	.34*	-.16	-.07	No	
Non-close	.43**	.12	.08	no	
Female	.48**	.01	.10	no	
Male	.15	-.17	-.11	No	
Frequently Dine	.35*	-.01	.13	No	
Occasionally Dine	.39**	-.02	-.09	No	
Similar (S) BMI	.31*	.06	-.14	no	
Dissimilar (D) BMI	.45**	-.08	.20	No	
MV exercise (S)	.35**	-.01	-.01	no	
MV exercise (D)	.44**	-.01	.13	yes	15
High Fat Snack consumption (S)	.54**	-.07	.14	no	
High Fat Snack consumption (D)	.20	.07	-.12	no	
Sedentary Behavior (S)	.48**	.04	.12	no	
Sedentary Behavior (D)	.22	-.07	-.11	Yes @t2	30
Diet and Exercise Values (S)	.55**	-.02	-.02	No	
Diet and Exercise Values (D)	.23	-.02	.09	No	
Accurate in judging D & E values	.36*	.08	-.07	no	
Inaccurate in judging D & E	.41*	-.23	.20	Yes	28

values					

Table 4d

Intraclass Correlations Over Time for Individual Food Items Separated by Gender.

Food Item	Females			Males		
	T1	**T2**	**T3**	**T1**	**T2**	**T3**
Salad	.51**	.40**	.35*	.39*	.16	0
Vegetables	.14	.12	.05	.28*	0	.22
Fruit	.11	0	0	0	.04	.23
Ice cream	.20*	0	.07	0	0	0
Cookies	.32**	.04	.10	.05	0	.09
Candy	.24*	.12	0	0	0	.21
Chocolate	.24*	.05	0	.14	.38*	0
Pastries	.18	.18	.17	0	.17	.07
Fries	.28*	0	.04	0	.19	.14
Popcorn	.15	.08	.07	0	.44**	0
Chips	.16	0	0	0	.10	.29*
Pretzels	.03	.11	.07	0	.31*	.05
Juice	0	.17	.09	0	0	.34*
soda	0	0	0	0	0	0

Table 5

Estimates and Critical Ratios for High and Low Power Roommates' Sedentary Time

Sedentary Time			
Effect	Estimate: Low IP Roommate	Estimate: High IP Roommate	Critical Ratio
Means			
Intercept	523.33**	535.18**	.22
Slope	277.78**	179.98**	1.52
Correlations			
Intercept-Intercept	.20		
Slope-Slope	.04		
Within intercept-slope	.51	.34	.60
Between intercept-slope	-.37	.47	2.73**

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

Table 6

Estimates and Critical Ratios for Close and Non Close Roommates' Weekly After Dinner Snacking Frequency

After Dinner Snacking			
Effect	Estimate: Close Roommates	Estimate: Non Close Roommates	Critical Ratio
Means			
Intercept	3.47**	3.45**	.05
Slope	.19	-.41	1.76
Correlations			
Intercept-Intercept	.54	.59*	.04
Slope-Slope	.72	.55	.82
Within intercept-slope	-.59	-.52*	.51
Between intercept-slope	-.76*	-.54*	.19

Table 7

Estimates and Critical Ratios for Males' and Females' Weekly Breakfast Skipping

Breakfast Skipping			
Effect	Estimate: Males	Estimate: Females	Critical Ratio
Means			
Intercept	1.97**	1.86**	.34
Slope	.83**	.27	1.71
Correlations			
Intercept-Intercept	.29	.16	.10
Slope-Slope	.56	-.48*	2.56**
Within intercept-slope	-.03	-.29*	1.18
Between intercept-slope	-.08	.17	1.02

Figure 1

Longitudinal APIM Model
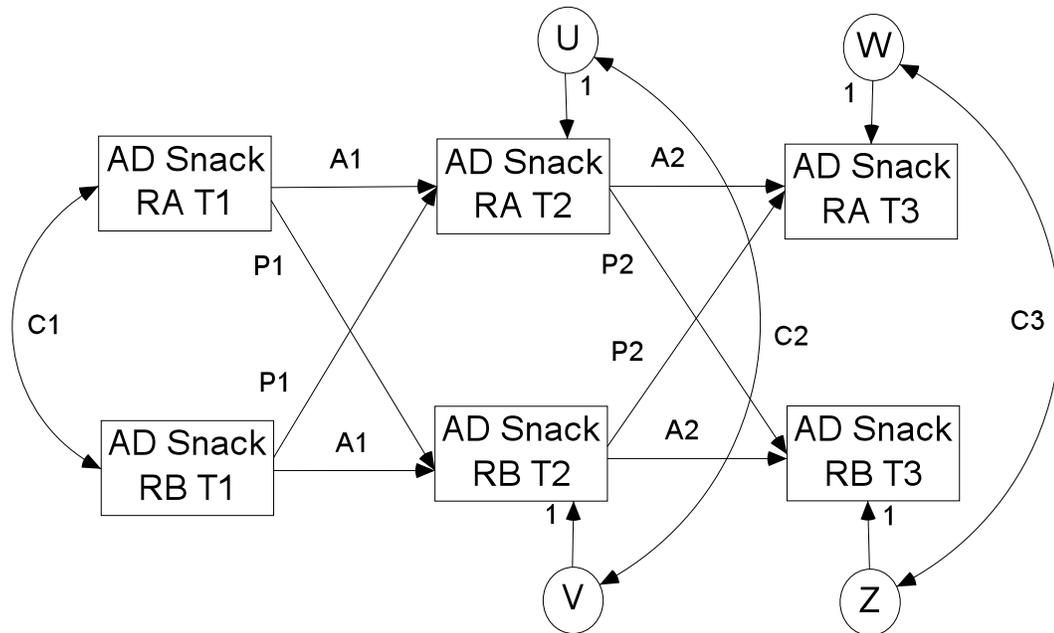
Figure 1. Longitudinal actor-partner interdependence model of eating behavior for dyads distinguished by differences in subjective social status. Actor effects are represented by *a1* and *a2* for the roommates at times 2 and 3. These paths represent the initial stability (a1) and subsequent stability (a2) of eating behavior over time. Partner effects are represented by *p1* and *p2* and represent the degree of influence a student's behavior has on his or her partner at a later point in time. C1 represents the degree of similarity at baseline. U and V are the residual variances in eating behavior at time 2. W and Z are the residual variance for eating behavior at time 3. c2 is time 2 residual similarity and c3 is time 3 residual similarity. C2 and c3 represents the remaining shared nonindependence that is not explained by actor and partner effects.

Figure 2

M1, V1
Sqrtsedentary_T1.1

M2, V2
Sqrtsedentary_T2.1

M3, V3
Sqrtsedentary_T3.1

M1, V1
Sqrtsedentary_T1.2

M2, V2
Sqrtsedentary_T2.2

M3, V3
Sqrtsedentary_T3.2
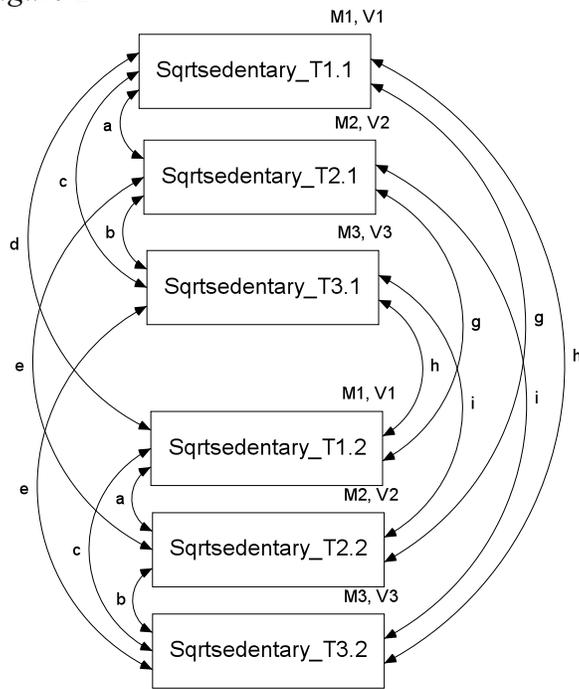
The Saturated Model for Indistinguishable Dyads

Figure 3
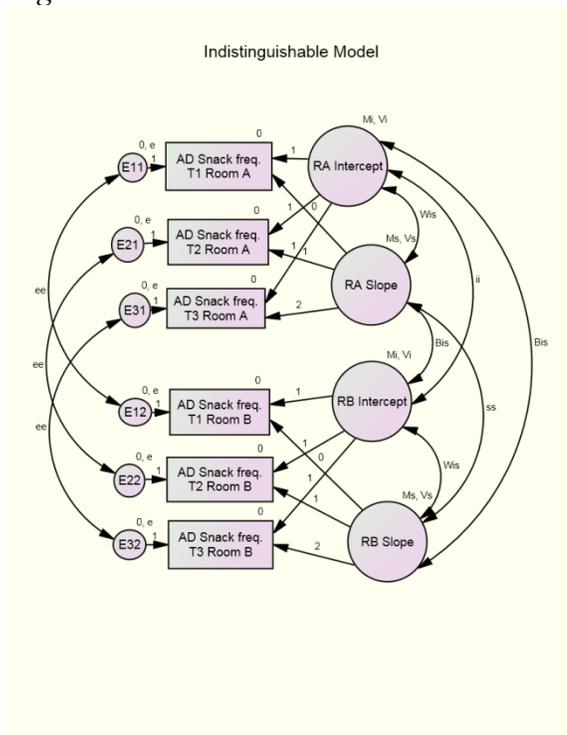
Figure 3 depicts the basic growth curve model for indistinguishable dyads.

Figure 4

Breakfast Consumption
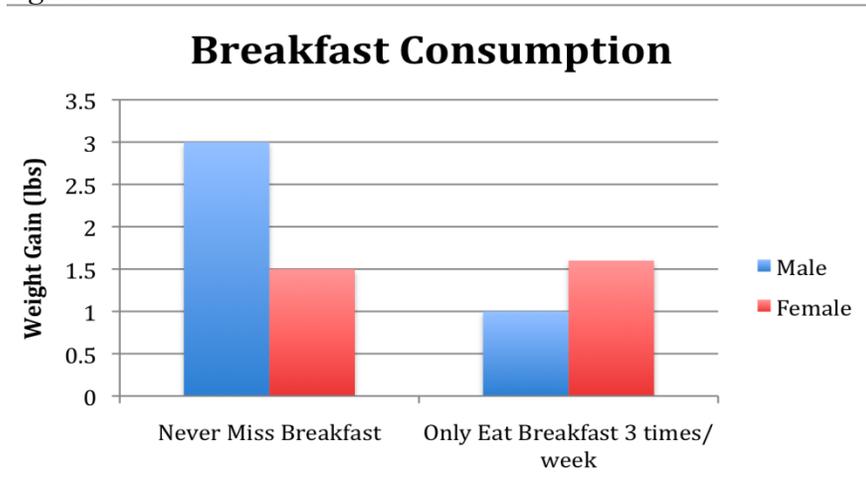
Gender Moderation of Weight Change by High and Low Breakfast Consumption
Low Breakfast Consumption @ 1SD below mean, approx. 3 times/week
High Breakfast Consumption @ 1SD above mean, 7 times/week

Figure 5 a
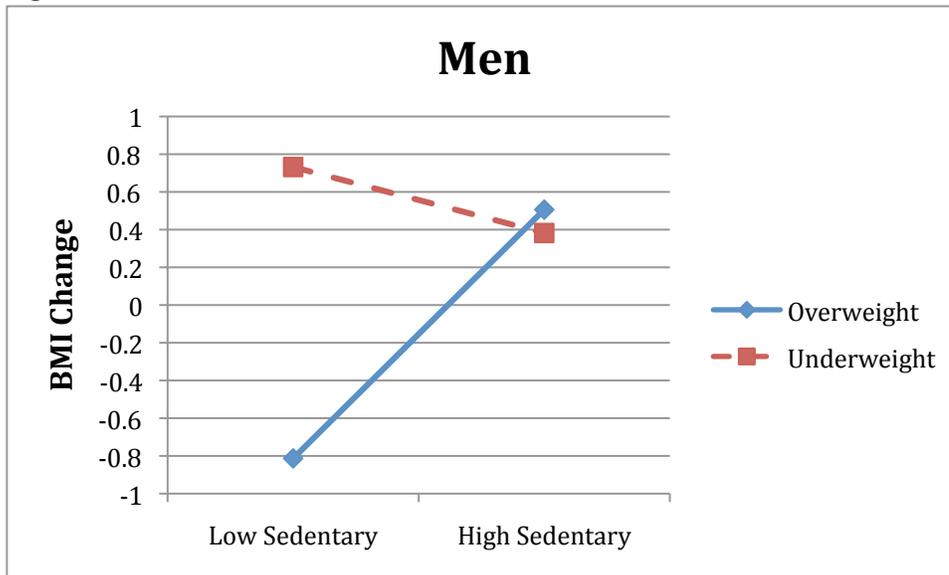
Men

Gender Moderation of BMI Change by High and Low Sedentary Time
Low sedentary time @ 1SD below mean, approx. 175 minutes/week
High sedentary time @ 1SD above mean, approx. 1,161 minutes/week

Figure 5b
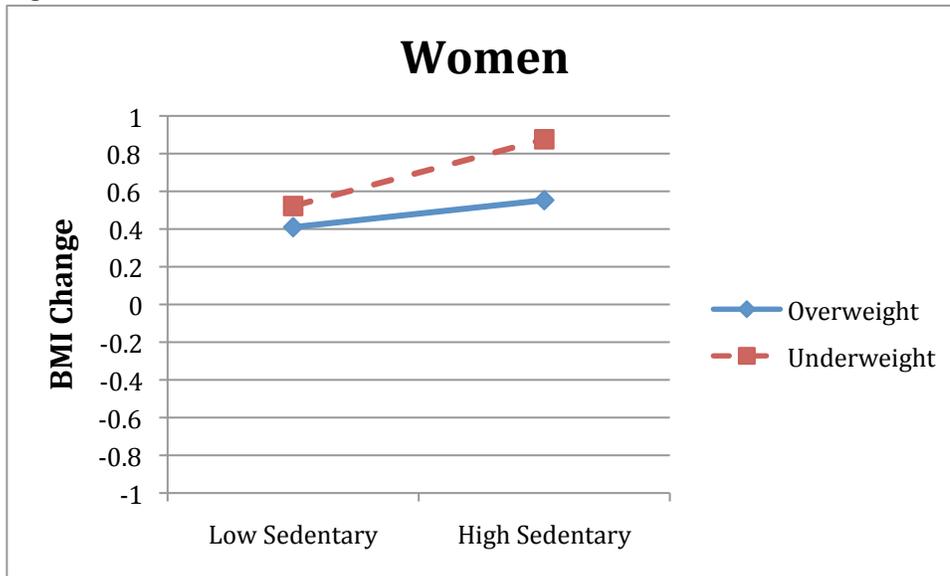
Gender Moderation of BMI Change by High and Low Sedentary Time
Low sedentary time @ 1SD below mean, approx. 175 minutes/week
High sedentary time @ 1SD above mean, approx. 1,161 minutes/week

Figure 6

Basic Sedentary APIM Model
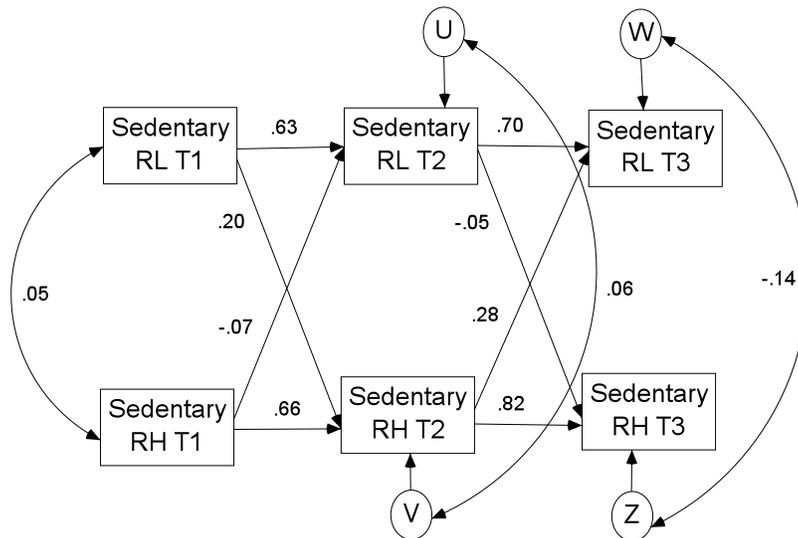
Sedentary longitudinal APIM for dyads distinguished by interpersonal power. RL= low power roommate, RH = high power roommate. U ,V & W,Z = residual variance in roommates' sedentary behavior at Times 2 and 3. The low IP partner effect at T1 and the high IP partner effect at T2 are significant at *p*<.01.

Figure 7

Basic Snack APIM Model
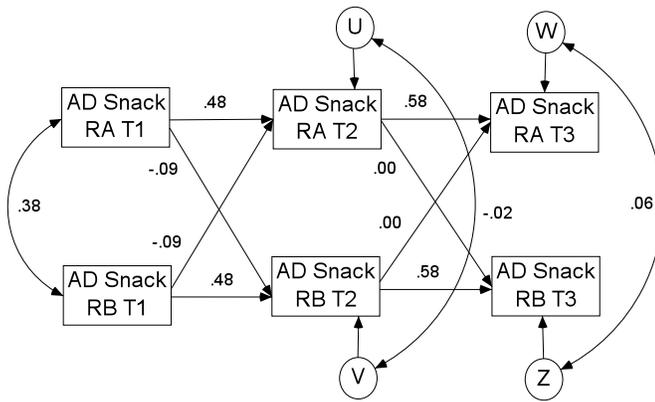
After dinner snacking frequency longitudinal APIM for indistinguishable dyads.

Figure 8

Basic Bskip APIM Model
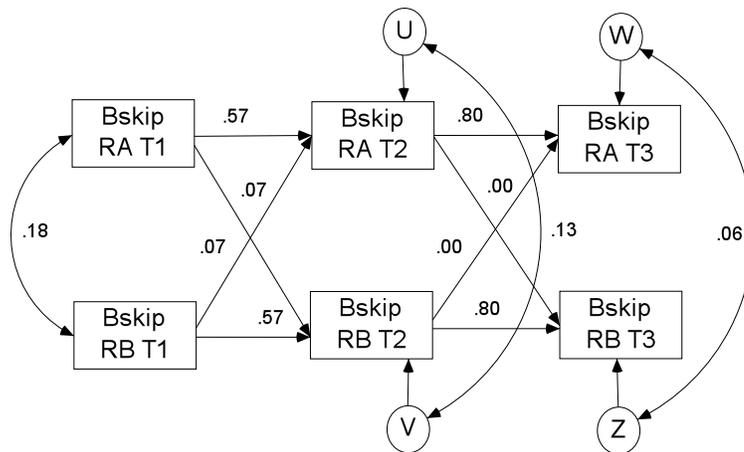
Breakfast skipping frequency longitudinal APIM for indistinguishable dyads.

Figure 9

Close Roommates
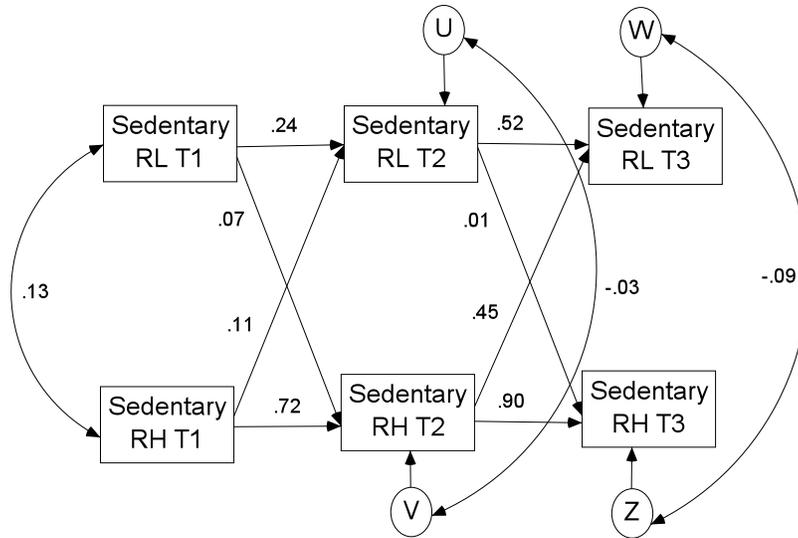
Sedentary model for close roommates. The partner effect for high IP roommates at Time 2 is significant at *p*<.001.

Figure 10

Women
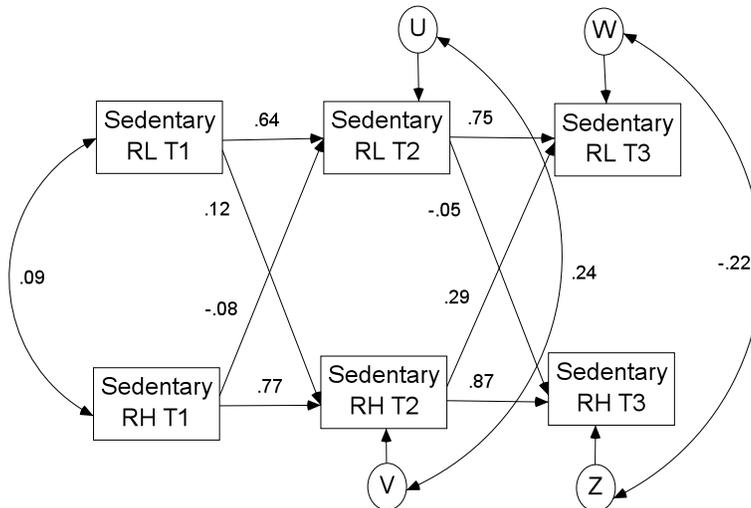
Sedentary model for female roommates. The partner effect for high IP roommates at Time 2 is significant at *p*<.001.

Figure 11

Frequently Dine Together
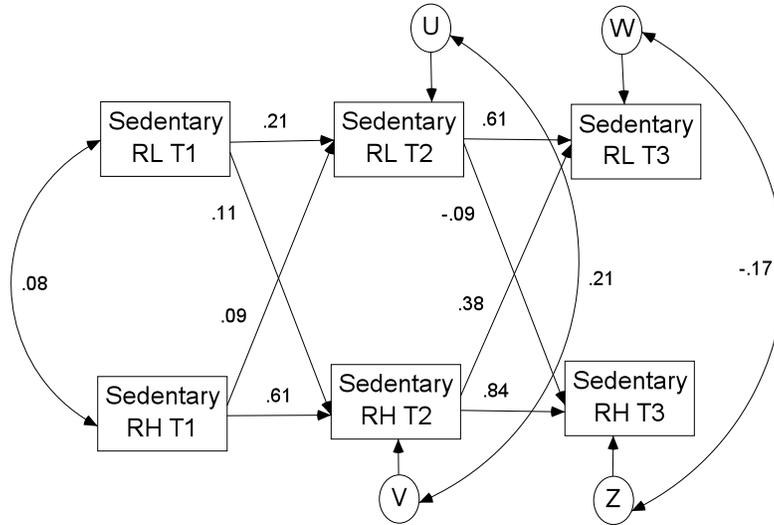
Sedentary model for roommates who frequent dine together. The partner effect for high IP roommates at Time 2 is significant at $p<.001$.

Figure 12

Inaccurate Roommates
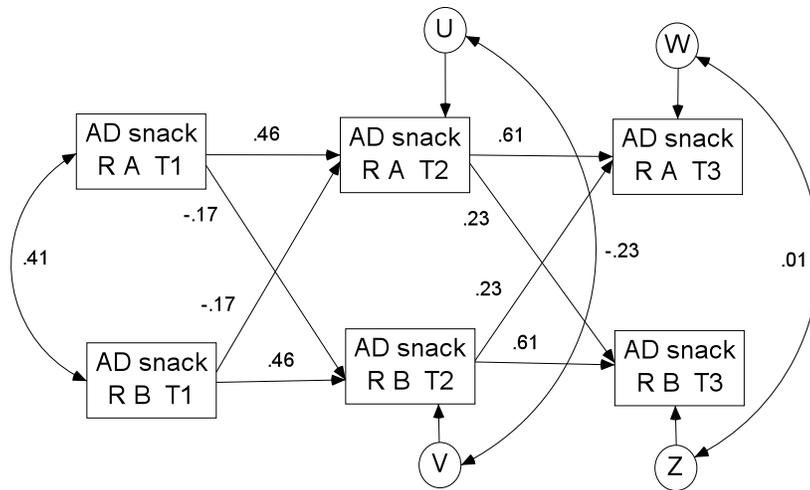
After dinner snacking model for roommates who inaccurately perceive each others diet and exercise values. The partner effect for high IP roommates at Time 2 is significant at $p<.01$.

Figure 13
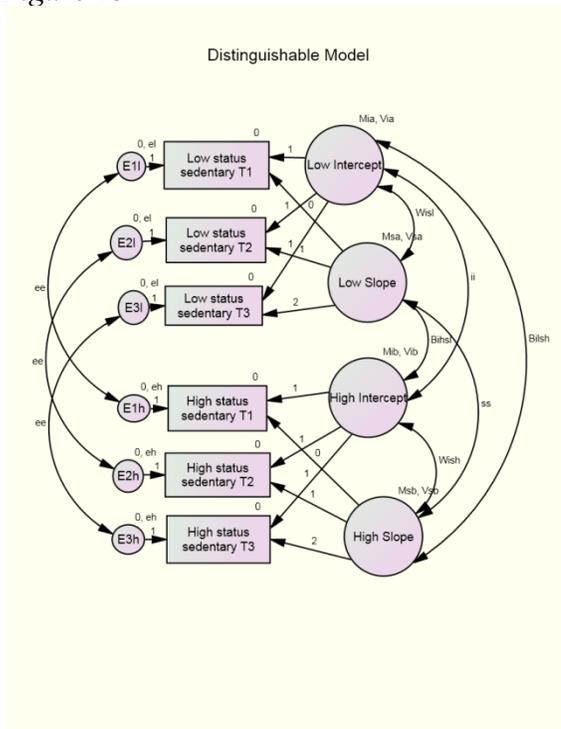
Basic Dyadic Growth Model for Distinguishable Dyads

Figure 14
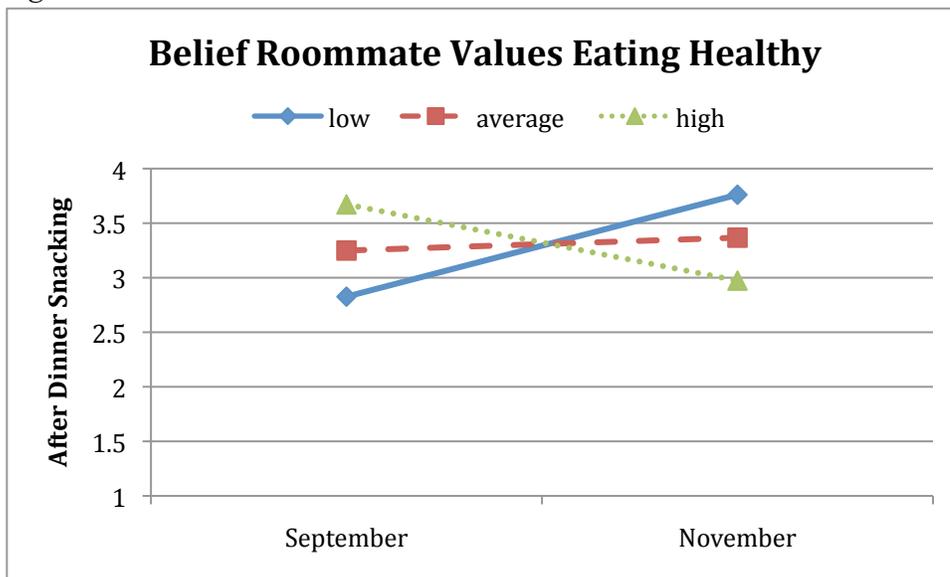
Student's perceptions of their roommate's values about eating healthy predicts change in his or her own after dinner snacking frequency. The figure depicts values that were assessed at Time 1. Lines represent low, average and high levels of a student's belief about how much his or her roommate values eating healthy everyday. Low and high levels are 1SD above and below the mean.

Figure 15a


Believe Roommate Values Exercise

Change in after dinner snacking frequency when perceptions of roommate's value of exercise is high (1 SD above mean). Estimates of roommates' exercise value were assessed at Time 2. Plot lines depict the change in a student's after dinner snacking for those whose own attitude about regular moderate exercise was either high (1 SD above the mean) or low (1 SD below the mean).

Figure 15b


Believe Roommate Does Not Value Exercise

Change in after dinner snacking frequency when perceptions of roommate's value of exercise is low (1 SD below mean). Estimates of roommates' exercise value were assessed at Time 2. Plot lines depict the change in a student's after dinner snacking for those whose own attitude about regular moderate exercise was either high (1 SD above the mean) or low (1 SD below the mean).

Figure 16

## Belief Roommate Values Eating Healthy

Student's perceptions of their roommate's attitude about eating healthy predicts change in his or her own breakfast skipping. Lines represent low, average and high levels of a student's belief about how much his or her roommate values eating healthy everyday. Low and high levels are 1SD above and below the mean.

Figure 17a


Belief Roommate Does Not Value Exercise

Change in breakfast skipping when perceptions of roommate's value of exercise is low (1 SD below mean). Estimates of roommates' exercise value were assessed at Time 2. Plot lines depict the change in a student's breakfast skipping for those whose own attitude about regular moderate exercise was either high (1 SD above the mean) or low (1 SD below the mean).

Belief Roommate Values Exercise
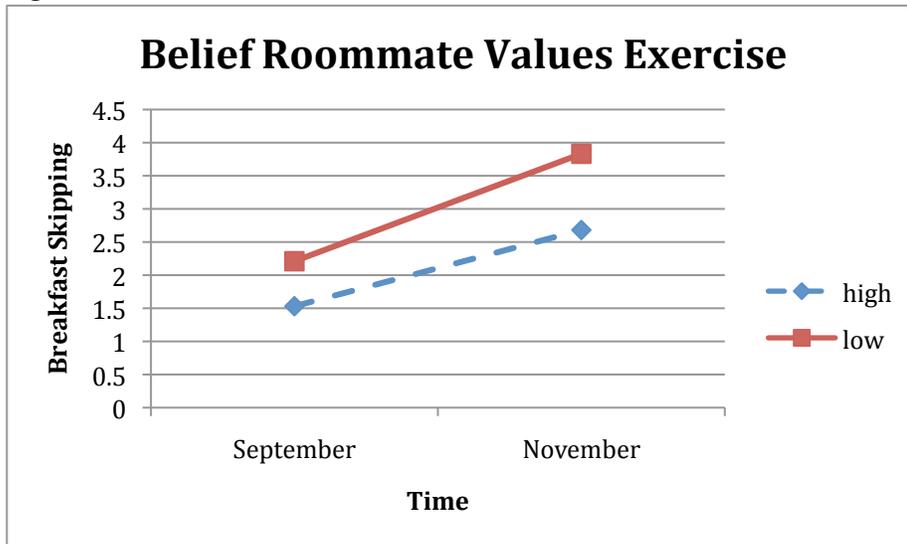
Change in breakfast skipping when perceptions of roommate's value of exercise is high (1 SD above mean). Estimates of roommates' exercise value were assessed at Time 2. Plot lines depict the change in a student's breakfast skipping for those whose own attitude about regular moderate exercise was either high (1 SD above the mean) or low (1 SD below the mean).

Figure 18

Low Power Roommate's Moderate Exercise at Time 1

Low power roommates' reported weekly moderate exercise minutes predict change in the high power roommates' sedentary behavior time. Estimates of the low IP roommates' moderate exercise time were assessed at Time 1. Plot lines depict the change in the high IP students' sedentary time depending on whether his or her roommate exercised for a low amount of time (1 SD below the mean), and average amount of time or for a high amount of time(1 SD above the mean).

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Appendices

Appendix A
Sedentary behavior, evening snacking and breakfast skipping evaluation
Sedentary items and breakfast skipping adapted From National Longitudinal Study of Adolescent Health
(Niemeier et al., 2006)
Snacking items adapted from (Levitsky, Halbmaier & Mrdjenovic, 2004)

_____

1. During the last seven days, how much total time would you estimate that you spent watching TV?

_____Hours   _____Minutes

2. During the last seven days, how much total time would you estimate that you spent playing video games (such as PlayStation, Xbox or Wii)?

_____Hours   _____Minutes

3. During the last seven days, how much total time would you estimate that you spent on the computer that was not related to school work?

_____Hours   _____Minutes

4. How often in the last week did you and your roommate watch TV or play video games together? *Check ONE box*.

0 □ Never   4 □ 4 times last week

1 □ 1 time last week   5 □ 5 times last week

2 □ 2 times last week   6 □ 6 times last week

3 □ 3 times last week   7 □ every day last week

5. Over the last week, how many times did you eat a snack after dinner? *Check ONE box*.

0 □ Never   **GO TO QUESTION 11**

1 □ 1 time last week   5 □ 5 times last week

2 □ 2 times last week   6 □ 6 times last week

3 □ 3 times last week   7 □ every day last week

4 □ 4 times last week

6. What was the average size of your after dinner snack? Use the examples below as a guide.

1 □ light =from just a taste to ½ serving, (e.g.½ apple, 1 small cookie)
2 □ moderate =about a normal serving (e.g.1-2 cups of chips, 1 regular candy bar)

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3 □ large =more than one serving (e.g. large order of fries, more than two scoops of ice cream).

7. What would you usually snack on after dinner?

_____

8. Average number of people with whom you ate post-dinner snack? _____

9. Where do you typically have an after dinner snack?

_____

10.How often in the last week did you and your roommate snack after dinner together?

0 □ Never	4 □ 4 times last week
1 □ 1 time last week	5 □ 5 times last week
2 □ 2 times last week	6 □ 6 times last week
3 □ 3 times last week	7 □ every day last week

11. Over the last week, how many times did you skip breakfast? *Check ONE box*.

0 □ Never	4 □ 4 times last week
1 □ 1 time last week	5 □ 5 times last week
2 □ 2 times last week	6 □ 6 times last week
3 □ 3 times last week	7 □ every day last week **GO TO QUESTION 17**

12. Over the last week, what was the average size of your breakfast?

1 □ light
2 □ moderate
3 □ large
4 □ did not eat

13. In the past week what did you usually eat for breakfast?

_____

14. In the past week what was the average number of people with whom you ate breakfast? _____

15. In the past week where did you typically have your breakfast?

_____

16. How often in the last week did you and your roommate eat breakfast together? *Check ONE box*.

0 ☐ Never   4 ☐ 4 times last week

1 ☐ 1 time last week   5 ☐ 5 times last week

2 ☐ 2 times last week   6 ☐ 6 times last week

3 ☐ 3 times last week   7 ☐ every day last week

17. How often in the last week did you and your roommate eat lunch together? *Check ONE box*.

0 ☐ Never   4 ☐ 4 times last week

1 ☐ 1 time last week   5 ☐ 5 times last week

2 ☐ 2 times last week   6 ☐ 6 times last week

3 ☐ 3 times last week   7 ☐ every day last week

18. How often in the last week did you and your roommate eat dinner together? *Check ONE box*.

0 ☐ Never   4 ☐ 4 times last week

1 ☐ 1 time last week   5 ☐ 5 times last week

2 ☐ 2 times last week   6 ☐ 6 times last week

3 ☐ 3 times last week   7 ☐ every day last week

Appendix B
Food Habits Questionnaire

Adapted from an instrument designed to target consumption of foods known to be associated with weight gain (French, Harnack, Toomey & Hannan, 2007).

Items measure average weekly consumption of sugar sweetened beverages, energy dense snacks, fruits and vegetables and fast food.

Instructions: Please answer the questions below about your food habits during the past week.

1. Over the last week, how many times did you drink **100% juice** such as orange, apple, grape, or grapefruit juice? **Do not count** fruit drinks like Kool-Aid, Fruitopia, lemonade, Hi-C, or cranberry juice drink. Include juice you drank at all mealtimes and between meals. *Check ONE box*.

0 □ **Never GO TO QUESTION 3**
1 □ 1-2 times per week   5 □ 2-3 times per day
2 □ 3-4 times per week   6 □ 4-5 times per day
3 □ 5-6 times per week   7 □ 6 or more times per day
4 □ 1 time per day

2. Each time you drank **100% juice**, how much did you usually drink? *Check ONE box*.

1 □ Less than 3/4 cup **(less than 6 ounces)**
2 □ 3/4 to 1 1/4 cup **(6 to 10 ounces)**
3 □ 1 1/4 to 2 cups **(10 to 16 ounces)**
4 □ More than 2 cups **(more than 16 ounces)**

3. Over the last week, how many times did you eat **fruit**? Count any kind of fruit, fresh, canned, and frozen. **Do not count** juices. Include fruit you ate at all meal times and for snacks. *Check ONE box*.

0 □ **Never GO TO QUESTION 5**
1 □ 1-2 times per week   5 □ 2-3 times per day
2 □ 3-4 times per week   6 □ 4-5 times per day
3 □ 5-6 times per week   7 □ 6 or more times per day
4 □ 1 time per day

4. Each time you ate **fruit**, how much did you usually eat? *Check ONE box*.

1 □ Less than 1 medium fruit
2 □ 1 medium fruit
3 □ 2 medium fruit
4 □ More than 2 medium fruit 36

5. Over the last week, how many times did you eat **lettuce salad (with or without other**

vegetables)? *Check ONE box*.

0 ▢ **Never GO TO QUESTION 7**
1 ▢ 1-2 times per week   5 ▢ 2-3 times per day
2 ▢ 3-4 times per week   6 ▢ 4-5 times per day
3 ▢ 5-6 times per week   7 ▢ 6 or more times per day
4 ▢ 1 time per day

6. Each time you ate **lettuce salad**, how much did you usually eat? *Check ONE box.*
1 ▢ About # cup

2 ▢ About 1 cup

3 ▢ About 2 cups

4 ▢ More than 2 cups

7. Over the last week, how many times did you eat **French fries** or **fried potatoes**? *Check ONE box*.

0 ▢ **Never GO TO QUESTION 9**
1 ▢ 1-2 times per week   5 ▢ 2-3 times per day
2 ▢ 3-4 times per week   6 ▢ 4-5 times per day
3 ▢ 5-6 times per week   7 ▢ 6 or more times per day
4 ▢ 1 time per day

8. Each time you ate **French fries** or **fried potatoes**, how much did you usually eat? *Check ONE box*.

1 ▢ Small order or less **(About 1 cup or less)**

2 ▢ Medium order **(About 1 1/2 cups)**

3 ▢ Large order **(About 2 cups)**

4 ▢ Super size or more **(About 3 cups or more)**

9. Over the last week, how many times did you eat **other vegetables**? **Do not count** lettuce salads, white potatoes, cooked dried beans, vegetables in mixtures such as sandwiches, omelettes, casseroles. **Do count** all other vegetables raw, cooked or frozen. *Check ONE box*.

0 ▢ **Never GO TO QUESTION 11**
1 ▢ 1-2 times per week   5 ▢ 2-3 times per day
2 ▢ 3-4 times per week   6 ▢ 4-5 times per day
3 ▢ 5-6 times per week   7 ▢ 6 or more times per day
4 ▢ 1 time per day

10. Each of these times that you ate **other vegetables**, how much did you usually eat? *Check ONE box*.

1 □ Less than # cup

2 □ 1/2 to 1 cup

3 □ 1 to 2 cups

4 □ More than 2 cups

11. Over the last week, how many times did you drink **fruit drinks** (such as cranberry cocktail, Hi-C, lemonade, or Kool-Aid, **Do Not Count Diet or Soft Drinks or 100% fruit juice**)? Check *ONE box*.

0 □ **Never GO TO QUESTION 13**

1 □ 1-2 times per week	5 □ 2-3 times per day
2 □ 3-4 times per week	6 □ 4-5 times per day
3 □ 5-6 times per week	7 □ 6 or more times per day
4 □ 1 time per day	

12. Each time you drank regular, **non-diet fruit drinks**, how much did you usually drink? *Check ONE box*.

1 □ Less than 12 ounces (less than 1 can)

2 □ 12-20 ounces (1 can to one bottle)

3 □ More than 20 ounces (more than one bottle)

13. Over the last week, how many times did you drink **regular, non-diet soft drinks, soda, or pop**? *Check ONE box*.

0 □ **Never GO TO QUESTION 15**

1 □ 1-2 times per week	5 □ 2-3 times per day
2 □ 3-4 times per week	6 □ 4-5 times per day
3 □ 5-6 times per week	7 □ 6 or more times per day
4 □ 1 time per day	

14. Each time you drank **regular (not diet) soft drinks, soda, or pop**, how much did you usually drink? *Check ONE box*.

1 □ Less than 12 ounces (less than 1 can)

2 □ 12 to 20 ounces (1 can to one bottle)

3 □ More than 20 ounces (more than 1 bottle)

15. Over the last week, how many times did you eat **potato chips**, **tortilla chips**, or **corn chips** (including low-fat or fat free)? *Check ONE box*.

0 □ **Never GO TO QUESTION 18**

1 □ 1-2 times per week	5 □ 2-3 times per day
2 □ 3-4 times per week	6 □ 4-5 times per day

3 □ 5-6 times per week 7 □ 6 or more times per day
4 □ 1 time per day

16. Each time you ate **potato chips**, **tortilla chips**, or **corn chips**, how much did you usually eat? *Check ONE box*.

1 □ Fewer than 10 chips (less than 1 cup)

2 □ 10 to 25 chips (1 to 2 cups)

3 □ More than 25 chips (more than 2 cups)

17. How often were the chips you ate **low-fat** or **fat-free chips**? *Check ONE box*.

1 □ Almost never or never

2 □ About 1/4 of the time

3 □ About 1/2 of the time

4 □ About 3/4 of the time

5 □ Almost always or always

18. Over the last week, how many times did you did you eat **popcorn** (including low-fat or fat-free)? *Check ONE box.*

0 □ **Never GO TO QUESTION 21**
1 □ 1-2 times per week 5 □ 2-3 times per day
2 □ 3-4 times per week 6 □ 4-5 times per day
3 □ 5-6 times per week 7 □ 6 or more times per day
4 □ 1 time per day

19. Each time you ate **popcorn**, how much did you usually eat? *Check ONE box*.

1 □ Less than 2 cups, popped

2 □ 2 to 5 cups, popped

3 □ More than 5 cups, popped

20. How often was the popcorn you ate **low-fat** or **fat-free**? *Check ONE box*.

1 □ Almost never or never

2 □ About 1/4 of the time

3 □ About 1/2 of the time

4 □ About 3/4 of the time

5 □ Almost always or always

21. Over the last week, how many times did you eat **pretzels**? *Check ONE box*.

0 ☐ **Never GO TO QUESTION 23**
1 ☐ 1-2 times per week   5 ☐ 2-3 times per day
2 ☐ 3-4 times per week   6 ☐ 4-5 times per day
3 ☐ 5-6 times per week   7 ☐ 6 or more times per day
4 ☐ 1 time per day

22. Each time you ate **pretzels**, how many did you usually eat? *Check ONE box*.

1 ☐ Fewer than 5 average twists

2 ☐ 5 to 20 average twists

3 ☐ More than 20 average twists

23. Over the last week, how many times did you eat **ice cream**, **ice cream bars**, or **sherbet** (including lowfat or fat-free)? *Check ONE box*.

0 ☐ **Never GO TO QUESTION 26**
1 ☐ 1-2 times per week   5 ☐ 2-3 times per day
2 ☐ 3-4 times per week   6 ☐ 4-5 times per day
3 ☐ 5-6 times per week   7 ☐ 6 or more times per day
4 ☐ 1 time per day

24. Each time you ate **ice cream**, **ice cream bars**, or **sherbet**, how much did you usually eat? *Check ONE box*.

1 ☐ Less than 1/2 cup (less than 1 scoop)

2 ☐ 1/2 to 1 1/2 cups (1 to 2 scoops)

3 ☐ More than 1 1/2 cups (more than 2 scoops)

25. How often was the ice cream you ate **light**, **low-fat**, or **fat-free ice cream** or **sherbet**? *Check ONE box*.

1 ☐ Almost never or never

2 ☐ About 1/4 of the time

3 ☐ About 1/2 of the time

4 ☐ About 3/4 of the time

5 ☐ Almost always or always

26. Over the last week, how many times did you eat **cookies** or **brownies** (including low-fat or fat-free)? *Check ONE box.*

0 ☐ **Never GO TO QUESTION 29**
1 ☐ 1-2 times per week   5 ☐ 2-3 times per day
2 ☐ 3-4 times per week   6 ☐ 4-5 times per day
3 ☐ 5-6 times per week   7 ☐ 6 or more times per day

4 □ 1 time per day

27. Each time you ate **cookies** or **brownies**, how much did you usually eat? ***Check ONE box***.

1 □ Less than 2 cookies or 1 small brownie

2 □ 2 to 4 cookies or 1 medium brownie

3 □ More than 4 cookies or 1 large brownie

28. How often were the cookies or brownies you ate **light**, **low-fat**, **or fat-free cookies** or **brownies**? ***Check ONE box.***

1 □ Almost never or never

2 □ About 1/4 of the time

3 □ About 1/2 of the time

4 □ About 3/4 of the time

5 □ Almost always or always

29. Over the last week, how many times did you eat **doughnuts**, **sweet rolls**, **Danish**, or **Pop-tarts**? ***Check ONE box.***

0 □ **Never GO TO QUESTION 31**

1 □ 1-2 times per week   5 □ 2-3 times per day
2 □ 3-4 times per week   6 □ 4-5 times per day
3 □ 5-6 times per week   7 □ 6 or more times per day
4 □ 1 time per day

30. Each time you ate **doughnuts**, **sweet rolls**, **Danish**, or **Pop-tarts**, how much did you usually eat? ***Check ONE box***.

1 □ Less than 1 piece

2 □ 1 to 2 pieces

3 □ More than 2 pieces

31. Over the last week, how many times did you eat **sweet muffins** or **dessert breads** (including low-fat or fat-free)? ***Check ONE box***.

0 □ **Never GO TO QUESTION 33**

1 □ 1-2 times per week   5 □ 2-3 times per day
2 □ 3-4 times per week   6 □ 4-5 times per day
3 □ 5-6 times per week   7 □ 6 or more times per day
4 □ 1 time per day

32. Each time you ate **sweet muffins** or **dessert breads**, how much did you usually eat?

Check ONE box.

1 ☐ Less than 1 medium piece

2 ☐ 1 medium piece

3 ☐ More than 1 medium piece

33. Over the last week, how many times did you eat **chocolate candy**? *Check ONE box*.

0☐ **Never GO TO QUESTION 35**
1 ☐ 1-2 times per week   5 ☐ 2-3 times per day
2 ☐ 3-4 times per week   6 ☐ 4-5 times per day
3 ☐ 5-6 times per week   7 ☐ 6 or more times per day
4 ☐ 1 time per day

34. Each time you ate **chocolate candy**, how much did you usually eat? *Check ONE box*.

1 ☐ Less than 1 average bar (less than 1 ounce)

2 ☐ 1 average bar (1 to 2 ounces)

3 ☐ More than 1 average bar (more than 2 ounces)

35. Over the last week, how many times did you eat **other candy**? *Check ONE box*.

0 ☐ **Never GO TO QUESTION 37**
1 ☐ 1-2 times per week   5 ☐ 2-3 times per day
2 ☐ 3-4 times per week   6 ☐ 4-5 times per day
3 ☐ 5-6 times per week   7 ☐ 6 or more times per day
4 ☐ 1 time per day

36. Each time you ate **other candy**, how much did you usually eat? *Check ONE box*.

1 ☐ Fewer than 2 pieces

2 ☐ 2 to 9 pieces

3 ☐ More than 9 pieces

37. Over the last week, how many times did you eat breakfast, lunch, or dinner at places such as McDonald's, Burger King, Wendy's, Arby's, Pizza Hut or Kentucky Fried Chicken? *Check ONE box*.

1 ☐ 1-2 times per week   5 ☐ 2-3 times per day
2 ☐ 3-4 times per week   6 ☐ 4-5 times per day
3 ☐ 5-6 times per week   7 ☐ 6 or more times per day
4 ☐ 1 time per day

Scoring this measure
Frequency items are recalculated as follows:

  0 = "0=Never"
  1.5 = "1.5 times/wk" (1-2 times/week)
  3.5 = "3.5 times/wk" (3-4 times/week)
  5.5 = "5.5 times/wk" (5-6 times/week)
  7 = "7 times/wk"   (once a day)
  17.5 = "17.5 times/wk" (2-3 times/day)
  31.5 = "31.5 times/wk" (4-5 times/day)
  42 = "42+ times/wk"   (6 or more times/day)

Serving size responses are coded as follows:

1: serving x 0.5
2: serving x 1.0
3: serving x 2.0
4: serving x 2.5

Each item is multiplied by the serving size response to get a value for servings per week.

Appendix C

Physical Exercise

Items from: International physical activity questionnaire Craig et al. (2003).

Think about all the vigorous activities which take hard physical effort that you did in the last 7 days. Vigorous activities make you breathe much harder than normal and may include heavy lifting, digging, aerobics, or fast bicycling. Think only about those physical activities that you did for at least 10 minutes at a time.

1. During the last 7 days, on how many days did you do vigorous physical activities?
 _____ Days per week

2. How much time did you usually spend doing vigorous physical activities on one of those days?

 __ __ Hours per day
__ __ __ Minutes per day

Now think about activities which take moderate physical effort that you did in the last 7 days. Moderate physical activities make you breathe somewhat harder than normal and may include carrying light loads, bicycling at a regular pace, or doubles tennis. Do not include walking. Again, think about only those physical activities that you did for at least 10 minutes at a time.

3. During the last 7 days, on how many days did you do moderate physical activities?
 _____ Days per week

4. How much time did you usually spend doing moderate physical activities on one of those days?
 __ __ Hours per day
 __ __ __ Minutes per day

Now think about the time you spent walking in the last 7 days. This includes at work and at school, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

5. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?
_____ Days per week

6. How much time did you usually spend walking on one of those days?
 __ __ Hours per day
 __ __ __ Minutes per day

Relationship Closeness Inventory

Adapted for roommates from (Berscheid, Snyder & Omoto, 1989)

As part of this study, we would like you to answer the following questions about your relationship with your roommate.

1. How long have you known your roommate? Please indicate the number of years and/or months (for example, 3 years, 8 months).
   _____ years _____ months

   We would like you to estimate the amount of time you typically spend alone with your roommate during the day. We would like you to make these estimates by breaking the day into morning, afternoon, and evening. Think back over the past week and write in the average amount of time, per day, that you spent alone with your roommate, with no one else around, during each time period. If you did not spend time with your roommate in some time periods, write 0 hours, 0 minutes

2. DURING THE PAST WEEK, what is the average amount of time per day, that you spent alone with your roommate in the MORNING (e.g between the time you wake and 12 noon)?
   _____ hours _____ minutes
3. DURING THE PAST WEEK, what is the average amount of time, per day, that you spent alone with your roommate in the AFTERNOON (e.g. between 12 noon and 6 pm)?
   _____ hours _____ minutes
4. DURING THE PAST WEEK, what is the average amount of time, per day, that you spent alone with your roommate in the EVENING (e.g. between 6 pm and bedtime)?
   _____ hours _____ minutes

   Compared with the "normal" amount of time you usually spend alone with your roommate, how typical was the past week? (Check one)
   _____ typical _____ not typical   if so, why? (please explain)

   The following is a list of different activities that people may engage in over the course of one week. For each of the activities listed, please check all of those that you have engaged in alone with your roommate in the past week. Check only those activities that were done alone with your roommate and not done with your roommate in the presence of others.

   In the past week, I did the following activities along with my roommate: (Check all that apply)

   _____ Did laundry
   _____ Prepared a meal
   _____ Watched TV

_____ Attended a non-class lecture or presentation
_____ Went to a restaurant
_____ Went to a grocery store
_____ Went for a walk/drive
_____ Discussed things of personal nature
_____ Went to a museum/art show
_____ Planned a party/social event
_____ Attended class
_____ Went on a trip (e.g. vacation or weekend)
_____ Cleaned house/apartment
_____ Went to church/religious function
_____ Worked on homework
_____ Discussed things of a non-personal nature
_____ Went to a clothing store
_____ Talked on the phone
_____ Went to a movie
_____ Ate a meal
_____ Participated in a sporting activity
_____ Outdoor recreation (e.g sailing)
_____ Went to a play
_____ Went to a bar
_____ Visited family
_____ Visited friends
_____ Went to a department, book, hardware store, etc.
_____ Played cards/board game
_____ Attended a sporting event
_____ Exercised (e.g jogging, aerobics)
_____ Went on an outing (e.g. picnic, beach, zoo, winter carnival)
_____ Wilderness activity (e.g hunting, hiking, fishing)
_____ Went to a concert
_____ Went dancing
_____ Went to a party
_____ Played music/sang

The following questions concern the amount of influence your roommate has on your thoughts, feelings, and behavior. Using the 7-point scale below, please indicate the extent to which you agree or disagree by writing the appropriate number in the space corresponding to each item.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

I strongly disagree   I strongly agree

1. _____ My roommate will influence my future financial security
2. _____ My roommate does not influence everyday things in my life
3. _____ My roommate influences important things in my life
4. _____ My roommate influences which parties and other social events that I attend
5. _____ My roommate influences the extent to which I accept responsibilities in our relationship
6. _____ My roommate does not influence how much time I spend doing household work

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7. ____ My roommate does not influence how I choose to spend my money
8. ____ My roommate influences the way I feel about myself
9. ____ My roommate does not influence my moods
10. ____ My roommate influences the basic values that I hold
11. ____ My roommate does not influence the opinions that I have of other important people in my life
12. ____ My roommate does not influence when I see, and the amount of time I spend with my family
13. ____ My roommate influences when I see, and the amount of time I spend with, my friends
14. ____ My roommate does not influence which of my friends I see
15. ____ My roommate does not influence the type of career I have
16. ____ My roommate influences or will influence how much time I devote to my career
17. ____ My roommate does not influence my chances of getting a good job in the future
18. ____ My roommate influences the way I feel about the future
19. ____ My roommate does not have the capacity to influence how I act in various situations
20. ____ My roommate influences and contributes to my overall happiness
21. ____ My roommate does not influence my present financial security
22. ____ My roommate influences how I spend my free time
23. ____ My roommate influences when I see him or her and the amount of time the two of us spend together
24. ____ My roommate does not influence how I dress
25. ____ My roommate influences how I decorate my home (e.g. dorm room, apartment, house)
26. ____ My roommate does not influence where I live
27. ____ My roommate influences what I watch on TV

Now we would like you to tell us how much your roommate affects your future plans and goals. Using the 7-point scale below, please indicate the degree to which your future plans and goals are affected by your roommate by writing the appropriate number in the space corresponding to each item. If an area does not apply to you (e.g. you have no plans or goals in that area) write a 1.

|	1	2	3	4	5	6	7	
Not at all							A great extent

1. ____ my vacation plans
2. ____ my marriage plans
3. ____ my plans to have children
4. ____ my plans to make major investments (house, car, etc)
5. ____ my plans to join a club, social organization, church, etc.
6. ____ my school-related plans (classes and major)
7. ____ my plans for what I will do over the summer.

Inclusion of Other in the Self (IOS) Scale
(Aron, Aron & Smollan 1992)

INSTRUCTIONS: Please circle the picture below that best describes your relationship with your roommate.
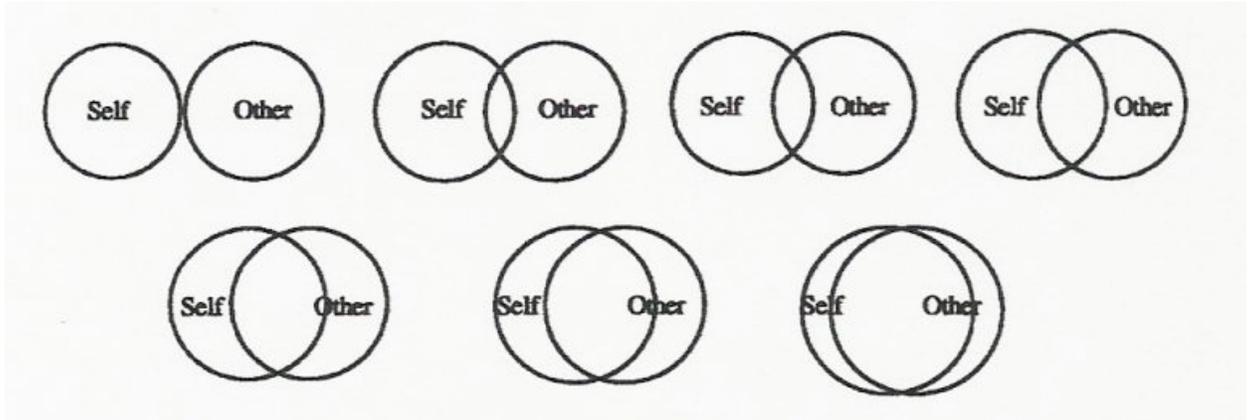
Subjective Social Status

1a. Imagine this ladder pictures how American society is set up.

- At the top of the ladder are the people who are the best off – they have the most money, the highest amount of schooling, and the jobs that bring the most respect.

- At the bottom are people who are the worst off – they have the least amount of money, little or no education, no job or jobs that no one wants or respects.

Now think about your family. Please tell us where you think your family would be on this ladder. **Fill in the circle that best represents where your family would be on this ladder.**
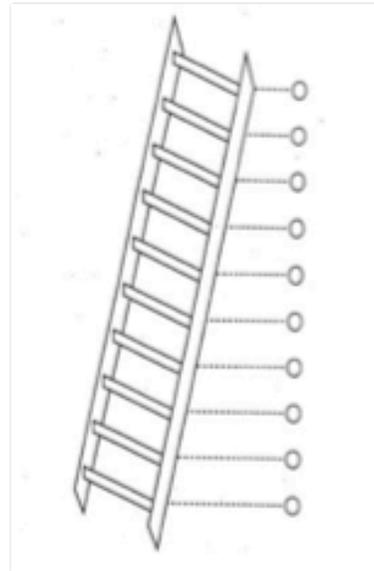
1b. Now assume that the ladder is a way of picturing your college campus.

- At the top of the ladder are the students on campus who get the most attention from others, are the most respected and have the ability to influence others.

- At the bottom are the people that no one respects and no one wants to hang around with.

Where would you place yourself on this ladder? **Fill in the circle that best represents where you would be on this ladder.**
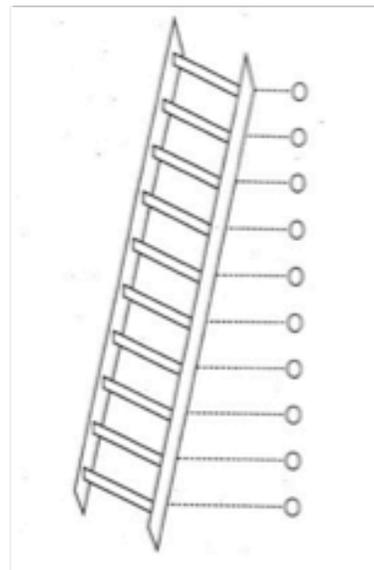
1c. Now assume that the ladder is a way of picturing your college campus in the **future**.

Where do you think you will be at the end of your first year at college? **Fill in the circle that best represents where you will end up being on this ladder at the end of the school year.**
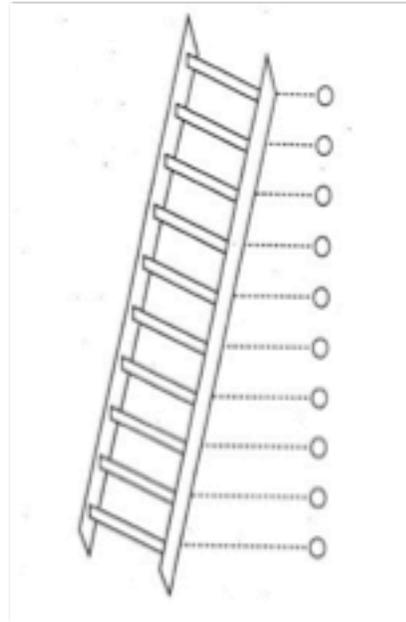
Roommate Evaluation
At time 2

1d. We would like to assess your perceptions of your roommate's prominence and respect on campus. Assume that the ladder is a way of picturing your college campus.

- At the top of the ladder are the students on campus who get the most attention from others, are the most respected and have the ability to influence others.

- At the bottom are the people that no one respects and no one wants to hang around with.

Where would you place your **roommate** on this ladder? **Fill in the circle that best represents where your roommate would be on this ladder.**
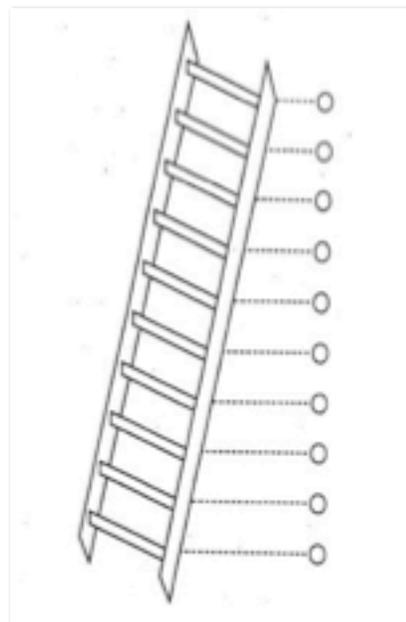
Modified version of the MacArthur Scale of Subjective Social Status. Adapted from: Goodman, E., Adler, N.E., Kawachi, I., Frazier, A.L., Huang, B., & Colditz, G.A. (2001) Adolescents' perceptions of social status: development and evaluation of a new indicator. *Pediatrics, 108,* E31.

Appendix G

Self-Monitoring Scale

(Snyder,1974)

> **The statements below concern your personal reactions to a number of different situations. No two statements are exactly alike, so consider each statement carefully before answering. If a statement is *TRUE* or *MOSTLY TRUE* as applied to you, write a "T" in the space provided. If a statement is *FALSE* or *NOT USUALLY TRUE*, write a "F" in the space provided. It is important that you answer as frankly and as honestly as you can. Your answers will be kept in the strictest of confidence.**

_____ 1. I find it hard to imitate the behavior of other people.

_____ 2. My behavior is usually an expression of my true inner feelings, attitudes, and beliefs.

_____ 3. At parties and social gatherings, I do not attempt to do or say things that others will like.

_____ 4. I can only argue for ideas which I already believe.

_____ 5. I can make impromptu speeches even on topics about which I have almost no information.

_____ 6. I guess I put on a show to impress or entertain people.

_____ 7. When I am uncertain how to act in a social situation, I look to the behavior of others for cues.

_____ 8. I would probably make a good actor.

_____ 9. I rarely seek advice of my friends to choose movies, books, or music.

_____ 10. I sometimes appear to others to be experiencing deeper emotions than I actually am.

_____ 11. I laugh more when I watch a comedy with others than when alone.

_____ 12. In a group of people I am rarely the center of attention.

_____ 13. In different situations and with different people, I often act like very different persons.

_____ 14. I am not particularly good at making other people like me.

_____ 15. Even if I am not enjoying myself, I often pretend to be having a good time.

_____ 16. I'm not always the person I appear to be.

_____ 17. I would not change my opinions (or the way I do things) in order to please someone else or win their favor.

_____ 18. I have considered being an entertainer.

_____ 19. In order to get along and be liked, I tend to be what people expect me to be rather than anything else.

_____ 20. I have never been good at games like charades or improvisational acting.

_____ 21. I have trouble changing my behavior to suit different people and different situations.

_____ 22. At a party I let others keep the jokes and stores going.

_____ 23. I feel a bit awkward in company and do not show up quite so well as I should.

_____ 24. I can look anyone in the eye and tell a lie with straight face (if for a right end).

_____ 25. I may deceive people by being friendly when I really dislike them.

Appendix H

Self-esteem scale

Rosenberg, M. (1965). Society and the adolescent self-image. Princeton, NJ: Princeton
University Press.

Please fill in the number which best indicates the extent to which you agree or disagree
with each statement listed below. *Be as honest and as accurate as possible.* Use the
following scale:

1 - - - - - - - - 2 - - - - - - - - - 3 - - - - - - - - - 4 - - - - - - - - 5
Strongly   Neither Agree   Strongly
Disagree   Nor Disagree   Agree

___1. On the whole, I am satisfied with myself.
___2. At times, I think I am no good at all.
___3. I feel that I have a number of good qualities.
___4. I am able to do things as well as most other people.
___5. I feel I do not have much to be proud of.
___6. I certainly feel useless at times.
___7. I feel that I'm a person of worth, at least on an equal plane with
others.
___8. I wish I could have more respect for myself.
___9. All in all, I am inclined to feel that I am a failure.
___10. I take a positive attitude toward myself.

Appendix I

Big 5 Inventory

John, O. P. & Srivastava, S. (1999).

Here are a number of characteristics that may or may not describe you. For example, do you agree that you are someone who is talkative? Please fill in the number which best indicates the extent to which you agree or disagree with each statement listed below. *Be as honest and as accurate as possible.* Use the following scale:

```
1 - - - - - - - - 2 - - - - - - - - - 3 - - - - - - - - - 4 - - - - - - - 5
```
| Strongly | Neither Agree | Strongly |
| Disagree | Nor Disagree | Agree |

I see myself as someone who...

___ 1. Is talkative.

___ 2. Tends to find fault with others.

___ 3. Does a thorough job.

___ 4. Is depressed, blue.

___ 5. Is original, comes up with new ideas.

___ 6. Is reserved.

___ 7. Is helpful and unselfish with others.

___ 8. Can be somewhat careless.

___ 9. Is relaxed, handles stress well.

___ 10. Is curious about many different things.

___ 11. Is full of energy.

___ 12. Starts quarrels with others.

___ 13. Is a reliable worker.

___ 14. Can be tense.

___ 15. Is ingenious, a deep thinker.

___ 16. Generates a lot of enthusiasm.

___ 17. Has a forgiving nature.

___ 18. Tends to be disorganized.

___ 19. Worries a lot.

___ 20. Has an active imagination.

___ 21. Tends to be quiet.

___ 22. Is generally trusting.

___ 23. Tends to be lazy.

___ 24. Is emotionally stable, not easily upset.

___ 25. Is inventive.

___ 26. Has an assertive personality.

___ 27. Can be cold and aloof.

___ 28. Perseveres until the task is finished.

___ 29. Can be moody.

___ 30. Values artistic, aesthetic experiences.

___ 31. Is sometimes shy, inhibited.

___ 32. Is considerate and kind to almost everyone.

___ 33. Does things efficiently.

___ 34. Remains calm in tense situations.

___ 35. Prefers work that is routine.

___ 36. Is outgoing, sociable.

___ 37. Is sometimes rude to others.

___ 38. Makes plans and follows through with them.

___ 39. Gets nervous easily.

___ 40. Likes to reflect, play with ideas.

___ 41. Has few artistic interests.

___ 42. Likes to cooperate with others.

___ 43. Is easily distracted.

___ 44. Is sophisticated in art, music, or literature

Appendix J
Items for measuring potential control variables

Items related to parents
These items were created specifically for this study

1. Overall, I am satisfied with my relationship with my mother
        1   2   3   4   5   6   7
I strongly disagree   I strongly agree

2. Overall, I am satisfied with my relationship with my father
        1   2   3   4   5   6   7
I strongly disagree   I strongly agree

3. How important is it to your parents that you eat healthy everyday?
        1   2   3   4   5   6   7
Not at all   Very much

4. When you were living at home how often did your parents provide healthy meals that you enjoyed?
        1   2   3   4   5   6   7
    Never   Everyday

5. Are either or both of your parents overweight?
1 □ Yes
2 □ No

Value placed on healthy eating

6. How important is it to you that you eat healthy everyday?
        1   2   3   4   5   6   7
    Not at all   Very much

7. How much do you believe your friends value the importance of eating healthy every day?
        1   2   3   4   5   6   7
    Not at all   Very much

8. How much do you believe your roommate values the importance of eating healthy every day?
        1   2   3   4   5   6   7
Not at all   Very much

Perceived norms

9. What percentage of your fellow students do you estimate will eat healthily in the next two weeks? Use the scale below to help make your estimate.

____% of my fellow students.

     0%   10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
No one   Everyone

Other sources of social influence

10. How many close friends do you currently have on campus? Only include those that you regularly interact with here at the University of Minnesota.

Enter Number of friends _____

11. Are you currently involved in a romantic relationship?
1 ☐ Yes
2 ☐ No

12．How much does your romantic partner influence your food choices?

     1   2   3   4   5   6   7
Not at all   Very much

13. How likely is it that you will stay friends with your roommate over the next 10 years?

     1   2   3   4   5   6   7
Not at all likely   Very likely