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No Person is an Island: A Multi-Level Analysis of the Relationship Between Self-Determination Theory and Well-Being

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NO PERSON IS AN ISLAND: A MULTI-LEVEL ANALYSIS OF THE RELATIONSHIP

BETWEEN SELF-DETERMINATION THEORY AND WELL-BEING

A Dissertation
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By

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ABSTRACT

Individuals frequently work collaboratively with others in school, workplaces, and in their daily lives. As such, the group literature has focused on several concerns that individuals have in groups such as making choices with others, feeling competent, and getting along with others. One such theory that addresses these concerns at the individual level is self-determination theory, or the idea that people must be satisfied in their needs for autonomy, competence, and relatedness to experience growth and well-being. The purpose of this project was to determine whether self-determination theory replicates in groups and whether individuals' perceptions that their groups are autonomous, competent, and related is associated with their own well-being. Undergraduate students met in small groups over Zoom and played the cooperative board game, *Forbidden Island*® (Gamewright, 2010). Participants responded to how satisfied and frustrated they were in their own basic psychological needs, as well as how satisfied and frustrated they thought their group was in these needs, at several points during the game. Self-determination theory did not replicate well in this context. Specifically, how autonomous one felt in their own personal psychological needs did not predict any well-being measures. People did rate their group's psychological needs as being different from their personal needs, but perceptions of group basic psychological needs only accounted for additional variance in negative affect. Thus, perceptions of how one's group is doing may not matter when a person is satisfied in their personal needs, but people's well-being may be negatively affected when they perceive their groups are not doing well.

LIST OF ABBREVIATIONS

RQ   Research Question

ICC   Intraclass Correlation Coefficient

DEFF   Design Effect

MLM   Multi-Level Model

SPSS   Statistical Package for the Social Sciences

HLM   Hierarchical Level Modeling software

MLmed   Multilevel Mediation software

PANAS   Positive and Negative Affect Schedule

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1. INTRODUCTION

Small groups are common entities that exist in a variety of academic, workplace, and leisure environments and serve many different purposes (Grigsby, 2008). Organizations may form committees to make decisions for the entire organization, task forces to employ substantial changes to the organization, or small groups to complete projects that serve the organization (Grigsby, 2008). Of particular interest are self-managing groups which typically involve individuals contributing equally to their group's success (Cohen, 1994). All individuals are responsible for the work that the group produces, but each individual typically brings their own set of unique skills and talents to the group (Cohen, 1994).

Self-managing groups are found in many business sectors and are becoming only more ubiquitous in the workdays of most individuals (Volini et al., 2019). The 2019 Deloitte Global Human Capital Trends survey reported that about 65% of employees indicated having some collaborative component to their job, such as group work. In addition, similar numbers of individuals (about 65% when averaged across sectors) agree that group work is important or very important to their organization's success (Volini et al., 2019). Thus, groups are incredibly common and useful in the workplace.

While groups are vital to organizations' success, people also form groups with others for nonwork related reasons. For example, people meet on a regular basis for various hobbies such

as book clubs, intramural sports teams, and to play video games or board games with one another. Similar to self-managing groups found in business, these group members share common objectives (e.g., to learn more about the hobby, to share the hobby with others) but members still have the capacity to contribute different skill sets to these groups (Prentice et al., 1994).

Self-managing groups at work and those that center around hobbies are known as common-bond groups, or groups that are defined by members' shared relationships with one another (vs common-identity groups which are defined by people who share similar identities) (Prentice et al., 1994). As with dyadic relationships, these common-bond groups of people have the capacity to influence individual's well-being in both positive and negative ways – people often gain resources while working with others, but these same groups can be a source of stress (Jetten et al., 2011). However, self-determination theory, which explains well-being in individuals and in dyads (e.g., relationship satisfaction; Hadden et al., 2016), has yet to be applied to small groups. The purpose of this project is to examine the relationship between self-determination theory and well-being in small groups.

Individual Benefits to Group Work

There are several reasons why people may enjoy group work. One function of groups is to delegate tasks amongst one another, thereby lessoning the work burden on any one member. This also allows individual group members to identify parts of the task that they feel especially equipped to handle. In fact, groups that are composed of members that have diverse abilities tend to be more successful than groups with more homogenous abilities (Littlepage et al., 2008). Furthermore, when individuals work in groups where they feel as though their delegated task better utilizes their expertise, individuals feel more efficacious (Wolf, 1997). Finally, groups give

people the ability to both support one another and to be supported by others at work (Kozlowski & Bell, 2013).

Research on small groups in classrooms echoes the above findings. Students in qualitative studies have noted that the group work in their classes allows them to network with others, to garner experience in managing projects, and to gain new viewpoints and ways of understanding difficult material by talking with other students (Lee et al., 2016; Robinson, 2013). Furthermore, students typically enjoy gaining experience in working with others (Jackson et al., 2014) and often perform better in classes that have an active collaborative component compared to traditional lecture classes (Hew & Lo, 2018). Thus, small self-managing groups seem to be a common and important experience in both academic and professional settings.

Difficulties that Arise from Working in Groups

Although groups can offer many benefits, many individuals still prefer to do without group work components at work and school. One survey of over 10,000 undergraduate students found that only 34% of students would choose a class with a group work component, and about 50% of students did not perceive there to be any benefit to group work (Labeouf et al., 2014). There are several reasons why some individuals do not enjoy working in groups or may not have positive experiences with working in groups.

When people work with others, they often worry about experiencing a loss of personal control, such as when an individual's group decides what task to do or decides how to do that task in a way that the individual does not agree with. For example, students report being in groups in which other members are overly bossy or who refuse to compromise can be incredibly frustrating (Lee et al., 2016; Robinson, 2013). Advocating for what one wants to do may lead to

a lack of group cohesion, especially if the individual and the rest of the group value different things (Langfred, 2000).

Second, individuals can become frustrated with their own competence or the competence of others in the group. Women and minorities especially can experience stereotype threat concerns, or concerns that they will be viewed as less competent than their other group members, making it difficult for them to contribute effectively to the group (Grover et al., 2017). In addition, people may become frustrated when they feel their group members have a wide range of abilities, with some group members being perceived as more competent than others (Tu et al., 2020). In fact, a common reason that participants point to for not enjoying their groups include other group members contributing work that is either less than adequate or members being social loafers and not contributing much work at all (Hall & Buzwell, 2012). On the other hand, it can also be frustrating when others in the group seem to understand the work on a deeper level but do not share their insights with the rest of the groups (Lee et al., 2016; Robinson, 2013). While social loafing and differences in work output between group members can often reflect differences in motivation, they can also reflect fears of exposing one's incompetence to other group members (Hall & Buzwell, 2012).

As conflict within groups is common and can negatively influence well-being and performance, a considerable amount of research has been investigated into how groups can best manage conflict (Adair et al., 2017; Jehn et al., 2010; Leon-perez et al., 2016). Individuals can especially dislike their group if they feel ostracized, which can lead to burnout and low motivation at work (Qian et al., 2019). Other more subtle frustrations may occur when individuals in groups feel as though they are not being listened to. In particular, people often note problems such as not feeling as though they can express their opinions, not feeling as though

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their opinions are being considered, or others failing to communicate with the group entirely as reasons why group work can be frustrating (Lee et al., 2016; Robinson, 2013).

While experiences such as concerns over choice, competency, and group cohesion have been studied independently of one another in the group literature, they have yet to be considered together. One such framework that addresses all of these perceptions is that of *self-determination theory*, which will be discussed in the next section.

Self-Determination Theory

Self-determination theory posits that people naturally strive for growth and optimal functioning (Deci & Ryan, 2000). One mini theory within this larger theory is Basic Psychological Needs theory which argues that individuals must feel satisfied in three basic psychological needs – autonomy, competence, and relatedness - in order to obtain this growth and optimal functioning. Autonomy is the perception that any behavior in which an individual engages is a result of their choice to behave that way, rather than a result of external factors and feelings of obligation. In other words, it is a perception that one's behavior is self-determined or self-directed (Deci &Ryan, 2000). Competence is the perception of feeling effective in a certain context. The desire for competence leads individuals to seek out challenges that they perceive match their skill levels (Van den Broeck et al., 2016). Finally, relatedness is the perception of being listened to and cared for by others (Deci & Ryan, 2000). It is important for individuals to feel as though they belong and that their actions benefit others (Deci et al., 2017).

Basic Psychological Need Satisfaction

A well-established finding is that satisfaction of these three basic psychological needs promotes both eudemonic well-being., or a feeling of growth and purpose in life, and hedonic well-being, or feeling happy and satisfied with one's life (Ryan & Deci, 2001). For example,

people who are satisfied in their three basic psychological needs tend to have higher life satisfaction and to feel more positively, both of which are markers of hedonic well-being (Šakan et al., 2020; Walker & Kono, 2018). Additionally, those who are satisfied tend to have more vitality and growth or purpose in life, both of which are markers of eudaimonic well-being (Mackenzie et al., 2018; Vansteenkiste et al., 2007).

The relationship between basic psychological need satisfaction and well-being has been found across numerous contexts. Those who are satisfied in their needs are likely to be more satisfied with their romantic relationships (Leung & Law, 2019), to be more satisfied with their college majors (Schenkenfelder et al., 2020), and to even have higher grades in school (Black & Deci, 2000) than those who are less satisfied. Indeed, one meta-analysis demonstrated that basic psychological need satisfaction at work is positively linked with job satisfaction, commitment, work engagement and performance, and was negatively linked to burnout (Van den Broeck et al., 2016).

The relationship between basic psychological need satisfaction and well-being has also been established across individuals. For example, when people are satisfied in their basic psychological needs, they experience well-being regardless of age and gender (Mackenzie et al., 2018). Importantly, this relationship has been demonstrated across cultures (Chen et al., 2015; Church et al., 2013). and well-being is no different for those in Western and Eastern cultures (Yu et al., 2018). Furthermore, the extent to which individuals desired these needs (known as *need strength*) did not moderate the relationship between need satisfaction and well-being, suggesting that this relationship occurs regardless of people's self-reported preferences for their needs to be satisfied.

Basic Psychological Need Frustration

In addition to need satisfaction, individuals can also experience *need frustration*, which occurs when other people or situations prevent individuals from feeling satisfied in their needs. Not surprisingly, while need satisfaction is a reliable and strong predictor of well-being, need frustration has been shown to predict ill-being (Vansteenkiste & Ryan, 2013). For instance, Bartholomew (2011) and Chen and colleagues (2015) found a positive relationship between need satisfaction and well-being, but there was no relationship between need satisfaction and negative outcomes such as depression and disordered eating. The opposite was true for need frustration, which predicted depression and disordered eating, but not vitality. However, other research has not supported this and has found that both need satisfaction and frustration explain variance in well- and ill-being (Jordan & Smith, 2022). Thus, need satisfaction and frustration appear to be separate constructs; however, need frustration has been studied less extensively than need satisfaction (Vansteenkiste et al., 2020). As such, both merit further study.

Social Context Influences Need Satisfaction and Frustration

One of the primary tenants of basic psychological needs theory is that the social context influences the extent to which individuals feel satisfied in their basic needs. Factors in the environment either *support* basic need satisfaction, increasing the likelihood that a person feels satisfied in their needs, or *thwart* their satisfaction, increasing the likelihood that a person feels frustrated in their needs (Vansteenkiste & Ryan, 2013). One such factor that has been studied extensively in the literature is the extent to which individuals perceive others to support or to thwart their needs.

Need Support from Group Members

Hierarchical relationships (e.g., how leaders support their subordinates) have received

more attention in the literature than egalitarian relationships (e.g., how coworkers support each other). This could be because those at equal levels have considerably less power to convey choice or control amongst their coworkers, and therefore have less opportunity to support or thwart each other's needs. However, individuals on self-managing teams use their own discretion when making decisions, generally rely on each other's skills when completing a task, and have regular face-to-face interactions (Cohen, 1994). They share goals and are often equally responsible for any product or work output. Therefore, it is important to investigate whether a colleague (and not just a supervisor) can influence a person's need satisfaction or frustration.

A few studies have investigated the relationship between need support and need satisfaction in individuals within more egalitarian relationships, but the results of these studies are somewhat mixed. For example, Fedesco and colleagues (2019) examined perceptions of both classmate and instructor need support separately to determine how both types of support influenced interest and enjoyment in the class, as well as perceived learning. As past research has found, instructor support influenced these outcomes, but classmate support did not. Yet another study found just the opposite (Basson & Rothmann, 2018). Specifically, pharmacy students who felt their classmates were need supportive tended to be more satisfied in their basic psychological needs than were those who experienced less classmate support. Furthermore, the effect of instructor support on basic psychological need satisfaction was not statistically significant when controlling for classmate support.

Some studies have examined peer support in youth (Jõesaar et al., 2011) and adult athletes (Murcia et al., 2008). In both studies, those who rated their sports climate as task-oriented (e.g., people encouraged one another) rather than ego-oriented (e.g., people often negatively compared themselves to others) felt more satisfied in their basic psychological needs.

Thus, the overall climate or culture of how team members behaved was related to team members' basic psychological need satisfaction (Murcia et al., 2008).

One explanation for these different findings could be the amount of group cohesion. Students in a typical lecture class like that of participants in Fedesco (2019) probably were not as cohesive as a group as students in a graduate or professional program (Basson & Rothmann, 2018) or members on a sports team (Jõesaar et al., 2011). As such, individuals within less cohesive groups may not influence each other's need satisfaction to the same extent.

Social Context Influences Need Satisfaction and Frustration

People within dyads (close friends, romantic relationships) support or thwart each other's basic psychological needs, which can influence the extent to which they perceives that their basic psychological needs are satisfied or frustrated (Deci et al., 2006; Hadden et al., 2015). Within a dyad, Partner A influences Partner B's need satisfaction, who then in turn influences Partner A's need satisfaction. For example, Wuyts and colleagues (2018) collected behavioral data on need support and satisfaction in dyadic pairs by instructing mothers and adolescents to have a conversation in the lab about the adolescent's friends. These conversations were taped, and observers rated supportive and controlling behaviors. Mothers were rated by observers as autonomy-supportive by engaging in behaviors such as reflective listening, showing interest in their child, and allowing their child to choose the topic of conversation. They were rated as controlling when they gave unsolicited advice, interrupted their child, and communicated mistrust. Mother's behavioral autonomy support predicted adolescents' need satisfaction which then predicted adolescents' willingness to disclose information about their friendships. In addition, when adolescents perceived that their needs were satisfied, their mothers were likely to perceive that their own needs were satisfied as well. Thus, individuals within dyads tend to

influence each other's need satisfaction, as those who feel supported themselves likely also support others.

In a similar demonstration of how individuals within dyads can influence each other's need satisfaction, Hadden and colleagues (2015) examined the relationship between self-reported relationship autonomy (the extent to which an individual wanted to be in their romantic relationship for self-determined reasons rather than for other reasons such as guilt or coercion) and the perception of how supported their partner felt. If Partner A reported high relationship autonomy, Partner B was more likely to report satisfaction in autonomy, competence, and relatedness than when Partner A reported low relationship autonomy (Hadden et al., 2015). Investigators have found similar findings for need frustration in a few other studies (Van den Berghe et al., 2016; Vanhee et al., 2018). For example, amongst couples, Partner B reported that they were less satisfied in their relationship and that there were more conflicts in their relationship when Partner A reported high levels of need frustration (Vanhee et al., 2018).

In sum, satisfaction in one's own relationship (or dyad) as a whole is related to an individual's need satisfaction (Hadden et al., 2015). Furthermore, need satisfaction (and frustration) amongst individuals within dyads or groups are likely related and bidirectional. However, questions still remain as to how one person's perceptions of their own need satisfaction relate to their perceptions of the need satisfaction of an entire *group* of people. First, to what extent is a person's individual need satisfaction similar to or separate from their perceptions of how satisfied their group as a whole is? For example, can a person feel competent in the abilities of their group but not feel competent in their own abilities? Can a person individually feel related and supported in their group interactions even if they feel their group is not supportive and connected to one another or ostracizes other group members? Second, how do

differing levels of need satisfaction (perceptions of individual need satisfaction vs perceptions of group satisfaction) influence well-being? Can a person experience well-being if they think their group is competent (or autonomous or related), but not themselves?

Although some research has examined the reciprocal influence of need satisfaction in dyadic pairs such as romantic relationships (e.g., Hadden et al., 2015), work has yet to examine small groups of individuals who are working towards shared work goals. Therefore, the following sections will discuss evidence from other literature of what perceptions of group need satisfaction functionally looks like and the relationship between perceptions of individual- and group-level variables.

Group Need Satisfaction

Although researchers have studied need satisfaction within dyads, less is known about how need satisfaction works within groups and if there is a relationship between an individual group member's satisfaction and how satisfied that same individual is with their group as a whole. Research does indicate that a person's group can provide them with need satisfaction. Participants in one study rated the extent to which they saw their fitness classes as having entitativeness, or the degree to which they perceived themselves to belong to a group (Evans et al., 2019). Those who saw their fitness classes as being high in entitativeness or "group-ness" were more likely to be satisfied with their groups than those who saw their classes as less of an entity, and this was mediated by psychological need satisfaction. Entitativeness likely led to need satisfaction because the class provided individuals with an opportunity to interact with one another and to satisfy their relatedness needs. In order to explain competence and autonomy needs, the authors relied on social identity theory (Tajfel & Turner, 1986), which is the idea that groups are an important part of individuals' self-esteem and conceptualization of their identity.

Thus, if they are incorporating their groups into their sense of self, then it is possible that they view their groups' decisions and achievements as part of their own, leading to individual satisfaction in competence and autonomy (Evans et al., 2019). It may seem odd that individuals can be autonomous while being a part of a group and working with others. However, according to self-determination theory, autonomy is not completely synonymous with individualism or independence (Chirkov et al., 2003). Instead, autonomy involves individuals making decisions regarding what one values or enjoys. Therefore, when individuals internalize the values of their own groups, it is possible they can feel autonomous when in a group setting.

To date, no studies have investigated basic psychological need satisfaction or thwarting at the group level and how these constructs relate to an individual's well- or ill-being. However, there are several constructs in the group literature which are similar to autonomy, competence, and relatedness. Thus, in the following sections I will 1) define what these constructs are, 2) discuss how perceptions of one's own individual needs relate to the individual's perceptions of group needs and 3) consider how perceptions of group needs relate to an individual's well-being.

Competence

One concept that has been studied in the group literature that is similar to that of competence is efficacy. Self-efficacy is an individual's perception that they can accomplish a task whereas group-efficacy is the belief that one's group can accomplish a task (Gibson, 1999; Pescosolido, 2003). Over the course of four studies, Jugert and colleagues (2016) assessed how perceptions of the individual need (self-efficacy) related to the individual's perception of the group need (group-efficacy). Results indicated that when individuals had high perceptions of how efficacious their groups were in helping the environment, the more likely they were to feel that they had high self-efficacy in helping the environment, and this predicted pro-environment

behavioral intentions. This suggests that it is possible that perceptions that one's group is competent can bolster perceptions of one's own efficacy or competence.

Research additionally supports the idea that there is a relationship between how satisfied an individual is in their group (feeling that one's group is competent or efficacious) and that person's well-being. Among groups of MBA students who were working on a semester-long research project, those groups who perceived themselves to be more efficacious at the research project in the beginning of the semester had group members at the end of the semester who were more committed to the group, who thought they learned a lot from their other group members, and who perceived themselves to work independently and autonomously compared to those groups who perceived themselves to be less efficacious (Pescosolido, 2003). Thus, group-level competence seems to function similarly to individual-level competence in that group-level competence predicts positive outcomes and overall well-being for the individual.

Relatedness

A concept similar to relatedness in the group literature is group cohesion. There are two types of group cohesion. With social or interpersonal cohesion, the individual perceives there to be positive relationships amongst group members and wants to spend time with those group members. Task cohesion, on the other hand, occurs when individuals in the group think that the members work well together and are united in working towards goals (Zacarro & Lowe, 1988). Some studies have directly investigated the relationship between satisfaction in all individual basic psychological needs and group cohesion, using sports teams as the group of interest. Felton and colleagues (2021) found that athletes who were satisfied in their personal basic needs in their relationship with their coach tended to experience more group cohesion with their team. Surprisingly, they did not measure the basic need satisfaction provided by other team members.

Erikstad and colleagues (2018) assessed athlete's perceptions of their individual basic psychological needs and their perceptions of how cohesive their team was as a whole at two different time points – once at the beginning of the sports season and once a year later. While social and task cohesion were not related across time points (Time 1 basic need satisfaction was not associated with Time 2 cohesion), they were related within time points (Time 1 basic psychological need satisfaction predicted Time 1 social cohesion) Thus, both relatedness and group cohesion appear to be positively related to one another.

Finally, perceptions of group cohesion seem to be related to an individual's well-being. American soldiers who were preparing to deploy to Iraq or Afghanistan and who felt that members of their unit worked together as a team (task cohesion) and felt that members of their unit regarded one another as friends (social cohesion) generally experienced higher subjective well-being than those who perceived that their unit was less cohesive (Layman et al., 2019). Therefore, perceptions of group functioning (such as how efficacious, or cohesive the group is) does seem to predict individual well-being amongst group members (Kachanoff, al., 2019; Layman et al., 2019; Pescosolido, 2003).

Autonomy

Unlike competence and relatedness, the relationship between an individual's perception of their group's autonomy and individual autonomy satisfaction with well-being has been directly studied. Kachanoff and colleagues (2019) investigated the idea that perceptions of one's individual autonomy and the autonomy of one's group are related. They measured (Studies 1 and 2) and manipulated (Studies 3 and 4) the extent to which individuals perceived that other groups had restricted their autonomy of their core cultural group by controlling what their group could do, value, or believe. Further, they found a mediated relationship such that perceptions of group

autonomy restriction led to lower perceptions of one's own autonomy satisfaction, which further led to lower individual well-being. It is important to note, however, that this study investigated the effect of group autonomy restriction in cultural groups, which are common-identity groups. That is, members are defined by sharing a common identity (Prentice et al., 1994). Work groups are often less defined by a common identity and more defined by the member's relationships with each other (common-bond groups).

Current Study

Given that individual need satisfaction is related to well-being and need frustration is related to ill-being (Jordan & Smith, 2022), similar relationships should be found in groups as well. However, there are several gaps in this research. First, while several studies have examined constructs similar to basic psychological need satisfaction such as group-efficacy (Jugert et al., 2016) and group cohesion (Layman et al., 2019) or have studied group autonomy without investigating competence and relatedness (Kachanoff et al., 2019), studies have yet to apply all three basic psychological needs to groups simultaneously. In addition, these studies were conducted on common-identity groups (Jugert et al., 2016) but have yet to examine common-bond groups. The overall goal of this research was to investigate autonomy, competence, and relatedness satisfaction and frustration and their relationship with well-being in common-bond, collaborative groups.

Additionally, the current research investigated if individuals perceived that their groups were satisfied (or frustrated) in their needs for autonomy, competence, and relatedness and the extent to which perceptions of one's personal basic psychological needs and their group's basic psychological needs were related. For example, it could be the case that individuals perceive their own, personal need satisfaction to be identical to that of their group's. It could also be that

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group need satisfaction is an entirely separate construct, with individuals being satisfied in their own personal basic needs (but less satisfied in their groups) or satisfied in their group's needs but less in their own needs. Furthermore, I expected to replicate the relationship that perceptions of one's personal need satisfaction would predict well-being and that frustration would predict ill-being, but questions remain as to whether multiple levels of need satisfaction (frustration) added to this relationship. In other words, do people's perceptions of how satisfied or frustrated their groups are in their autonomy, competence, and relatedness account for additional variance in well-being above personal basic psychological needs? Below are the primary research questions (RQs):

RQ1. Does basic psychological needs theory of self-determination theory replicate in a small group context? In particular, does personal autonomy, competence, and relatedness satisfaction and frustration predict several facets of well-being (hedonic well-being, eudaimonic well-being, and satisfaction with one's group)?

RQ2. Do people perceive the satisfaction and frustration of their own personal basic psychological needs differently from the satisfaction and frustration of their group's basic psychological needs? Specifically, is personal autonomy, competence, and relatedness satisfaction statistically different from satisfaction and frustration of each respective group need?

RQ3. Do group basic psychological needs account for additional variance in well-being above personal needs? In other words, does both personal and group autonomy, competence, and relatedness satisfaction and frustration predict several facets of well-being (hedonic well-being, eudaimonic well-being, and satisfaction with one's group)?

On an exploratory basis, this research also examined whether people are accurate in their predictions of whether their basic psychological needs will be satisfied (or frustrated) while working with their groups. In other words, to what extent are people's predictions of how satisfied (or frustrated) they will be in their needs before working with their group consistent with their actual reported experience of how satisfied or frustrated their needs were after working with their groups? Furthermore, because past research suggests that people are generally more engaged in their work when their needs are satisfied (Schreurs et al., 2014; Rahmadani et al., 2019), the current study will determine if the relationship between anticipated basic psychological needs and experienced psychological needs is mediated through behavioral engagement. That is, do people engage more with their group and in the cooperative task when they anticipate that their needs for autonomy, competence, and relatedness will be satisfied, and is that engagement then associated with greater need satisfaction after interacting with their group? Below are the exploratory research questions:

RQ4. Does anticipated autonomy, competence, and relatedness satisfaction and frustration predict the respective experienced basic psychological need?

RQ5. Is the relationship between anticipated need satisfaction and frustration and experienced need satisfaction and frustration mediated through behavioral engagement?

<div align="center">II. METHOD</div>

Participants

  Participants were undergraduate psychology students recruited from psychology classes at a large public university in the southeast United States. Data collection occurred over the course of the Fall 2021 semester and ended once the semester ended. The final sample consisted of 124 participants nested within 39 groups (an average of 3.18 people per group). Although few methods currently exist in terms of conducting power or sensitivity analyses for multi-level data, a systematic review of simulation studies on multilevel models suggested researchers should recruit at least 20 groups in order to avoid biased parameter estimates (Mcneish & Stapleton, 2016). Therefore, the current study recruited the required number of groups for analyses.

  Participant demographics are displayed in Table 1[1]. Most participants were white (78%), female (65%), and between the ages of 18 to 25 ($M = 18.75$). Almost all participants indicated they had prior familiarity with Zoom. The sample included an even distribution of those who were not at all familiar with cooperative games and those who were familiar. However, most participants had no prior familiarity with the cooperative game played in the study, *Forbidden Island*® (Gamewright, 2010). Group demographics are displayed in Table 2. Most groups consisted of 3 group members and were composed of both men and women. About 28% of groups had at least two people who had prior familiarity with one another.

  All participants were awarded partial course credit and a 5$ Starbucks gift card for their participation. Participants who won the game were entered into a drawing for one of four 20$

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[1] All tables are displayed in the Appendix.

Tango gift cards. This study was funded by a University of Mississippi Graduate Student Council Research Grant.

Study Tasks

Ice Breaker Task

Participants completed a brief ice breaker task to get to know one another before they played the game. Participants first introduced themselves and then played *Two Truths and a Lie*. In this game, each participant stated three "facts" about themselves, two of which were true and the other which was false. All other group members gave their input as to which "fact" they thought was a lie. The research assistant offered their facts first to set the tone for the rest of the group and then directed the participants to share their facts.

Forbidden Island

Forbidden Island® (Gamewright, 2010) is a cooperative board game in which players must work together to capture treasure on a sinking island. Because it is a cooperative game, players either win together or they lose together based on objective criteria. As such, game instructions suggest that participants share information with each other through several mechanisms, such as by stating that "group members are allowed (and encouraged) to give you advice on the best actions to take during your turn" (Leacock, 2010). However, players are also given individual roles with specific actions they can perform that other players cannot. Therefore, this game was chosen because it mimics dynamics in work groups. The group must work together towards common goals, but each member also has unique abilities and skills that they bring to the group. Furthermore, although there are several other cooperative games that could have been used in this study, this game is consistently rated as a great game for families and those who are new to cooperative games (Alexander, 2019), while still claiming to reinforce

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strategic thinking, cooperation, and decision making (Leacock, 2010). Therefore, *Forbidden Island*® was a mechanism that allowed participants to interact with one another to measure perceptions of autonomy (whether they perceive that they are able to make the decisions that they want to), competence (their perceptions of how successful their moves in the game are), and relatedness (e.g., whether they feel that other group members are listening to them).

Game Instructions

Participants received game instructions twice. Prior to the study, all participants were sent a link to the game instructions to read on their own. About half of participants indicated they read these instructions ahead of time. During the study, participants listened to instructions from a research assistant. Game instructions were standardized as the research assistant read from a script that was like the actual game instructions. At several points in the instructions, participants were asked if they had questions about the game.

Measures

Descriptive statistics and reliability coefficients for all variables are displayed in Table 3. All measures and study materials can be found in the Appendices.

Personal Anticipated Need Satisfaction and Frustration

Prior to playing the game, participants responded to a collection of one-item measures reflecting the degree to which participants thought their needs would be satisfied and frustrated during the game. Example items include: "When I play the game, I think that my decisions will reflect what I want to do" and "I think my group members will be a bit cold towards me". Participants answered these items on a 10-point sliding scale ranging from 1- "not at all" to 10 "very much". All items were analyzed separately.

Personal Experienced Need Satisfaction and Frustration

Participants responded to a collection of one-item measures which assessed satisfaction of autonomy ("I feel that the decisions I'm making reflect what I want to do"), competence ("I am feeling confident that I am doing well in this game"), and relatedness ("I'm feeling close and connected with my group"), as well as frustration of these needs ("I am feeling pressured to follow my group member's directions", "I am feeling insecure about my abilities", and "I am feeling that my group members are being a bit cold towards me", for autonomy, competence, and relatedness, respectively). Participants were asked these items at the end of the game and were instructed to answer regarding how they felt overall while playing the game. These items were adapted from a well-validated 24-item basic psychological need satisfaction and frustration measure (Chen et al., 2015). Only one item per factor was used to decrease participant fatigue. Participants answered these items on a 10-point sliding scale ranging from 1- "not at all" to 10- "very much". All items were analyzed separately.

Group Experienced Need Satisfaction and Frustration

Participants responded to a collection of one-item measures which assessed their perceptions of how satisfied their group was in autonomy ("I think my group is making decisions that reflect what we want to do"), competence ("My group is feeling that we can successfully navigate difficult challenges in the game"), and relatedness, ("People in my group are working well together"), and how frustrated they thought their group as a whole was in these needs ("I think my group is feeling pressured to make certain decisions", "I think my group is doubting that we can succeed at this game", and "My group members are acting cold and distant towards each other", for autonomy, competence, and relatedness frustration, respectively) (adapted from Chen et al., 2015). As with personal experienced need satisfaction and frustration, participants

were asked these items at the end of the game and were instructed to answer regarding how they felt overall while playing the game. Participants answered these items on a 10-point sliding scale ranging from 1- "not at all" to 10 "very much". All items were analyzed separately.

Well-Being Measures

Hedonic Well-Being. At the end of the game, participants responded to the 13-item affective circumplex model measure (Posner et al., 2009) which assessed the extent to which they felt several positive and negatively valanced emotions while playing the game overall (e.g., excited, calm, bored, distressed). Participants responded to these items on a 1- "not at all" to 10- "very much" sliding scale. These items were submitted to an exploratory factor analysis to make composites. Because the factor analysis suggested there were four factors with Eigenvalues greater than 1, I formed four composites, thereby creating four different outcome variables that tap into hedonic well-being. Items for each factor were averaged together to form happiness (joyous, happy excited), sadness (sad, angry, depressed), disinterest (sleepy, bored) and anxiety (afraid, distressed, calm (reversed)) composites. All composites had acceptable reliability (see Table 3).

Eudaimonic Well-Being. After playing the game, participants responded to a 7-item vitality measure regarding how energized, alive, and alert they felt overall while playing the game (Ryan & Frederick, 1997.). This measure is commonly used as a measure of eudaimonic well-being (Ryan & Deci, 2001). Example items include "I felt alive and vital", and "I didn't feel very energetic" (reverse scored). Participants responded on a 1- "not at all" to 10- "very much" sliding scale. Items were averaged to form a composite.

Satisfaction with the Group. At the end of the game, participants responded to three items regarding how satisfied they were with their group in general (e.g., "I was very satisfied

working with this group"; Jehn et al., 2010). Participants responded to these items on a 5-point scale 1- "not at all" to 5- "very much". These items were averaged to form a composite.

Behavioral Engagement. At the end of the game, participants responded to the behavioral engagement subscale of the Social Presence in Gaming Questionnaire (Kort et al., 2007). This was an 8-item measure which reflected the degree to which participants thought their actions in the game influenced their group members' actions and that their group members' actions influenced their actions in the game. Example items include, "my actions depended on my group member's actions" and "what my group members did affected what I did". Participants rated these items on a 1- "not at all" to 5- "very much" scale. All items were averaged to form a composite, with higher values reflecting greater behavioral engagement.

Demographics and Individual Differences. Participants answered three questions to determine if group members knew each other prior to the study. For example, participants answered yes or no to "Prior to participating in this study, did you know any of your group members?". Participants answered several questions regarding their familiarity with cooperative games, Forbidden Island, Zoom, and the degree to which they enjoyed the game. Participants answered demographic questions concerning age, race, and gender.

Procedure

Participants signed up for a study about the psychology of cooperative board games that would take them about two and a half hours to complete. If three or four participants signed up for a study session, all participants were emailed a reminder with the Zoom link, the informed consent, game directions, and information regarding which character they would be in the game, and they were asked to review these resources ahead of time. If fewer than three participants

signed up for the study session, the session was cancelled, and participants were allowed to sign up for other time slots.

The study was conducted entirely online via Zoom and one research assistant presided over all study sessions to maintain consistency. Participants clicked the Zoom link at their study time and were then sent a link in the Zoom chat box to the informed consent. Once all participants consented to participating, they completed the icebreaker task to get to know one another. Following this, the research assistant walked participants through how to play the game with a standardized script and participants were once again sent a reference sheet in the Zoom chat box with quick facts about the game and about their specific role in the game. This reference sheet also contained their participant and group ID numbers which participants entered each time they took a survey.

Following instructions, the research assistant guided participants through playing one practice round of the game and answered any questions that participants had. The game board was set up in front of the research assistant and broadcasted over Zoom for participants to see. Participants instructed the research assistant how they wanted their pieces to be moved, and the research assistant followed all participant instructions unless the participants' instructions violated game rules. The board and the order of cards was standardized for the practice session to ensure that the research assistant was familiar with the game and to give each group a similar practice game experience. The research assistant then sent a link to the initial survey regarding participants' anticipated need satisfaction and frustration in the Zoom chat box. The survey took no more than 2 minutes to complete, and participants were asked to message the research assistant when they were done with the survey so that the research assistant knew when to advance in the study protocol.

Next, the research assistant reminded participants of the reward for winning the game (entry into a drawing for a gift card) and instructed the participants to begin playing the game. Unlike the practice game where all cards were in a predetermined order, all cards for the full game were shuffled and randomized. Participants were further randomized to both order of play (i.e., whether they would be first, second, third, or fourth to move) and to their character in the game. As with the practice game, the research assistant followed all participants' requests with how they wanted their pieces to be moved unless those requests violated game rules.

Participants completed basic psychological need satisfaction and frustration measures every two to three rounds of the game (the game was paused, and they were sent the link to this two-minute survey in the chat box); however, these were not analyzed because some groups lost the game before completing these measurements. The game ended once the group won the game, lost the game, or 45 minutes of game play had passed. Participants then completed the end of game survey (a link to this 7-minute survey was sent in the Zoom chat box) where they responded to experienced personal basic psychological need satisfaction and frustration, well-being, group basic psychological need satisfaction, satisfaction with group, behavioral engagement, and demographics (in that order). Participants were debriefed, thanked for their participation, and compensated with partial course credit and a 5$ Starbucks gift card. Six groups won the game, and the winners from each of these groups were additionally entered into a drawing to win one of four additional gift cards.

III. RESULTS

Analytical Overview

The primary research questions (RQ1 – RQ3) sought to replicate the relationship between basic psychological need satisfaction and frustration and several markers of well-being (hedonic well-being, eudaimonic well-being, and satisfaction with the group) and then to extend this theory into small groups. Specifically, these research questions assessed whether satisfaction and frustration of one's own basic psychological needs predicts well-being and then whether people's perceptions of their group's basic psychological needs uniquely predicts several markers of well-being while controlling for personal basic psychological needs. In addition, these research questions examined whether models containing both personal and group basic psychological needs were a better fit in explaining variance in well-being compared to those models with personal needs alone.

The second set of research questions (RQ4 and RQ5) were exploratory and assessed whether people were accurate in predicting their own basic psychological needs. In particular, I examined the degree of similarity between individuals' personal anticipated basic psychological needs before playing the cooperative game and their experienced basic psychological needs (or needs after playing the game). Finally, I tested whether the relationship between anticipated basic psychological needs and experienced basic psychological needs was mediated through behavioral engagement. In other words, I tested the model that when people think that they will be more satisfied (or less frustrated) in their basic psychological needs that they become more

engaged in the cooperative task, which then is associated with experienced need satisfaction (lower frustration).

Prior to conducting these hypotheses, I first examined descriptive statistics. Next, I conducted a series of unconditional models on all variables involved in analyses to estimate the intraclass correlation coefficients (ICCs), or the ratio of between group to pooled within group variance. A significant ICC suggests that there is a significant amount of between group variation (as opposed to only variation at the individual level). I also conducted design effect statistics (DEFF) which assesses the degree to which a sample with interdependent residuals differs from a sample that assumes completely independent residuals (Sommett & Morselli, 2021). The purpose of both ICC and DEFF statistics is to confirm that the data are nested and that multi-level modeling is needed to disentangle within-group and between-group effects. As such, all research questions except those examining simple mean differences (conducted to partially test RQ2 and RQ4) were conducted within the multi-level model framework because ignoring violations in the assumption of independence could result in false positive or false negative regression coefficients (Sommett & Morselli, 2021).

After presenting ICCs and DEFF statistics, I presented the results for each research question and I included each research question's MLM equation. All descriptive statistics and mean difference analyses were conducted with SPSS software, version 27. For Research Questions 1 – 4, all multi-level models were conducted with HLM software, version 8.1, and used restricted maximum likelihood estimate function to estimate coefficients (REML) (Raudenbush & Congdon, 2021). Furthermore, all models were level-1 only models (variables examining differences between participants), with no level-2 variables (variables examining differences between groups). Variables in all MLM analyses were group mean centered, which

means that coefficients can be interpreted as the pooled within-group effect; the intercept of each model represents the expected score of the outcome variable when each predictor variable is held at each group's mean on that predictor variable (Nezlek, 2001). Each coefficient represents the degree of change in the outcome variable with every one-point change from the mean of each group in the predictor variable while controlling for all other predictors (Sommett & Morselli, 2021). Finally, indirect effects for RQ6 were calculated with Rockwood's (2019) MLmed, a multi-level mediation macro for SPSS. As with models conducted in HLM, all variables were group mean centered so coefficients represent the pooled within effect and coefficients were estimated with REML.

Descriptive Statistics

Descriptive statistics for all variables are summarized in Table 3. With the exception of personal anticipated and experienced relatedness frustration, all variables spanned the full range or mostly full range of values. Participants' anticipated autonomy and competence satisfaction was higher than the midpoint, their anticipated relatedness satisfaction and autonomy frustration was at the midpoint, and their anticipated competence and relatedness frustration was below the midpoint. Participants ended the game scoring above the midpoint in satisfaction of experienced personal and experienced group needs and below the midpoint for frustration of experienced personal and experienced group needs. Regarding well-being, participants scored above the midpoint for happiness and below the midpoint in sadness, disinterest, and anxiety. Participants scored at the midpoint in eudaimonic well-being but scored higher than the midpoint in group satisfaction. A visual examination of all variables, as well as the skew and kurtosis statistics (which should ideally fall between -1 and 1; Decarlo, 1997), indicate that most variables were approximately normally distributed.

Examining the Degree of Variability Between and Within Groups

In order to determine the amount of variability due to differences within and between-groups, ICCs and DEFF statistics were conducted for each variable and are presented in Table 4. ICCs range from 0 to 1, with higher values indicating that people's scores within groups are highly related or dependent on one another. Values of .01, .05, and .20 correspond with small, medium, and large within group dependence (Kreft & de Leeuw, 1998). DEFF scores range from 1 to *n*, with *n* being the mean cluster size (*n* = 3.18 for this study). Higher DEFF scores also represent greater within-group similarity and represent a ratio of variance assuming clustering to the variance assuming independence. For example, a DEFF value of 2 indicates that the variance assuming clustering is twice as large as the variance assuming independence (Sommett & Morselli, 2021). While it is customary to calculate ICCs, some authors have suggested that DEFF is more informative (Sommett & Morselli, 2021).

Regarding *anticipated personal* basic psychological needs, or how participants' thought they would feel during the game, only relatedness satisfaction (ICC = .11, *p* = .039; DEFF = 1.24) was statistically significant. This means that about 11% of variance in relatedness satisfaction prior to the game was due to within group dependence. There was not a significant amount of within-group dependence for any of the other anticipated needs, which indicates that there was little within-group or interdependence prior to playing the game (ICCs ≤.07, *p*s ≥ .246; DEFF ≤ 1.15). Little within group dependence was expected in these variables as participants responded to these measures before the game when they had little previous interaction with one another.

Regarding *experienced* basic psychological needs, there was a significant amount of dependence in autonomy, competence, and relatedness satisfaction for satisfaction of both

personal and *group* needs (ICCs range from .15 to .46; DEFFs range from 1.33 to 2.00; all ps ≤ .016). These correspond with medium to large amounts of group dependence. Amongst satisfaction of the three basic psychological needs, relatedness satisfaction had the highest degree of dependence at both the personal and group level, with 46% and 44% of variance, respectively, due to within-group dependence. Overall, there was less within-group dependence in needs frustration. Only personal relatedness frustration (ICC = .16, p = .007; DEFF = 1.35) was statistically significant.

When examining well-being, happiness (ICC = .31, p < .001, DEFF = 1.66) and anxiety (ICC = .17, p = .008; DEFF = 1.37) had a significant amount of within-group dependence while sadness and disinterest did not. About 16% of variance in eudaimonic well-being and about 13% of variance in group satisfaction were due to within-group dependence. Finally, about 28% of variance in behavioral engagement was due to within-group dependence. Although not all primary outcome variables had a statistically significant amount of clustering (sadness and disinterest did not), research indicates that even small ICCs can produce bias in regression coefficients if clustering is not taken into account (Musca et al., 2011). Thus, all research questions were analyzed assuming non-independence.

Research Question 1

Research Question 1 asked whether the relationship between personal experienced satisfaction and frustration of autonomy, competence, and relatedness with well-being replicates. I first conducted a series of bivariate regression models in the MLM framework to examine whether satisfaction and frustration of each experienced need individually predicts each well-being measure (see Table 5). I standardized all variables so that the strength of all regression

coefficients can be compared to one another like coefficients in a correlation matrix. Thus, this table is a "pseudo-correlation" table. All variables were group mean centered.

Notably, relatedness satisfaction and relatedness frustration predicted every well-being measure in the expected direction at the bivariate level, with relatedness satisfaction positively predicting happiness, eudaimonic well-being, and group satisfaction, and negatively predicting sadness, disinterest, and anxiety (bs ranged from -.14 to .48). Relatedness frustration, as one would expect, showed the opposite relationship with each of these variables (bs ranged from -.15 to .43). Satisfaction and frustration of autonomy and competence were slightly less consistently related with well-being measures. Satisfaction of both autonomy ($b = .34$) and competence ($b = .40$) positively predicted happiness while frustration of both of these basic psychological needs did not. In addition to relatedness, only autonomy frustration significantly predicted sadness ($b = .22$). Both satisfaction and frustration of competence predicted disinterest and eudaimonic well-being, but autonomy was unrelated to both of these variables (bs range from -.27 to .48). In contrast, both satisfaction ($b = -.18$) and frustration ($b = .25$) of autonomy predicted anxiety but competence was unrelated. In addition to relatedness, only autonomy satisfaction significantly predicted group satisfaction ($b = .24$).

I next modeled variance in all well-being measures with satisfaction and frustration of autonomy, competence, and relatedness as simultaneous predictors. This allowed me to examine whether each basic psychological need was a unique predictor of each well-being measure while controlling for all other basic psychological needs. The level-1equation (equation 1) and level-2 equation (equation 2) for these models is shown below:

Level 1:

$$y_{ij} = \beta_{0j} + \beta_{1j}(\text{Autonomy Satisfaction}) + \beta_{2j}(\text{Competence Satisfaction}) +$$

$$\beta_{3j}(\text{Relatedness Satisfaction} + \beta_{4j}(\text{Autonomy Frustration}) + \beta_{5j}(\text{Competence Frustration}) +$$

$$\beta_{6j}(\text{Relatedness Frustration}) + r_{ij}$$

Level 2 (null model):

$$\beta_{0j} = \gamma_{00} + \mu_{0j}$$

All variables were group mean centered, representing fluctuations to each group's average score on that predictor variable. Coefficients for each model (happiness, sadness, disinterest, and anxiety, eudaimonic well-being, and group satisfaction) are presented in Table 6. These coefficients can be read as the degree of change in the outcome variable for every one-point change about each person's group mean on that predictor variable while controlling for all other variables.

Happiness

Only competence satisfaction significantly predicted happy affect. No other variables uniquely predicted happiness (all $ps > .05$).

Sadness

There were no statistically significant predictors of sadness (all $ps > .05$).

Disinterest

Competence satisfaction negatively predicted disinterest while controlling for all other variables. No other predictors uniquely predicted disinterest (all $ps > .05$).

Anxiety

Relatedness frustration positively predicted anxiety while controlling for all other variables. No other predictors uniquely predicted anxiety (all *p*s > .05).

Eudaimonic Well-Being

Both competence and relatedness satisfaction positively predicted eudaimonic well-being. All other variables were not significant unique predictors (*p*s > .05).

Group Satisfaction

Relatedness satisfaction positively predicted group satisfaction while relatedness frustration negatively predicted group satisfaction. Satisfaction and frustration of autonomy and competence were unrelated (*p*s > .05).

Research Question 2

Research Question 2 asked whether people's perceptions of their group's basic psychological needs exist as a separate construct from their perceptions of their own personal basic psychological needs. In order to address this research question, I conducted two sets of analyses. First, I conducted paired-sample *t* tests to determine if people rated their satisfaction and frustration of their *personal* basic psychological needs (e.g., "I feel that the decisions I'm making reflect what I want to do") and *group* psychological needs (e.g., I think my group is making decisions that reflect what we want to do") differently from one another (see Table 7). Second, I conducted a series of bivariate regression models to determine the degree of variance that personal needs share with group needs (e.g., I assessed whether personal autonomy satisfaction predicted group autonomy satisfaction). Similar to the pseudo-correlation matrix in Research Question 1, I standardized all coefficients for ease of interpretation (See Table 8).

According to the paired-samples *t* tests analyses, participants felt significantly more satisfied in their own autonomy and competence needs than they thought their group as a whole was. However, participants perceived their group to be overall more satisfied in relatedness than they were individually. Participants perceived that their group as a whole was more frustrated in their needs for autonomy and competence than they were individually. Participants saw no statistically significant difference between their own relatedness frustration and their group's relatedness frustration. Thus, across most basic psychological needs, participants rated their group needs as different from their own needs.

According to the bivariate regressions, all individual needs except competence frustration accounted for a significant portion of variance in their respective group needs (*b*s ranged from .23 to .75). This means that people rated their personal competence frustration differently from their group competence frustration, but personal competence frustration did not explain a statistically significant amount of variance in group frustration (*p* = .065). This could simply because paired-samples *t* tests ignore nesting, while the bivariate multi-level analysis does not. In other words, the paired-samples *t* test does not partial out variance due to between group differences. In order to test this idea, I conducted a simple correlation (which ignores nesting). The relationship between personal and group competence frustration was statistically significant (*r* = .33, *p* < .05). The fact that the two variables are not significantly related when partialing out between group differences (but are when not partialing out between group differences) means that in addition to individual variables, there are likely group-level variables that may be explaining variance in competence frustration.

Research Question 3

Research Question 3 asked whether individuals' perceptions of how satisfied and

frustrated their group was in autonomy, competence, and relatedness explained additional

variance in well-being above personal need satisfaction and frustration. In order to test this

research question, I modeled each well-being measure as a function of both personal and group

autonomy, competence, and relatedness satisfaction and frustration. The level-1 equation

(equation 3) and level-2 equation (equation 4) for these models is below:

Level 1:

$$(3)$$

$$y_{ij} = \beta_{0j} + \beta_{1j}(\text{Personal Autonomy Satisfaction}) + \beta_{2j}(\text{Personal Competence Satisfaction}) +$$

$$\beta_{3j}(\text{Personal Relatedness Satisfaction} + \beta_{4j}(\text{Personal Autonomy Frustration}) +$$

$$\beta_{5j}(\text{Personal Competence Frustration}) + \beta_{6j}(\text{Personal Relatedness Frustration}) +$$

$$\beta_{7j}(\text{Group Autonomy Satisfaction}) + \beta_{8j}(\text{Group Competence Satisfaction}) +$$

$$\beta_{9j}(\text{Group Relatedness Satisfaction} + \beta_{10j}(\text{Group Autonomy Frustration}) +$$

$$\beta_{11j}(\text{Group Competence Frustration}) + \beta_{12j}(\text{Group Relatedness Frustration}) \ r_{ij}$$

Level 2 (null model):

$$(4)$$

$$\beta_{0j} = \gamma_{00} + \mu_{0j}$$

For each outcome variable, I will discuss which variables are unique predictors. All

coefficients are presented in Table 9. Additionally, I will discuss deviance statistics of each

model which will allow me to compare model fit from this larger model to the models without

group basic psychological needs presented in Research Question 1. In other words, this will

answer the question regarding if perceptions of the group's basic psychological needs explain

more variance in well-being than personal psychological needs alone. This is calculated by subtracting the deviance of the larger model (conducted in this set of analyses - Research Question 3) from the deviance of the smaller model (conducted in Research Question 1). In order to determine if this difference is statistically significant, the value is compared to a chi-square distribution with the degrees of freedom equal to the number of additional parameters in the larger model (in this case, 6) (Sommet & Morselli, 2021).

Happiness

Personal autonomy satisfaction positively predicted happiness. Group relatedness frustration was the only other unique predictor of happiness, but it was not significant in the expected direction. Specifically, higher group relatedness frustration predicted greater experienced happiness. The larger model did not have statistically better fit compared to the smaller model, indicating that group basic psychological need satisfaction and frustration did not account for much more additional variance beyond personal need satisfaction alone, $\chi^2 (6) = 11.41, p = .08$.

Sadness

Only one personal need was a unique predictor of sadness; that is, personal relatedness frustration positively predicted sadness. Two group needs were significant predictors. Group autonomy satisfaction was related to lower sadness and group competence frustration was related to higher sadness. This model with both personal and group needs provided a better model fit than the smaller model with personal needs alone, $\chi^2 (6) = 25.03, p < .001$.

Disinterest

There was only one unique predictor of disinterest. Specifically, greater personal competence satisfaction was related to less disinterest. The model with both group and personal needs yielded a better model fit than personal needs alone, $\chi^2 (6) = 15.2, p = .019$.

Anxiety

No personal needs were unique predictors of anxiety. However, group autonomy satisfaction was significantly negatively related to anxiety and group competence frustration was significantly positively related to anxiety. The model with both group and personal needs provided a better model fit than personal needs alone, $\chi^2 (6) = 19.06, p = .004$.

Eudaimonic Well-Being

Higher personal competence satisfaction predicted higher eudaimonic well-being. Similar to happiness, group relatedness frustration significantly predicted eudaimonic well-being in the unexpected direction, with higher group relatedness frustration being related to higher eudaimonic well-being. The larger model with both group and personal needs was not a better fit than the model with personal needs alone, $\chi^2 (6) = 6.14, p = .408$.

Group Satisfaction

Only one variable was a significant and unique predictor of group satisfaction. Specifically, higher group relatedness frustration predicted lower group satisfaction. The larger model with both group and personal needs was not statistically a better model than the model with personal needs alone, $\chi^2 (6) = 5.25 \ p = .512$.

Research Question 4

Research Question 4 examined whether people accurately predict their basic psychological needs. Similar to Research Question 2, I will test this with two analyses by first

examining mean differences in anticipated and experienced basic psychological needs with a paired-samples *t* test (see Table 10) and then by conducting bivariate regressions to determine if anticipated needs share a significant amount of variance with experienced needs (see Table 11).

According to the paired-samples *t* tests analyses, people's anticipated autonomy satisfaction did not statistically differ from their experienced autonomy satisfaction. This indicates that people ended the game being about as equally satisfied in their autonomy as they thought they would be. However, according to the paired-samples *t* tests, participants statistically differed on every other basic psychological need. Participants anticipated they would be less satisfied in their competence and relatedness than they actually were at the end of the game. In contrast, people anticipated they would be more frustrated in their autonomy, competence, and relatedness than they were at the end of the game. Anticipated needs explained a significant amount of variance in all experienced needs except for competence satisfaction and autonomy frustration, indicating that additional variables likely account for variance in both variables.

Research Question 5

Research Question 5 asked whether behavioral engagement mediated the relationship between anticipated needs and experienced needs. For example, when people think that they will be satisfied in autonomy, are they more likely to engage with their group members, and does that in turn lead to higher experienced autonomy satisfaction? For each model, I entered in the anticipated need as the X variable, behavioral engagement as the mediator (M variable), and the respective experienced need as the outcome variable (Y variable). Confidence intervals for the indirect effects were computed using the Monte Carlo Method (10,000 samples), which is a form of parametric bootstrapping (Bauer et al., 2006). I report the path A coefficients (each anticipated need predicting behavioral engagement), the path B coefficients (behavioral engagement

predicting each experienced need) and the indirect effects and their confidence intervals in Table 12. Coefficients for autonomy frustration were omitted because results did not converge.

No indirect effects were significant, indicating that behavioral engagement does not mediate the relationship between predicted and experienced basic psychological needs. Both anticipated autonomy satisfaction and anticipated relatedness satisfaction predicted higher behavioral engagement. Anticipated competence satisfaction or anticipated frustration of any basic psychological need did not significantly predict behavioral engagement. Furthermore, behavioral engagement did not significantly predict experienced basic psychological needs.

IV. DISCUSSION

The current study contributed to the literature in several ways. First, I examined whether self-determination theory, or the relationship between satisfaction and frustration of autonomy, competence, and relatedness with well-being replicated in a new context – when people are working with others in small groups. I examined several markers of well-being, including satisfaction with the group, eudaimonic well-being, and several facets of hedonic well-being. Second, I examined whether the theory of self-determination, which has been mostly confined to only the study of individuals, can extend to that of common bond groups such that people see their groups as being satisfied or frustrated in basic psychological needs. Specifically, I examined whether people's perceptions of whether their groups are autonomous, competent, and related is associated with their own well-being. Finally, on an exploratory basis, the current study contributed to the literature by investigating the degree to which people are accurate in predicting whether their basic psychological needs will be satisfied (or frustrated) after working with others. I will discuss each of these contributions to the literature, as well as limitations and directions for future research.

Does Self-Determination Theory Replicate a Group Context?

To determine whether self-determination theory replicated in small groups, I examined whether each basic psychological need individually predicted each type of well-being, and then I determined whether satisfaction and frustration of each need predicted well-being while controlling for the remaining needs. The relationship between need satisfaction and well-being did not extend to groups as well as theory would suggest. At the bivariate level, relatedness

satisfaction and frustration predicted every facet of well-being, but autonomy and competence were less consistent predictors of well-being. It could be that certain contexts lead to some basic psychological needs explaining more or less variation in well-being. For example, Jordan and Smith (2022) found that autonomy and competence were especially important predictors of well-being and ill-being during the COVID-19 pandemic, perhaps due to lockdown measures that threatened people's autonomy or due to the drastic changes regarding daily living that threatened people's competence. Past research suggests that people consider their immediate surroundings when judging their own well-being. For example, in a classic study by Schwarz and Clore (1983), people rated their life satisfaction as being better on a sunny day compared to a rainy day. When people work with others, they might consider first how connected they are with others and consider the other needs as secondary.

Although results of the bivariate analyses suggest that relatedness was a consistent predictor of well-being, self-determination theory suggests that satisfaction of all three needs – autonomy, competence, and relatedness - should each uniquely predict well-being (Deci & Ryan, 2000). While less research has been conducted on need frustration (Vansteenkiste et al., 2020), theory would suggest that need frustration should predict, at the very least, the negative affect items such as sadness and anxiety (Bartholomew, 2011). Contrary to past self-determination theory research, there are no models where satisfaction or frustration of all three needs predicts greater well-being. Most models only had satisfaction and frustration of one or two needs that predicted well-being. In fact, autonomy was not a unique predictor of well-being in any model. This could be in part because of the social context and in part because of the ways that well-being was measured.

The Group Context Influences Basic Psychological Needs

One possibility as to why autonomy was not a significant predictor of well-being is that autonomy may not matter when people are working with others. For example, autonomy has been criticized as being a value not relevant in collectivistic cultures because people in these cultures care more about the concerns of the group rather than themselves as an individual (Tripathi et al., 2018). This would suggest that people in groups are not able to make autonomous decisions because they are acting in accordance with what their group wants. However, research in social identity theory, which suggests that people find their sense of self-esteem in groups, suggests otherwise (Tajfel & Turner, 1986). A recent meta-analysis (Yu et al., 2018) found that satisfaction of autonomy is still important in collectivistic cultures because people identify with the concerns of their groups, so their decisions feel autonomous because they are making decisions that are of value to them. Thus, perceptions of one's autonomy should explain variance in well-being when people are working in groups.

A more nuanced perspective is that people may vary in the degree to which they identify with their groups, and it is possible that this has downstream consequences for the perceptions of whether their basic psychological needs are met. For example, Evans and colleagues (2019) found that individuals who saw their fitness classes as being high in entitativeness (or the extent to which they perceived their class to be a group), were more likely to perceive that their needs of autonomy, competence, and relatedness were satisfied because they could conceptualize their group's achievements as their own. In the current study, the ICCs give some evidence that groups were (on average) moderately cohesive because these analyses indicate that there was little to no within group dependence prior to the game, but within-group dependence did increase after the game when members from within groups had interacted with one another. However, it

could still be that there is variance here with some people perceiving themselves as belonging to a group and others perceiving themselves to be individuals who happened to be working alongside others. This might would create variability in the data, as autonomy would matter more for people who either saw their groups as cohesive or who identified with their groups, and less for people who did not.

Self-Determination Theory Does Not Explain All Types of Well-Being

The current study used the affective circumplex model of emotion (Posner et al., 2009) to measure hedonic well-being. A factor analysis suggested this measure had four factors of emotion – one positive and three that were negatively valanced (sadness, disinterest, and anxiety). However, when investigating the relationship between basic psychological need satisfaction and hedonic well-being, prior research frequently assesses hedonic well-being with life satisfaction, the Positive and Negative Affect Schedule (PANAS) (Watson, Clark, & Tellegen, 1988), and at times, some combination of these (see Chang et al., 2015; Howell & Demuynck, 2021). The PANAS collapses emotion across two broad affective states – feeling positive and feeling negative. The fact that self-determination theory did not predict hedonic well-being when emotion was decomposed into more specific factors may present a boundary condition in self-determination theory. Perhaps basic psychological needs do not predict specific emotional states such as sadness or disinterest, or perhaps only basic psychological needs that are relevant to that specific emotion matter. For example, in both bivariate and full model analyses, the degree to which a person felt competent was significantly associated with disinterest, but not the degree to which they felt autonomous or related.

Of course, this boundary condition in the conceptualization of hedonic well-being does not necessarily explain why the three basic psychological needs did not predict eudaimonic well-

being or satisfaction with the group. It is worth noting that a well-established measure of eudaimonic well-being was used in this study (vitality; Ryan & Frederickson, 1997) which, in prior research, has demonstrated consistent relationships with all three basic psychological needs (e.g., Hadden & Smith, 2019). However, competence and relatedness satisfaction significantly predicted eudaimonic well-being in the full model and both satisfaction and frustration of competence and relatedness predicted eudaimonic well-being at the bivariate level. As previously stated, this could be because group identification especially matters for autonomy, and people might have differed in their degree of group identification. Finally, regarding satisfaction with the group, only relatedness satisfaction and frustration were significant predictors. How competent one feels in their own abilities may have little to do with how much people appreciate their groups.

Do People See their Groups as Having Basic Psychological Needs and Does that Matter?

Participants in this study rated whether they thought their own needs of autonomy, competence, and relatedness were met and whether the needs of their entire group were met. While people's perceptions of their own needs were correlated with their perceptions of their group's needs, participants rated them as being statistically different from one another. Participants thought they were more satisfied (and less frustrated) in their needs for autonomy and competence than their group was, indicating that satisfaction and frustration of group needs does exist as a different construct from satisfaction and frustration of one's personal needs. Furthermore, the direction of differences (personal needs being higher than group needs) echoes research regarding that people view themselves as more competent than others after watching others complete the same task (Kardas & O'Brien, 2018), or the better-than-average effect,

wherein most people rate their own abilities as being higher than average – a cognitive error because most people are in fact statistically average (Alicke & Govorun, 2005).

While autonomy and competence painted a clear picture in terms of personal needs being different from group needs, relatedness painted a slightly less clear picture. People saw their group being more satisfied in relatedness than they were personally, and there was no statistically significant difference between ratings of personal and group needs for relatedness frustration. This could be because people do not know how to judge their own connectedness relative to their entire group's connectedness, or it may simply be easier to judge with other types of groups such as common identity groups (e.g., religious groups, racial groups). Research indicates that in reference to identity groups, people easily identify the extent to which members of groups interact with one another, are similar to one another, and share common goals (Toosi & Ambady, 2011), whereas groups that are formed due to common interests (common bond groups), are usually rated as being lower in these traits (Prentice & Miller, 2007). Thus, while people may feel connected to individuals in groups, they may not know how to rate them in terms of overall connectedness.

Participants perceive their groups being differentially satisfied (or frustrated) in their needs for autonomy, competence, and relatedness relative to their personal needs, but the question of whether perceptions of group needs is associated with an individual's well-being is a different question entirely. In order to test this question, I conducted additional models with both personal and group needs and determined if group needs accounted for additional variance in well-being above personal needs. Like the smaller models discussed above, the larger models with both types of needs did not fully replicate self-determination theory. Many of the models

only had satisfaction or frustration of one or two basic psychological needs that were significantly and uniquely related with well-being. However, there were some general patterns.

In general, group needs did not matter in the prediction of happiness and eudaimonic well-being. Adding group needs to these models did not improve model fit. That is, once a person's individual needs of autonomy, competence, and relatedness needs are met, their perceptions of their group's needs do not matter in explaining well-being. Interestingly, people's perceptions of how frustrated their groups were in relatedness positively predicted both happiness and vitality. It is unclear as to why this may be, but it could reflect the idea that people are unsure how to judge how connected their group as a whole is.

In contrast to happiness and vitality, group needs did improve model fit over personal needs alone for negative affect. The less that people thought their groups were making their own autonomous choices and the more that people thought their groups were incapable at succeeding at the task, the greater negative affect that people felt. Perceptions of how well one's group is doing might especially matter in the prediction of negative affect. In our ancestral history, separation from one's group would have been dangerous (Tooby & Cosmides, 2008). Thus, perceiving that one's group is not doing well reflects signs of trouble and may negatively influence well-being. Finally, disinterest and group satisfaction each only had one unique predictor – personal competence satisfaction and group relatedness frustration, respectively. Again, this is likely because these are more specific emotion states and attitudes, and therefore only certain needs explain variance in these outcome variables.

Are People Accurate in Anticipating their Needs and Does this Predict Engagement?

Participants rated how satisfied and frustrated they thought they would be in their basic psychological needs before the game and rated how they experienced these needs after the game.

These scores statistically differed from one another such that people thought they would be less satisfied in their needs for competence and relatedness and more frustrated in autonomy, competence, and relatedness than they were at the end of the game. In other words, except for autonomy satisfaction, people were not especially accurate at predicting how they would feel in the future; notably, they assumed they would feel worse during the game than they did. This echoes research in affective forecasting (Wilson & Gilbert, 2005), which suggests that people are bad at predicting how they will feel in future situations, and that people overestimate how bad they will feel in negative situations because they underestimate their ability to cope with those situations. It could be that learning a new task in front of strangers (during a global pandemic nonetheless when people likely had fewer social interactions) was a somewhat discomforting experience for participants, and they underestimated their ability to cope with that situation.

While participants' anticipated need satisfaction and frustration differed from their experienced need satisfaction and frustration, a perhaps more important question is whether these differences had any association with their behavior during the game. Participants who anticipated that they would be more satisfied in their needs of autonomy and relatedness were more likely to report that they engaged with their other group members during the game. However, the extent to which a person was engaged with their group members had no relationship with their need satisfaction and frustration after the game. Furthermore, there were no significant indirect effects – the relationship between anticipated and experienced basic psychological need satisfaction was not mediated by behavioral engagement. These results were not entirely in line with prior work in self-determination theory. Rahmadani and colleagues (2019), for example, found that when participants' needs were satisfied at work that they were more likely to be engaged in their work, such that they were proud of the work that they did and that they experienced good workflow. It

is important to mention that need satisfaction in this prior study *predicted* greater work engagement – not the other way around. This could explain why none of the behavioral engagement to experienced psychological need pathways were statistically significant. People become more engaged when their needs are satisfied, but high engagement does not necessarily predict that one's needs are satisfied or frustrated. Some engagement with one's group could lead to one's needs being satisfied, and some engagement could lead to one's needs being frustrated.

Limitations and Directions for Future Research

The current study was the first of its kind to extend self-determination theory to common bond groups to determine if the way an individual conceptualizes their groups influences their own well-being. However, this study was not without limitations. This study examined groups who met on Zoom as the COVID-19 pandemic has led to people meeting online (Parker et al., 2022). This represented an important opportunity to study groups where they are currently meeting. However, this also meant that there was less standardization in where participants were meeting (relative to an in lab study). As participants were undergraduate students, many participants attended the study from their dorm rooms where their roommates were present or in high traffic areas on campus (e.g., the student union), while others attended in much more private areas. Thus, there was a lot of variation in the extent to which participants could be involved with their group members because some were in more distracting environments than others. In many ways this increases the mundane realism of the study. When people work with others online, they are in all kinds of environments and group members do not share the same distractors with one another. However, this also likely created more variability in the data. Future research should investigate differences between groups meeting online and meeting in person. This would have important real-world implications, because employees and management at

many large corporations are still debating the advantages and disadvantages to working from home (Parker et al., 2022).

Second, this study examined ad hoc groups, or groups newly formed for the purpose of the study. Many participants were strangers prior to the study and the groups dissolved when the study concluded. There are many benefits to studying ad hoc groups. Some are practical – it is easier to collect data for more groups in a shorter amount of time and these groups can be given standardized tasks, which increases internal validity. In other ways, ad hoc groups pose interesting theoretical questions. For example, the minimal groups paradigm (Tajfel et al., 1979) asks the question of whether people show ingroup bias even when they were assigned to their groups based on relatively meaningless criteria. With ad hoc groups, we can ask the question of if people perceive that their groups are autonomous, competent, and related, even under somewhat minimal criteria - when they are newly formed and will quickly dissolve. However, results of the current study were largely inconclusive with whether self-determination theory extends to the study of small groups as the theory did not replicate well even when only considering personal needs. As such, future research should examine different types of groups. When people interact with their group members on a regular basis (e.g., standing committees at work, project help groups in class) and when those groups have larger implications on their well-being (e.g., job performance, class grades), people may be more likely to think more about the needs of their entire group. To that end, future research should study already formed, common-bond groups, as well as identity groups (e.g., is my political party that I am apart of competent, autonomous, and related enough to positively affect policy). It will be important to investigate whether perceptions of group identification or cohesiveness moderate the relationship between need satisfaction and well-being in groups.

Finally, there are a couple of methods that the current study used that could be adjusted in future research. First, the current study used a cooperative task that few participants were familiar with (91% of participants were not at all familiar with *Forbidden Island*). A possible consequence of this was that only 6 of 39 groups won the game, meaning that I was unable to determine if winning (vs losing) the game had any downstream consequences. Future research might benefit by having participants play more practice rounds (participants only played one practice round) to get a better grasp at the game. Second, the current study used several single-item measures especially when examining basic psychological need satisfaction and frustration. Participants completed these measures at several times over the course of the study – before playing the cooperative game, during, and after. Thus, shortened measures were used to reduce participant demand, as is commonly done in research like daily diary studies (e.g., Hadden & Smith, 2019) where people complete the same measure multiple times. However, single item measures may not be tapping into the entire construct, and their ability to produce reliable results over time can range (Postmes et al., 2012). Thus, future research should use more comprehensive scales of basic psychological need satisfaction and frustration.

Conclusion

Decades of research in self-determination theory suggests that satisfaction of autonomy, competence, and relatedness is associated with psychological well-being (Van Den Broeck et al., 2016). While this research has investigated the relationship in many different contexts, no research to date has extended the theory from the individual alone to the individual situated in groups. Thus, the current study sought to determine whether satisfaction of autonomy, competence, and relatedness predicts several facets of well-being in groups. Furthermore, a main

goal of the study was to examine if people perceive their groups to be autonomous, competent, and related, and whether perceptions of one's groups are associated with well-being.

To test these research questions, the current study recruited 39 ad hoc groups of 2 to 4 people who played a cooperative game and responded to their basic psychological need satisfaction and frustration and well-being before and after the game. Self-determination theory did not replicate well in this context; specifically, satisfaction of autonomy did not predict any well-being measure. This could be because people may be less sensitive to their autonomy when working with others. However, people did see their group's basic psychological needs as being different from their own. Adding individuals' perceptions of group basic psychological needs did not explain additional variance in positive affect or eudaimonic well-being, perhaps suggesting that if a person's needs are satisfied, they are less concerned with how their group is doing. It did improve model fit for negative affect, which suggests that perceptions that one's group is not doing well may negatively impact their well-being.

It is important that investigators continue conducting research on common bond groups. These groups exist in a variety of contexts, including schools, workplaces, the military, and in people's daily lives. Individuals must work together to conduct great research at universities, develop innovative ideas, and make tough decisions. Understanding how individuals influence one another in these group settings is not only crucial for group productivity and performance, but also for overall well-being both in the group context and out.

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APPENDICES

Table 1

Participant Demographics

Total number of participants	124
Participants indicating some familiarity with Zoom	122 (98.4%)
Participants who read game instructions prior to study	60 (48.4%)
How often participants play cooperative games	
Never or rarely	46 (37.1%)
Sometimes or occasionally	41 (33.1%)
Often	37 (29.8%)
Participants' prior familiarity with *Forbidden Island*	
Not at all familiar	113 (91.1%)
Somewhat familiar	7 (5.6%)
Very familiar	3 (2.4%)
Race	
White	97 (78.2%)
Black	15 (12.1%)
Hispanic	3 (2.4%)
Biracial	8 (6.5%)
Other	1 (0.8%)
Gender identity	
Female	80 (64.5%)
Male	43 (34.7%)
Transgender Male	1 (0.8%)
Mean age (SD)	18.75 (1.24)
Mean game enjoyment (SD)	3.83 (.94)

Table 2

Group Demographics

Total number of groups	39
Groups who won the game	6 (15.4%)
Groups with prior familiarity with other group members	11 (28.2%)
Number of group members	
2 Members	6 (15.4%)
3 Members	20 (51.3%)
4 Members	13 (33.3%)
Gender composition of groups	
All Women	10 (25.6%)
All Men	2 (5.1%)
Mixed Gender	27 (69.2%)

Table 3

Descriptive Statistics for all Primary Study Variables

Variable	*M*	*SD*	Range	Skew	Kurtosis	Reliability
Anticipated Personal Basic Psychological Needs						
Autonomy Satisfaction	7.54	2.10	1 – 10	-1.24	1.59	
Competence Satisfaction	6.12	2.24	1 – 10	-0.29	-0.52	
Relatedness Satisfaction	5.39	2.04	1 – 10	-0.02	-0.56	
Autonomy Frustration	5.10	2.07	1 – 9	-0.16	-0.72	
Competence Frustration	4.38	2.63	1 – 10	0.39	-0.89	
Relatedness Frustration	2.96	1.82	1 - 8	0.89	0.12	
Experienced Personal Basic Psychological Needs						
Autonomy Satisfaction	7.62	2.32	1 – 10	-1.12	0.95	
Competence Satisfaction	7.19	2.33	1 – 10	-0.71	-0.13	
Relatedness Satisfaction	6.31	2.63	1 - 10	-0.29	-0.81	
Autonomy Frustration	3.28	2.15	1 – 9	0.78	-0.15	
Competence Frustration	3.34	2.34	1 – 10	0.83	-0.04	
Relatedness Frustration	2.28	1.71	1 - 8	1.33	1.17	
Experienced Group Basic Psychological Needs						
Autonomy Satisfaction	7.02	2.48	1 - 10	-0.68	-0.20	
Competence Satisfaction	5.94	2.92	1 – 10	-0.12	-1.17	
Relatedness Satisfaction	7.15	2.46	1 – 10	-0.72	-0.19	
Autonomy Frustration	3.78	2.42	1 – 10	0.50	-0.81	
Competence Frustration	4.30	2.52	1 – 10	0.34	-0.83	
Relatedness Frustration	2.33	1.93	1 - 10	1.71	2.72	
Hedonic Well-Being						
Happiness	6.34	1.84	1 – 10	-0.48	0.46	.86
Sadness	2.36	1.76	1 – 9	1.34	1.44	.81
Disinterest	4.11	2.40	1 – 10	0.32	-0.73	.77
Anxiety	3.43	1.81	1 – 9.33	0.54	-0.00	.72
Eudaimonic Well-Being	5.97	1.72	1 – 9.86	-0.31	0.09	.86
Group Satisfaction	4.08	1.03	1 – 5	-1.05	0.40	.96
Behavioral Engagement	3.78	0.91	1 - 5	-0.75	0.24	.92

Table 4

Intraclass Correlation and Design Effect Statistics for all Primary Study Variables

Variable	Intraclass Correlation Coefficient (ICC)	χ^2	*p*	Design Effect (DEFF)
Anticipated Personal Basic Psychological Needs				
Autonomy Satisfaction	.00	28.45	.870	1.00
Competence Satisfaction	.00	29.46	.838	1.00
Relatedness Satisfaction	.11	54.63	.039	1.24
Autonomy Frustration	.00	36.63	.532	1.00
Competence Frustration	.00	36.88	.521	1.00
Relatedness Frustration	.07	43.56	.246	1.15
Experienced Personal Basic Psychological Needs				
Autonomy Satisfaction	.33	66.24	.003	1.72
Competence Satisfaction	.15	58.99	.016	1.33
Relatedness Satisfaction	.46	141.29	<.001	2.00
Autonomy Frustration	.05	44.94	.204	1.11
Competence Frustration	.05	45.16	.197	1.11
Relatedness Frustration	.16	62.73	.007	1.35
Experienced Group Basic Psychological Needs				
Autonomy Satisfaction	.19	70.84	.001	1.41
Competence Satisfaction	.29	87.53	<.001	1.63
Relatedness Satisfaction	.44	130.41	<.001	1.96
Autonomy Frustration	.01	39.59	.399	1.02
Competence Frustration	.11	52.59	.058	1.24
Relatedness Frustration	.05	47.77	.133	1.11
Hedonic Well-Being				
Happiness	.31	93.80	<.001	1.66
Sadness	.03	39.63	.397	1.07
Disinterest	.01	39.25	.414	1.02
Anxiety	.17	62.40	.008	1.37
Eudaimonic Well-Being	.16	59.89	.013	1.35
Group Satisfaction	.13	56.57	.027	1.28
Behavioral Engagement	.28	85.81	<.001	1.61

Note. Degrees of freedom for chi-square statistics is 38.

Table 5

Pseudo-Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11
1. Autonomy Satisfaction	-										
2. Competence Satisfaction	.51*	-									
3. Relatedness Satisfaction	.49*	.51*	-								
4. Autonomy Frustration	-.08	-.08	-.10	-							
5. Competence Frustration	-.14	-.26*	-.22*	.41*	-						
6. Relatedness Frustration	-.19	-.17*	-.31*	.45*	.41*	-					
7. Happiness	.34*	.40*	.31*	-.22	-.16	-.28*	-				
8. Sadness	.01	.03	-.15*	.22*	.08	.43*	-.21*	-			
9. Disinterest	-.17	-.34*	-.16*	.24	.29*	.20*	-.46*	.31*	-		
10. Anxiety	-.18*	-.12	-.14*	.25*	.14	.41*	-.17	.70*	.19	-	
11. Eudaimonic Well-Being	.16	.48*	.30*	-.11	-.27*	-.15*	.66*	-.06	-.71*	.05	-
12. Group Satisfaction	.24*	.15	.48*	-.03	-.05	-.40*	.28*	-.31*	-.11	-.24*	.20

Note. *p < .05

Coefficients are group mean centered and represent the effect while controlling for the average of each participant's group.

All coefficients were standardized to allow for comparisons.

Significance computed with robust standard errors

Table 6

RQ1: Relationship Between Personal Basic Psychological Needs and Well-Being Variables

	Happiness	Sadness	Disinterest	Anxiety	Eudaimonic Well-Being	Group Satisfaction
	b (SE)	*b* (SE)	*b* (SE)	*b* (SE)	*b* (SE)	*b* (SE)
Intercept	6.39 (.21)*	2.47 (.17)*	4.04 (.22)*	3.44 (.19)*	5.99 (.17)*	4.07*
Autonomy Satisfaction	.08 (.09)	.01 (.08)	-.01 (.17)	-.11 (.07)	-.14 (.09)	.04 (.04)
Competence Satisfaction	.16 (.07)*	.05 (.11)	-.37 (.14)*	.00 (.09)	.33 (.07)*	-.05 (.06)
Relatedness Satisfaction	.16 (.09)	-.08 (.13)	.00 (.12)	.03 (.08)	.21 (.07)*	.28 (.06)*
Autonomy Frustration	-.11 (.09)	.09 (.08)	.10 (.12)	.09 (.08)	-.06 (.09)	.02 (.03)
Competence Frustration	.06 (.09)	-.14 (.09)	.16 (.11)	-.04 (.08)	-.03 (.09)	.08 (.05)
Relatedness Frustration	-.07 (.09)	.55 (.11)	.04 (.18)	.39 (.14)*	.01 (.11)	-.17 (.06)*

Note: * $p \leq .05$.
Coefficients are group mean centered and represent the effect while controlling for the average of each participant's group.
Coefficients with robust standard errors are reported.

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Table 7

RQ2: Difference Between Personal and Group Basic Psychological Needs

Variable (Personal Needs – Group Needs)	t	Mean Difference	95% CI of Mean Difference	p	Cohen's D
Autonomy Satisfaction	3.27	0.60	0.24, 0.96	<. 001	.30
Competence Satisfaction	4.89	1.24	0.74, 1.74	< .001	.44
Relatedness Satisfaction	-5.70	-0.85	-1.14, -0.55	<.001	.51
Autonomy Frustration	-2.65	-0.50	-0.87, -0.13	.009	.24
Competence Frustration	-3.77	-0.98	-1.49, -0.46	<.001	.35
Relatedness Frustration	-0.64	-0.07	-0.31, 0.16	.526	.06

Table 8

RQ2: Examination of Whether Personal Needs Predict Variance in Group Needs

Variable (Personal Needs Predicting Group Needs)	b (SE)	p
Autonomy Satisfaction	.60	<.001
Competence Satisfaction	.23	.004
Relatedness Satisfaction	.65	<.001
Autonomy Frustration	.59	<.001
Competence Frustration	.23	.065
Relatedness Frustration	.75	<.001

Note. Regression coefficients are group mean centered and represent the effect while controlling for the average of each participant's group.

All coefficients were standardized to allow for comparisons.

Significance computed with robust standard errors.

Table 9

RQ3: Relationship Between Personal and Group Basic Psychological Needs and Well-Being Variables

	Happiness	Sadness	Disinterest	Anxiety	Eudaimonic Well-Being	Group Satisfaction
	b (SE)	*b* (SE)	*b* (SE)	*b* (SE)	*b* (SE)	*b* (SE)
Intercept	6.38 (.21)*	2.45 (.17)*	4.03 (.23)*	3.44 (.19)*	5.98 (.17)*	4.09 (.12)*
Personal Autonomy Satisfaction	.17 (.08)*	.09 (.09)	.05 (.16)	-.04 (.09)	-.14 (.08)	-.03 (.03)
Personal Competence Satisfaction	.12 (.08)	.02 (.09)	-.40 (.17)*	.02 (.09)	.31 (.08)*	-.01 (.04)
Personal Relatedness Satisfaction	.17 (.12)	.14 (.09)	.01 (.20)	.15 (.11)	.20 (.11)	.12 (.07)
Personal Autonomy Frustration	-.05 (.10)	-.05 (.09)	.05 (.14)	.00 (.12)	-.07 (.10)	.01 (.04)
Personal Competence Frustration	.08 (.11)	-.14 (.09)	.12 (.15)	-.00 (.09)	-.01 (.11)	.01 (.08)
Personal Relatedness Frustration	-.19 (.14)	.45 (.12)*	.19 (.22)	.30 (.16)	-.16 (.14)	.08 (.04)
Group Autonomy Satisfaction	-.09 (.10)	-.26 (.11)*	-.16 (.20)	-.21 (.10)*	.08 (.11)	-.00 (.02)
Group Competence Satisfaction	.11 (.07)	.12 (.07)	.20 (.13)	.11 (.09)	-.03 (.06)	.12 (.06)
Group Relatedness Satisfaction	-.10 (.15)	.04 (.13)	-.05 (.24)	.08 (.14)	-.02 (.13)	.00 (.04)
Group Autonomy Frustration	-.10 (.07)	.18 (.09)	.03 (.11)	.12 (.10)	.03 (.07)	.00 (.04)
Group Competence Frustration	-.10 (.09)	.30 (.09)*	.01 (.13)	.22 (.09)*	-.07 (.09)	.01 (.03)
Group Relatedness Frustration	.22 (.11)*	-.09 (.08)	-.18 (.18)	-.09 (.09)	.25 (.10)*	-.19 (.06)*

Note. *p < .052
Coefficients are group mean centered and represent the effect while controlling for the average of each participant's group.
Significance computed with robust standard errors.

Table 10

RQ4: Relationship Between Anticipated Basic Psychological Needs and Experienced Basic

Psychological Needs

Variable (Anticipated Needs – Experienced Needs)	t	Mean Difference	95% CI of Mean Difference	p	Cohen's D
Autonomy Satisfaction	0.04	0.01	-0.43, 0.45	.97	.00
Competence Satisfaction	-3.56	-0.98	-.1.53, -0.44	.001	.34
Relatedness Satisfaction	-3.83	-0.83	-1.26, -0.40	<.001	.36
Autonomy Frustration	7.04	1.74	1.25, 2.23	<.001	.67
Competence Frustration	4.62	1.05	0.60, 1.49	<.001	.44
Relatedness Frustration	4.66	0.70	0.40, 0.99	<.001	.43

Table 11

RQ4: Examination of Whether Anticipated Needs Predict Variance in Experienced Needs

Variable (Anticipated Needs Predicting Experienced Needs)	b (SE)	p
Autonomy Satisfaction	.45 (.14)	.002
Competence Satisfaction	.26 (.14)	.076
Relatedness Satisfaction	.45 (.10)	<. 001
Autonomy Frustration	.19 (.12)	.120
Competence Frustration	.46 (.10)	< .001
Relatedness Frustration	.59 (.11)	< .001

Note. Regression coefficients are group mean centered and represent the effect while controlling for the average of each participant's group.
All coefficients were standardized to allow for comparisons.
Significance computed with robust standard errors.

Table 12

RQ5: Examination of Whether Behavioral Engagement Mediates the Relationship Between Anticipated and Experienced Needs

	Path A Anticipated need → behavioral engagement	Path B Behavioral engagement → experienced need	Path C Indirect effect	95% CI Indirect Effect
	b (SE)	*b* (SE)	*b* (SE)	
Autonomy Satisfaction	.11 (.04)*	.15 (.30)	.02 (.03)	-.05, .09
Competence Satisfaction	.04 (.04)	-.13 (.34)	-.01 (.02)	-.05, .03
Relatedness Satisfaction	.15 (.04)*	.25 (.29)	.04 (.05)	-.05, .14
Autonomy Frustration	-	-	-	-
Competence Frustration	.01 (.03)	-.06 (.30)	-.00 (.01)	-.02, .02
Relatedness Frustration	.01 (.05)	.06 (.20)	.00 (.01)	-.02, .02

Note. p < .05
Path A and Path B coefficients were computed with group mean centered variables and represent the effect while controlling for the average of each participant's group.
Effects were not computed for autonomy frustration because results did not converge.
Significance computed with robust standard errors.

List of Appendices

Appendix A: SONA Recruitment Information

Study Title: Psychology of Cooperative Board Games

Brief Description: This will take 2.5 hours to complete. You will play a board game on Zoom with other participants and answer questions about your experience.

Long Description: We want YOU to play a board game on Zoom with us!

We're looking for people who love to play board games. We will be playing the game, Forbidden Island®. In this game, you'll have to work with your group members to capture treasure and to get off of a sinking island! You do not need to know how to play the game prior to signing up. In fact, we hope you'll learn more about a game that you can play with your friends later! If you want to know more about the game, click the following link to view the game rules: https://gamewright.com/pdfs/Rules/ForbiddenIslandTM-RULES.pdf

For this study, you will complete an activity to get to know your other group members, will learn how to play the cooperative board game, and then will play the game, all over Zoom. We'll take breaks periodically throughout the game so that you can answer brief but anonymous questions about your experience with your group members and with playing the game.

If you would like to participate, please make sure that you show up at the start of your study session and that you can stay the whole time as to not interrupt the experience for others.

As a thank you for your participation, you will receive a 5$ Starbucks gift card in addition to SONA credit. If you and your group members win the game, you will also be entered into a drawing for 20$ gift card of your choosing (https://www.tangocard.com/reward-catalog/).

Please know that because this study is about playing cooperative games in groups, we will need four participants in each study session in order to play the game. Because of this, if we do not have enough participants signed up for your time slot, we will work with you to reschedule you at a time that you and other participants can meet.

If you see that all time slots are taken, please continue to check back daily for more time slots. We will only schedule future time slots once our current time slots are all filled up - this is to ensure that we have four people to play each game!

Once you and three others have signed up for your time slot, you will receive an email with information for your Zoom study session. You will not need a Zoom account in order to participate, but you will need to attend the Zoom session on a laptop or desktop computer (this is essential for you to be able to see the game board!) and be able to use audio and webcam functions. The study session will be recorded by Zoom.

Good luck to all who play the game. We hope you can make it off of the sinking island!

Appendix B: Participant Email with Zoom Information and Qualtrics Link for Consent

Hi,

Thank you for signing up for the study, *Psychology of Cooperative Board Games*! We are really excited that you chose to sign up for this study and that you get to play this game with us. At **[insert time]** you will just need to click on the Zoom link below in order to participate:

[insert zoom link]

Here are a couple of things to know about this study:
- A research assistant will be with you on the Zoom call to guide you through playing the game and completing the surveys
- This study session will be recorded by Zoom
- You do not need a Zoom account in order to participate
- We ask that you participate on a laptop or desktop computer in order to properly see the game during the study. If you do not participate on one of these devices, you will be unable to participate
- You are strongly encouraged to have a scratch piece of paper and something to write with so that you can take notes for yourself during the game

Before participating in the study, please click the link below in order to learn more about the study and to tell us whether or not you agree to participate.

[insert informed consent link]

You might also have more fun in the game (and have a better chance at winning the game and therefore one of our 20$ gift cards) if you are comfortable with the game board and instructions! You will learn how to play the game in our Zoom meeting, but it might also be helpful to review a few resources beforehand:
- Here is a link to the game instructions: https://gamewright.com/pdfs/Rules/ForbiddenIslandTM-RULES.pdf
- I have also attached a picture of the game board that we will be playing on AND a reference sheet for you to use throughout the game.

If you have any questions, please email Lauren Jordan at ljordan1@go.olemiss.edu

Thank you,

Lauren Jordan

Appendix C: Beginning of Study Instructions

1. Instructions for Entering Study

[*Before participants enter Zoom session, game board should already be set up according to game board set up instructions*]

As participants enter the Zoom room, meet with each individually to gain verbal consent for participating and for recording the study session in Zoom breakout rooms:

Research assistant: "We really appreciate you willing to help us with this study! Before we begin the study, I'd like to once again share with you our study information form [*send form if participant has already completed Qualtrics consent, send Qualtrics consent link if not*]. We will also be recording this study session. These recordings will not be shown to anyone besides the research assistants of this study and the principal investigator. These videos will not be published anywhere and will only be reported in summary form. Do you agree to allow us to record this study session?

Research assistant: "Great! I'll give you a few minutes to look over everything. Once everyone in your group has had time to look over this information, I'll add everyone into the same Zoom room and we'll begin the study. If you have any questions in the meantime, please feel free to message me in the chat window. You can find the chat window by moving your cursor to the bottom of the screen and clicking on "chat".

[*After a few minutes, bring all participants into the same room*]
[*Begin recording Zoom session*]

Research assistant: "Hi everyone! Thank you for coming to participate in our study today. We are interested in learning how people interact while playing cooperative games and performing cooperative tasks. Today, we will first complete a task so that everyone can get to know each other better. Then, we'll learn how to play the game, *Forbidden Island®*. *Forbidden Island®* is a cooperative game meaning you all succeed together, or you all fail together. You won't be competing against each other; rather, you'll be seeing if you can win against the system. Not only will you receive SONA credit and a Starbucks gift card for your help in our study today, but the groups who successfully win the game will be put into a drawing for a 20$ gift card of your choice! Don't worry, we'll do a few practice rounds to make sure you understand the game before we begin. What questions do you have so far?

Research assistant: "Before we begin the game, we'll complete an icebreaker so that you can get to know each other. Let's get started!"

2. Icebreaker Instructions

RA: Okay, so let's spend just a few minutes getting to know each other. I'm [*insert RA name*] and I study psychology here. What are your names and majors? What year of school are you in?

RA: Thanks everyone for sharing! Let's get to know each other a little bit more by playing two truths and a lie. For this game, think of three statements about yourself. Two of them will be true, but the other will not. Then, we'll all take turns guessing which of your statements are true and which are a lie. I'll go first!

[*research assistant gives their statements and allows for others to as well*]

3. Learning the Game and Practice Rounds

Research assistant: "Now that you all have gotten to know each other a little better, it's time for you to learn how to play *Forbidden Island*®!

[not necessary to say if you share screen to camera which is the ideal].
I'm going to walk you through step by step with how to play this game. It might help to move your view into speaker view by clicking view in the top-right corner and then by selecting speaker. This will help you to see a larger picture of the game board.

Let's begin! First, Forbidden Island is a cooperative game. That means you are not competing against one another. You will work together to try to win the game. Similarly, if one of you goes down, you all go down with them.

Your primary objective is to work together to keep Forbidden Island from sinking in order to buy enough time to capture its four treasures [*show treasures*]. Once you've captured them, you must make it to Fool's landing and escape by helicopter to win [*show everyone Fool's landing*]. If, however, the island sinks before you complete your tasks, your mission ends in defeat!

Let me *first* show you around the game board and *then* introduce you to how you'll capture treasures and make it off the island.

This is the game board that you and your fellow teammates will be moving around. First, I want to show you the treasure pieces. Here is the water treasure, the wind [*lion*] treasure, the fire treasure, and the earth treasure. You can definitely just call these treasures by their colors if that's easier for you. Your team will move around the game board in order to capture these treasures during the course of the game. I'll explain how you'll move around the board later, but for now, know that you'll capture a treasure by discarding 4 matching treasure cards (once someone has four earth stones, that person can capture the earth stone treasure for the whole group). You must be on one of the treasure's corresponding tiles to discard your treasure cards and to capture the treasure. Each treasure has two corresponding tiles. That means that in order to capture the water treasure, you must be either here or here [*point to appropriate places on the board*] when discarding your treasure cards. I will tell you more about the actions you'll take in the game in a minute, but what questions do you have so far?

Perfect! Let's continue. Since I have already mentioned the treasure cards, I will go ahead and deal those out to you. Pay attention to which cards you are getting and please know that it might be helpful to write down your cards to keep up with them. Remember, you are working with your teammates, so it is okay (and even recommended) for you to know your teammates cards and for your teammates to know your cards. [*Pass out **two cards** to each player, show them to participants*]. Notice there are a variety of cards which I'll explain later [*players might get treasure or special action cards. Read those to participants if they get them. If they get a Waters Rise! Card, put it back in the deck and shuffle the deck*].

In addition to the treasure cards, there are also two other types of cards. First, there is the flood deck. These cards will determine which parts of the island are flooding. The game starts with 6 pieces of the island that are flooding, so I will draw 6 cards and show you which parts of the island are flooding [*Draw the 6 cards. Flip the tiles*]. Notice that the Flooding tiles are blue. You'll still be able to move around the game board on these as you would non-flooded tiles, but if you re-draw a card for a tile that is already flooded, it'll cause that part of the island to sink (the tile will be removed from the game board) and it'll make movement around the game board more difficult. You'll want to pay attention to the parts of the island that are flooding!

The last type of card is the adventurer card. I've already assigned you to an adventurer and have created sheets with your adventurer information on them, as well as other game instructions that you can use as a cheat sheet throughout the game. I sent these reference sheets to you in the introductory email, but I will re-send you your adventurer cards in the chat box [*send adventurer cards and make sure everyone knows which adventurer they are*]. Take a moment to read out loud your roles and powers written on the top of the document I sent you so that your teammates know your strengths.

Thank you for doing that! You'll find that the game will be easier to win if you cooperate and take advantage of these special powers.

I'm now going to take the pawn matching the color of your adventurer card and place it on the corresponding tile. [*show each participant where they are on the board*].

The last part of the game board that I want to introduce you to is the water level meter. We will start off at "novice" level 2. This will tell us how many tiles on your island will flood each turn! This means after every person's turn, we'll find out which two parts of the island are flooding.

That is your introduction to the board and all the pieces. I know that was a lot of information, and hopefully it will start coming together when I tell you how to move around the board. Does anyone have any questions in the meantime?

You will take turns in this order: [*list order of names and be sure to write them down along with the color of the pieces and their adventurer*]

On each of your turns, you're going to take three actions. You can take any combination of the following actions and can do your actions in any order. I'm going to go through these actions in detail, and as a reminder they are also on your cheat sheet on the right hand side.

1. Option number 1: You can move one space across the game board. Moving one space = one action. You can go up and down or side to side but not diagonally. You'll tell me which way to move your pawn by telling me to move a certain direction (up, down, left, right OR by telling me to move to a certain location -Tile C6/Temple of the Moon).
    a. Couple of exceptions. You all have already told each other what your special actions are but I will reiterate a few of them here:
        i. The pilot can move to ANY tile once per turn for 1 action
        ii. The navigator may move OTHER players up to 2 adjacent tiles per action
        iii. The diver may move through one or more adjacent MISSING tiles for 1 action (so if a tile has sunk and has been removed from the game board, you can still move across that space).
        iv. Engineer – you have special abilities, but they don't apply to movement around the board
2. Option 2: You can shore up adjacent tiles. That means you can flip over flooded tiles. You must be on or directly next to the flooded tile in order to shore it up (it must be above, below, left, or right of you in order to shore up).
    a. One exception to this: the engineer can actually shore up to 2 tiles for 1 action
3. Option 3: You can give a treasure card to a teammate. 1 card = 1 action. You must be **on the same tile** as your teammate in order to give them a treasure card. If you want to give them two treasure cards, that takes up two of your actions. Remember, you have three actions per turn. You can't give special action cards, only treasure cards. Special action cards are the helicopter and sandbags that some of you got; I'll discuss those in a second.
4. Option 4: You can capture a treasure. 1 Treasure = 1 action. Once you have 4 treasure cards, you can discard them if your pawn is on or next to the corresponding tile with treasure.

So, in summary – when it's your turn, you can take three actions of your choosing in any order (move, shore up, give a treasure card, or capture a treasure once you have 4 treasure cards). A reminder of what actions you can take are on the sheet that I sent you!

Do you have any questions about the actions you will take in the game?

Great! After you take your three actions, I'll draw two treasure cards for you. There are several types of cards you may get when I draw these cards for you. Of course there are treasure cards – the entire deck has 5 of each treasure. Remember, you need four of each treasure to capture the corresponding treasure. There are also special action cards [*show them the special action cards*]. This includes helicopter lifts and sandbags. THESE CARDS CAN BE PLAYED AT ANYTIME, even during another person's turn. These cards, therefore, are super helpful to have. You also have Waters Rise! Cards. There are three waters rise cards in the deck. Anytime I draw one of these for your turn I will move the tick mark on the water meter [*show water meter again*]. This

notes how many flood cards I will now draw each turn. I'll then take all of the flood cards from the discard pile and shuffle them and place them on top of the flood draw pile. Importantly, this means that previously drawn cards will be drawn again soon and that flooded tiles can be permanently removed from the game board.

One last note about treasure cards – you can only have 5 cards in your hand at a time. If you find that you have 6 or more cards, you must immediately choose and discard the excess. If you choose to discard a special action card, you may use its action before discarding.

Okay. So you took your three actions. You drew your two treasure cards which I will draw for you and show you. The last part of your turn is to draw those flood cards. I will draw the number of flood cards that equal the current water meter level (so if the meter is at 2, I will draw 2 cards per turn). If the matching island tile is un-flooded, I will flip it over to its flooded side (it'll be blue). If the matching island tile is already flooded, it sinks! I will remove it and it will now be out of play.

If one of you is on a tile that becomes flooded: no big deal – YET, that is. I will pick you up and flip the tile over to show that the tile is flooded, and put you back on the same tile. If you are on a tile that sinks and must be removed, you must immediately "swim" to an adjacent tile. If you are on a tile that sinks and you can't move to an adjacent tile, everyone loses the game.
    One exception: the diver can swim to the nearest tile – so you don't have to have an adjacent tile to move to if you end up on a tile that sinks.

One last summary: For each person's turn, you'll take three actions of your choosing (move, shore up, give a treasure card, or discard 4 treasure cards to capture a treasure), I'll then draw two treasure cards for you, and then we'll draw the number of flood cards equal to the water meter. Then, we'll move on to the next player. We'll do that until you capture all 4 treasures and then you'll have one more step to win the game!

Winning the game:
Specifically, after you capture all 4 treasures, you must get to Fool's landing [*show them where Fool's landing is*]. After that, one player must discard a helicopter lift card to lift your team off of forbidden island for the win!

Losing the game:
There are 4 possible ways to lose:
- If both of the tiles with a treasure piece on them sink before you capture the respective treasure, you lose (because you will be unable to capture one of your treasures)
- If fool's landing sinks, you lose (because you will be unable to get off of the island. You will be stuck on the island for eternity)
- If any player is on an island tile that sinks and there is no adjacent tile to swim to, you lose (because you must all get off the island together. No person left behind!)
- And finally, if the water level reaches the top – the skull and crossbones – you lose (because the waters got too high)!

A reminder of your order of play for your turn (take three actions, draw two treasure cards, draw flood cards) is on your reference sheet for you to refer to throughout the game. I'll also be here to guide you, but I cannot make decisions about how you should act in the game. You also have on your reference sheet reminders about how to win the game and how to lose the game.

So, with that being said, that is everything you should need to begin playing the game. What questions do you have before we begin practicing the game?

4. Begin Practice Rounds (everyone takes one turn)

Research assistant. We'll do one practice round so that you can get a hang of all of this, but until then, what questions do you have?

Research assistant: "Okay, let's begin the practice rounds!"

[*research assistant shows participants a board that is already set up. The board will be set up the same way every time.]* **[***Research assistant directs participants to begin playing a practice round of the game*].

4. Participants Play Full Game

Research assistant: Okay, that concludes our practice round of the game. Great job! Do you have any more questions about how to play the game before we get started on the full round of the game?

Research assistant: Perfect. Before we begin the game, we'll take our first survey. I'll send the link to the survey in the chat window. Remember, you can find the chat window by moving your cursor to the bottom of the screen and clicking "chat". These survey questions will ask you about how you are feeling at the current moment in regard to playing the game with your group members. You will take this survey privately and there will be no way for your group members to know your responses.

Research assistant: When you start the survey, you'll be asked for your participant ID and your group ID. You can find these two different numbers at the bottom of your reference sheet. You all have the same group ID but different participant ID numbers. After entering in your ID numbers, you'll be asked what point of the game you're at. Click that you are at the beginning of the game.

[*inserts Qualtrics link and gives everyone two to three minutes to complete:]*
https://uofmississippi.qualtrics.com/jfe/form/SV_1G5BQEUkIFOtUVv

Research assistant: Okay, now that it looks like everyone is done with that, let's begin the game. Because you're already familiar with where the game tiles are placed, we'll be using that same set up in this round of the game. However, all other cards will be shuffled so that we can

start from the beginning. [*Show participants that all cards are being shuffled*]. You'll keep your same adventurer role so you can continue using your same reference sheets, and everyone will also play in the same order as before. Before I pass out everyone's cards, I'd like to let you know that every two rounds we will be completing a short survey. These survey questions will be similar to the ones you just answered. After you finish the game – whether that is by winning or losing – you'll also complete an additional survey. Do you have any questions?

[*Turns to board again*].

Research assistant: Let's begin the full round of the game! Remember, if you win the game, you'll be entered into a drawing to win a 20$ gift card so do your best! You'll have 45 minutes to play this game (not including survey time) so try to work quickly. I'll begin by drawing 6 flood cards. [*Draws 6 flood cards and turns over appropriate tiles; places pawns back on appropriate tiles*]. Now I'll begin dealing your cards [*Deals cards and show each player what their cards are*]. Remember, it might help to make notes about what your cards are so that you can keep up with them more easily. [*Make sure water card is set to level 2*]. Player 1, go ahead and take your first turn! [*set timer and stop every time they begin a survey. Restart timer when they begin playing again*].

[*After every 2 rounds of the game…*]

Research assistant: "Okay everyone, we've played for two rounds, so let's pause the game. We're now going to take a survey about how you are currently feeling about playing the game and interacting with your group members. Please know that some people's responses will change every time they take the survey and others may stay fairly consistent. There really is no right or wrong way to answer these! I'll send you the link for this survey in the chat window. Once again, you'll begin by typing in your participant and group ID which can be found at the bottom of your reference sheet. After that, answer that you are in the middle of the game.
[*sends Qualtrics link*]
https://uofmississippi.qualtrics.com/jfe/form/SV_1G5BQEUkIFOtUVv

[*After allowing a couple of minutes for participants to complete the questionnaires on Qualtrics, return to the study and have participants complete the game*]

5. End of Game Instructions

Verbal instructions for groups that win:

Research assistant: Congratulations on successfully capturing your treasure, getting off of the sinking island, and winning the game! As promised, we will put all of your names into a raffle along with the other groups who won the game. We'll let you know towards the end of the semester if you each have won one of our 20$ gift cards.

Verbal instructions for groups that lose:

Research assistant: Sorry, you just lost the game! You were unable to capture your treasure and get off of the sinking island.

To all participants:
Research assistant: We have one last survey we would like you to complete. Once again, I will send you a survey in the chat window. Please read the instructions at the top of the survey carefully, as you will see many of the same questions as before. Please respond to these questions regarding your *overall* experience playing the game. After that, you'll be asked a couple of questions about yourself. As usual, enter your participant and group ID number and then choose that you have just finished the game. When everyone is done, I will give you final instructions. Any questions?

[*sends Qualtrics link*]

https://uofmississippi.qualtrics.com/jfe/form/SV_1G5BQEUkIFOtUVv

Alright everyone, thank you once again for playing this game with me and with each other! I want to tell you just a little bit more about the point of this study. We were interested in studying *self-determination theory* which says that in order to experience well-being, people must be satisfied in their basic psychological needs for autonomy, competence, and relatedness. When people are prevented from feeling satisfied in these needs, they often feel frustrated and stressed. We specifically wanted to study this theory in the context of small groups. For example, if you felt like your group was capable of making competent decisions but you weren't really feeling particularly competent in yourself, how would that influence your well-being? We decided to ask these questions while you played a cooperative game because we thought it would mimic real life work groups. You all were all working together towards a goal, but you also had individual roles, or special powers, that you were responsible for. Further, groups of people working (and playing games with each other) have moved online over the course of the pandemic. We thought it was especially important to study groups where they are currently meeting – like on Zoom!

Once again, thank you for participating in this study! I'll assign your SONA credit and email you your Starbucks gift cards within the next few days. [if participants won the game also tell them about the 20$ gift card drawing which they will find out at the end of the semester].

Thanks everyone! Have a good day!

ADVENTURER: THE DIVER
Grey Pawn

Special Action: The Diver can move through 1 or more adjacent flooded and/or missing tiles for 1 action (Must end your turn on a tile.)

Order of Play:
1. Take up to 3 Actions
2. Draw 2 Treasure cards
	Discard down to 5
3. Draw Flood cards
	Equal to water level

- Move
	o Adjacent (not diagonally)
- Shore Up - flip a flooded tile up/make tile no longer flooded
	o On or adjacent tiles
- Give a Treasure card
	o If on same tile
- Capture a Treasure
	o 4 matching cards on matching tile

Actions:

Winning the Game
1. Collect all 4 treasures
2. All players must get to the Fools' Landing tile
3. One player must discard a Helicopter Lift card to lift your team off of Forbidden Island for the win!

Losing the Game
There are 4 possible ways to lose:
1. If both Temples, Caves, Palaces, or Gardens tiles sink before you collect their respective treasures.
2. If the Fools' Landing tile sinks.
3. If any player is on an Island tile that sinks and there is no adjacent tile to swim to.
4. If the water level reaches the skull and crossbones

Your participant ID:
Your group ID:

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Appendix E: Game Set Up Instructions

1. Post quiet sign on door
2. Make sure you have all of the correct documents ready to go:
   a. Check to see if all participants have completed the consent survey. If not, have the link ready to go to send to them. If yes, have the informed sheet pdf ready to go to send to them. Paste on Desktop for quick access
   b. Make sure you have all 4 adventurer cards saved on desktop for easy use. Before the game, randomly assign the four participants to an adventurer. On each adventurer card, type the participant number and group number that corresponds with the next ID numbers on the excel spread sheet. Make sure these sheets update and save properly before sending to participants.
3. Set up the game board:
   a. The game board should be set up the same way every single time. Refer to picture/map in order to set up the board

		Silver Gate	Temple of the Sun		
Cave of Shadows	Twilight Hollow	Fools' Landing	Lost Lagoon	Phantom Rock	Crimson Forest
Watchtower	Breaker's Bridge	Coral Palace	Dunes of Deception	Gold Gate	Temple of the Moon
Copper Gate	Whispering Garden	Observatory	Howling Garden	Iron Gate	Cave of Embers
	Tidal Palace	Misty Marsh	Bronze Gate	Cliffs of Abandon	

b. Place the water meter next to the board so that it is visible. Set the level to 2:normal
c. Set up the treasure deck: The first 8 cards should be in the following order: purple, helicopter, fire, lion, fire, sandbags, blue, sandbags. Take out the water rise cards. Shuffle remaining cards and put a waters rise card at the 15th position. Put the remaining waters rise cards at the bottom. Place the treasure deck next to the board, making sure you have enough room to discard any excess.
d. Set up the flood deck: The first 6 cards should be in the following order: Lost lagoon, phantom rock, dunes of deception, whispering garden, temple of the moon, Gold Gate. Shuffle the remaining deck and place it beneath the first 6 cards. Place the flood deck next to the board, making sure you have enough room to discard any excess.
e. Set up an area to keep track of participant cards. Get 4 notecards. Notecards should have player 1/Engineer/Red; Player 2/Diver/Green; Player 3/Navigator/yellow; Player 4/Pilot/Blue. Randomly assign each participant to each of these cards and write their name on the card. Use these cards as a placeholder to keep participant's cards and to keep track of order of participant play and who has what color
f. Make sure treasure pieces are placed next to game board
g. Make sure the protocol instructions and stopwatch (set to 0) are available.
h. Set up ring light and camera so that game board is visible on Zoom.
i. Make sure you are able to toggle between cameras and share screen to camera

Thank you for signing up for the study, Psychology of Cooperative Board Games! We really appreciate you helping us out with this research and we could not do it without you.

For this study, please click the Zoom link that we emailed you at the time you signed up for the study. You do not need a Zoom account in order to participate. We ask that you participate on a **laptop or desktop computer** and to have a scratch piece of paper and something to write with.

Upon logging on to your Zoom study session, you will complete an activity to get to know your other group members, will learn how to play a cooperative board game, and then will play the game. We'll take breaks periodically throughout the game so that you can answer brief but anonymous questions about your experience with your group members and with playing the game. This study session will be recorded by Zoom.

As a thank you for your participation, you will receive a 5$ Starbucks gift card in addition to SONA credit. If you and your group members win the game, you will also be entered in to a drawing for a 20$ gift card of your choosing.

Please read over the following information about the study and indicate whether you agree or disagree to participate in the study and whether you agree or disagree to allowing Zoom to record the study session.

Title: Psychology of Cooperative Board Games

Investigator	**Advisor**
Lauren Jordan, M.A.	Carrie Smith, Ph.D.
Department of Psychology	Department of Psychology
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The University of Mississippi	The University of Mississippi
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Description
The purpose of this research project is to determine how people interact while playing cooperative games and performing cooperative tasks, especially in online settings. We would like you to first complete a short task to get to know your other group members, and then for you to play a cooperative game with others on Zoom. We will ask you a few questions about the group you are playing the game with before the game, several times throughout the game, and at the end of the game.

Cost and Payments
It will take you 2.5 hours to complete this study. You will be granted 2.5 SONA credits and a 5$ Starbucks gift card for your participation. In addition, groups who successfully win the game will be entered into a drawing for 20$ gift card of your choosing.

Risks and Benefits
You may feel uncomfortable introducing yourself to and collaborating with others who you do not know. However, we do not think that there are any other risks. We think you will enjoy playing this game.

Confidentiality
This study will be recorded by Zoom. These recordings will be stored in a password protected file. The video recording of your study session, as well as the rest of your responses, will not be shared with anyone other than the principal researchers and will only be reported in summary form. We will not be collecting any identifying information.

Right to Withdraw
You do not have to take part in this study and you may stop participation at any time. If you start the study and decide that you do not want to finish, all you have to do is to tell the research assistant, Lauren Jordan, or Dr. Carrie Smith (contact information listed above). You may skip any questions you prefer not to answer.

IRB Approval
This study has been reviewed by The University of Mississippi's Institutional Review Board (IRB). If you have any questions, concerns, or reports regarding your rights as a participant of research, please contact the IRB at (662) 915-7482 or irb@olemiss.edu.

By providing the information below, you acknowledge that you are at least 18 years of age, have been informed of and understand the purpose of the study, agree to allow Zoom to record the study session, and freely consent to participate.

If you do not wish to participate/give consent, you can just close this window in your browser.

First name:
Last name:

Appendix G: Measure Appendix

1. Beginning of Survey Instructions

Enter your **Participant ID** number. This number can be found on the bottom left corner of your character sheet.

Enter your **Group ID** number. This number can be found on the bottom left corner of your character sheet.

Which point of the game are you at?
- Before the game
- Playing the game
- Finished the game

Before game instructions:
Let's get started! You're about to play Forbidden Island®, but first we'd like to ask how you a few questions about how you think the game will go. Remember that there are no right or wrong answers and your responses will remain private.

2. Anticipated Basic Psychological Need Satisfaction and Frustration

The following questions ask about **you specifically.**

Drag the slider below to match how true you think these statements will be of you **while playing the game.**

Not at all (1) -> Very Likely (10)
1. When I play the game, I think that my decisions will reflect what I want to do
2. I think I will do well at this game
3. I think I will fell close and connected with my group
4. I think I will feel pressured to follow my group member's directions
5. I am feeling insecure about my abilities
6. I think that my group members will be a bit cold towards me

3. End of Survey/Game Instructions

You have just finished Forbidden Island®! The following questions will ask you how you generally felt in the game. Some people's answers might be different from how they previously responded, while others might remain fairly consistent. Please know there is no right or wrong way to answer these questions.

4. Experienced Personal Basic Psychological Need Satisfaction

The following questions ask about **you specifically.**

Drag the slider below to match how true you thought these statements were of you **overall in the game.**

1 (Not at all) -> 10 (Very much)

1. Overall, I felt that my decisions reflected what I wanted to do
2. I felt that I was doing well at the game
3. I felt close and connected with my group
4. I felt pressured to follow my group member's directions
5. I felt insecure about my abilities
6. I felt that my group members were a bit cold towards me.

5. Affective Circumplex Model

Below are a few emotions.

Read each statement and drag the slider below to indicate how <u>you</u> felt **overall** while playing the game.

1 (Not at all) -> 10 (Very much)

1. Surprised
2. Content
3. Sleepy
4. Depressed
5. Afraid
6. Excited
7. Bored
8. Distressed
9. Joyous
10. Calm
11. Sad
12. Angry
13. Happy

6. Vitality

During the game,

1 (Not at all) - > 10 (Very much)

1. I felt alive and vital
2. I didn't feel very energetic
3. I felt so alive I just wanted to burst
4. I had energy and spirit
5. I was looking forward to each of my turns
6. I felt alert and awake
7. I felt energized

7. Experienced Group Basic Psychological Need Satisfaction and Frustration

These next questions ask about your **group as a whole**.

Drag the sliders below to match how true you think these statements were of your group **overall while playing the game.**

1 (Not at all) -> 10 (Very much)

1. As a whole, I think my group's decisions reflected what we wanted to do
2. My group successfully navigated difficult challenges in the game
3. I think people in my group worked together well
4. I think my group felt pressured to make certain decisions
5. My group had serious doubts about whether we could succeed at the game
6. My group members acted cold and distant towards each other

8. Group Satisfaction

The following questions will ask about your experience with your **group in general.**

1(Not at all) - > 5(Very much)

1. I was very satisfied working with this group
2. I enjoyed playing this game with my group members
3. I was happy with this group

9. Behavioral Engagement

The following questions will ask about your experience with your **group in general.**

1. What I did affected what my group members did
2. My group members paid close attention to me
3. I paid close attention to my group members
4. My intentions were clear to my group members
5. My group member's intentions were clear to me
6. What my group members did affected what I did
7. My group member's actions depended on my actions
8. My actions in the game depended on my group member's actions

10. Game Perceptions

The following questions will ask about your experience with **the game in general**.

1 (not at all) to 5 (very much)

1. I think the game was fun
2. I enjoyed playing the game
3. I felt bored while playing the game
4. I am likely to recommend this game to others
5. If given the chance, I would want to play this game again
6. I thought it was easy to learn how to play the game
7. I think I performed effectively in the game

11. Demographics

1. What is your age?
2. Which race(s) do you identify as (Please select all that apply):
     A. White/Caucasian
     B. Black/African American
     C. Hispanic, Latino, or Spanish Origin (e.g., Mexican, Puerto Rican, Cuban, Argentinian, Colombian, Dominican, Nicaraguan, Salvadoran, or Spanish)
     D. American Indian or Alaskan native
     E. Asian (e.g., Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, Hmong, Laotian, Thai, Pakistani, or Cambodian)
     F. Native Hawaiian or Other Pacific Islander
     G. Other race or origin
     H. Prefer not to answer

3. With which gender identity do you most identify?
    A. Male
    B. Female
    C. Transgender Male
    D. Transgender Female
    E. Gender-variant/Non-conforming
    F. Not listed

4. Prior to participating in this study, how familiar would you say you were with Zoom?
1 (Not at all) -> 5 (Very familiar)

5. How often do you play cooperative games (board games, video games)?
1 (Never) -> 5(Often)

6. Prior to participating in this study, how familiar would you say you were with the game we played, *Forbidden Island*?
1 (Not at all familiar) -> 5 (Very familiar)

7. Prior to participating in this study, did you read the instructions to the game, Forbidden Island?
    A. Yes
    B. No
    C. Not sure

8. How helpful did you find the instructions for *Forbidden Island*?
1 (Not at all helpful) -> 5(Very helpful)

9. Prior to participating in the study did you know any of your group members?
    A. Yes
    B. No

10. How many group members did you know prior to participating in this study?
    A. One
    B. Two
    C. Three

11. How well did you know this group member?
1 (Not well at all) -> 5 (very well)

12. How well did you know these group members on average?
1 (Not well at all) - > 5 (very well)

13. How helpful did you find the research assistant who helped you to play in the game?
1 (Not at all helpful) -> 5 (Very helpful)

14. How friendly did you find the research assistant who helped you to play in the game?
1 (Not at all friendly) -> 5 (Very friendly)

15. Are there any other thoughts about your experience in this study that you would like us to know?

VITA

Lauren Jordan
Curriculum Vitae
University of Mississippi
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Education

Ph.D., Experimental/Social Psychology (expected May 2022)
University of Mississippi
Minor: Applied Interdisciplinary Statistics
Dissertation: *No Person is an Island: A Multi-level Analysis of the Relationship Between Self-Determination Theory and Well-being*
Fellowships:
      Dissertation Fellowship - $6,500
      Honors Fellowship - $12,000
Advisor: Carrie Veronica Smith, Ph.D.

M.A., General Experimental Psychology (July 2016)
Southeastern Louisiana University
Master's Thesis: *Terror Management Theory and the Effect of Fitness-Relevant Primes and Religiosity on Worldview Defense*
Advisors: Matthew Rossano, Ph.D.; Sara Sohr-Preston, Ph.D.

B.A. **Honors**, Psychology (May 2014)
Southeastern Louisiana University
Honors Thesis: *Identity Development Behaviors and Their Influence on College Student Involvement*
Chairperson: Sara Sohr-Preston, Ph.D.

Research

Publications

Jordan, L.N. & Smith, C.V. (2022). Examining American adult's mental well- and ill-being during the 2020 COVID-19 pandemic using a self-determination theory perspective. *International Journal of Public Health*. Advanced online publication. https://doi.org/10.3389/ijph.2022.1604508

McCarthy, R. J., Gervais, W., Aczel, B., Al-Kire, R. L., Baraldo S. M., Baruh L., Basch, C., Baumert, A., Behler, A., Bettencourt, A., Bitar, A., Bouxom, H., Buck, A., Cemalcilar, Z., Chekroun, P., Chen, J. M., del Fresno- Díaz, A., Ducham, A, Edlund, J. E., Lair, E.C.,

Jordan, L.N.,…Zogmaister, C. (2021). A multi-site collaborative study of the hostile priming effect. *Collabra: Psychology, 7*. https://doi.org/10.1525/collabra.18738

Hardin, B. S., Smith, C. V., & **Jordan, L. N.** (2020). Is the covid-19 pandemic even darker for some? Examining dark personality and affective, cognitive, and behavioral responses to the covid-19 pandemic. *Personality and Individual Differences*. https://doi.org/10.1016/j.paid.2020.110504

Lair, E. C., **Jordan, L. N.,** Peters, R. M., & Nguyen, T. V. C. (2020). Emotion provides feedback about thinking styles to influence natural hazard likelihood and perceived response preparedness. *International Journal of Disaster Risk Reduction*. http://dx.doi.org/10.1016/j.ijdrr.2019.101469

Sohr-Preston, S. L., Lacour, A., Brent, T., Dugas, T., & **Jordan, L**. N. (2016). Blogging about family building (Infertility, pregnancy loss, adoption, pregnancy, trying to conceive): Content and blogging motivations. *Studies in Media and Communication, 4*, 8-20. doi: 10.11114/smc.v4i1.1281

Manuscripts Under Review

Sohr-Preston, S.L., Boswell, S.S., **Jordan, L.N.,** & Morain, S. (2022). *Predicting Academic Entitlement and Academic Dishonesty over the Course of the First University Semester*. Manuscript under review.

Manuscripts in Preparation

Smith, C.V., **Jordan, L.N.**, Shaffer, M.J., Heger, A.K. (2022). *Exploring Work Experiences of Men and Women in STEM and Non-STEM Jobs through the Lens of Self-Determination Theory*. Manuscript in preparation.

Smith, C.V., **Jordan, L.N.**, Ballard, B.J., & Webster, G.D. (2022). *Validation of the Dark Tetrad Personality Inventory: A Very Brief Measure*. Manuscript in preparation.

Haupt, E. E., Smith, C.V., & **Jordan, L.N.** (2022). *Protected or Prone? Examining Prevalence of and Motivations for Prescription Drug Misuse Among Honors and Non-Honors College Students*. Manuscript in preparation.

Ehman, A.C., **Jordan, L.N.,** Lair, E.C., & Gross, A.M. (2022). *Putting the "Me" in Blame: The Effect of Independent vs. Interdependent Construal Message Framing on Victim Blame and Avoidance*. Manuscript in preparation.

Book Chapter

Jordan, L., Chavez-Babycos, B. & Coats, S. (2015). Stereotypes: A beneficial necessity or a harmful convenience? In R. S. Feldmen (12th Ed.) *Understanding Psychology* (Southeastern Louisiana University custom edition). McGraw Hill: New York, NY.

Grants

Jordan, L.N. (2020). *An Investigation of Basic Psychological Need Satisfaction in Small Groups,* University of Mississippi Graduate Student Council Research Grant Program. Amount: $1,000.

Smith, C.V. & Shaffer, M.J. (2019). *Examining Daily Experiences in STEM Workplaces through the Lens of Self-Determination Theory,* ORAU-Directed Research and Development Program. Amount: $70,000. Primary research assistant: **Jordan, L.N**.

Presentations

Jordan, L.N. & Smith, C.V. (October, 2021). *Validation of the Brief Dark Personality Inventory*. Talk presented at the 44th annual meeting of the Society of Southeastern Social Psychologists, online.

Jordan, L.N. & Smith, C.V. (March, 2021). *Thriving in the Time of COVID-19? Examining the Utility of Self-Determination Theory during a Global Pandemic*. "Elevator pitch" presented at the Graduate Student Council Research Symposium, Oxford, MS.

Jordan, L.N. & Smith, C.V. (January, 2021). *Should I Stay or Should I Go? Gender and the STEM Workforce.* Talk presented at the University of Mississippi 3-Minute Thesis Competition, Oxford, MS.

Lair, E.C., **Jordan, L.N.**, Peters, R.M., & Nguyen, T.-V. C. (October, 2019). *Emotions and cognitive processing interact to influence likelihood judgments and perceived preparedness for natural disasters*. Talk presented at the 42nd annual meeting of the Society of Southeastern Social Psychologists, Johnson City, TN.

Posters

Jordan, L.N., & C. Veronica Smith (February 2022). *How's Everyone Doing? Examining the Relationship Between Self-determination Theory with Well-being and Ill-being During the COVID-19 Pandemic*. Poster presented at the 23rd annual meeting of the Society for Personality and Social Psychology, San Francisco, CA.

C. Veronica Smith & **Jordan, L.N.** (February 2022). *Contingent Satisfaction: Examining Basic Psychological Need Satisfaction Amongst STEM and Non-STEM Contingent Faculty.* Poster presented at the 23rd annual meeting of the Society for Personality and Social Psychology, San Francisco, CA.

Jordan, L.N., C. Veronica Smith, & Matthew J. Shaffer (February, 2021). *Should I Stay or Should I Go? Gender, STEM, and Self-Determination.* Poster presented at the 22nd annual meeting of the Society for Personality and Social Psychology, Online.

Benjamin S. Hardin, C. Veronica Smith, & **Lauren N. Jordan** (February, 2021). *Is the COVID-19 Pandemic even Darker for Some? Examining Dark Personality and Affective, Cognitive, and Behavioral Responses to the COVID-19 Pandemic.* Poster presented at the 22nd annual meeting of the Society for Personality and Social Psychology, Online.

Jordan, L.N & **Lair,** E.C. (February, 2020). *The relationship between political orientation, religiosity, and genetic knowledge on genetic essentialism for political groups*. Poster presented at the 21st annual meeting of the Society for Personality and Social Psychology, New Orleans, LA.

Jordan, L.N., Curtis, P.D., & Lair, E.C. (February, 2019). *Interdependent construals and emotion influence judgments of obese targets.* Poster presented at the 20th annual meeting of the Society for Personality and Social Psychology, Portland, OR.

Lair, E.C., **Jordan, L.N.**, Peters, R.M. (February, 2019). *Will disaster strike?: Happiness and sadness provide feedback about construal levels for disaster likelihood judgments.* Poster presented at the 20th annual meeting of the Society for Personality and Social Psychology, Portland, OR.

Jordan, L.N., Lair, E.C., & Peters, R.M. (March, 2018). *The effect of positive affect and threat on perceived group similarity*. Poster presented at the 19th annual meeting of the Society for Personality and Social Psychology, Atlanta, GA.

Peters, R.M., Lair, E.C., & **Jordan, L.N**. (March, 2018). *Trait anxiety levels inform construal level processing in high need for cognition individuals.* Poster presented at the 19th annual meeting of the Society for Personality and Social Psychology, Atlanta, GA.

Lair, E.C., Peters, R. M., & **Jordan, L.N.** (January, 2017). *Do I really know Trump's or Clinton's policies? Anger and construal levels influence the illusion of explanatory depth.* Poster presented at the Emotion Pre-Conference of the 18th annual meeting for the Society for Personality and Social Psychology, San Antonio, TX.

Jordan, L.N. (May, 2016). *Terror management theory and the effect of fitness-relevant primes and religiosity on worldview defense.* Poster presented at the 68th annual meeting of the Louisiana Psychological Association, Kenner, LA.

Jordan, L.N. (June, 2015). *Do identity development behaviors predict college student involvement?.* Poster presented at the 67th annual meeting of the Louisiana Psychological Association, Metairie, LA.

Jordan, L.N. (June, 2014). *Identity development behaviors and their association with college student involvement.* Poster presented at the 66th annual meeting of the Louisiana Psychological Association, Metairie, LA.

Teaching and Mentoring

Courses and Workshops

Course: General Psychology (Face-to-face and online)
Position: Instructor of Record
Semesters: 5
University of Mississippi, Oxford, MS

Course: Research Methods in Psychology: Experimental Social Psychology
Position: Instructor of Record
Semesters: 2
University of Mississippi, Oxford, MS

Course: GRE Verbal Preparatory Workshop for McNair Scholarship Program
Position: McNair Scholarship Program Workshop Instructor
Semesters: 4
University of Mississippi, Oxford, MS

Course: Statistics Laboratory
Position: Lab Instructor
Semesters: 1
Southeastern Louisiana University, Hammond, LA

Teaching Grant

Jordan, L.N. (2018). *Graduate Instructor Mini Grant*, University of Mississippi Department of Writing and Rhetoric. Amount: 500$

Psychology Statistics Tutor

University of Mississippi
Semesters: 8
Responsibilities:

- Taught students statistical theory and hand calculations for their undergraduate introductory statistics classes
- Trained students in SPSS and R analytical software

Teaching Assistant

University of Mississippi & Southeastern Louisiana University
Courses: General Psychology, Social Psychology, Developmental Psychology, and Introduction to Clinical Psychology
Semesters: 3

Research Assistant

University of Mississippi
Labs: Ishtar lab and Social Cognition lab
Semesters: 9
Responsibilities:

- Supervised up to 10 undergraduate students a semester in data collection
- Co-mentored several students on honors thesis and other projects, including one published paper and one paper in preparation
- Co-led lab meetings consisting of professional development and research presentations

Administrative and Supervisory Positions

Statistics Laboratory Coordinator

University of Mississippi & Southeastern Louisiana University
Semesters:5
Responsibilities:

- Supervised graduate student tutors
- Worked with statistics instructors to procure resources for tutors
- Designed and trained tutors in appointment system for online tutoring sessions
- Trained graduate students in instructing statistics laboratory sessions
- Helped to create a common curriculum for SPSS instruction across lab sections

Assistant to the Director of Undergraduate Studies

University of Mississippi
Semesters: 2
Responsibilities:

- Collected and analyzed assessment data from undergraduate courses
- Assisted with designing schedule for undergraduate courses
- Maintained web page for undergraduate majors

Service

Awards

- University of Mississippi Department of Psychology Experimental Graduate Student Research Achievement Award, 2022 – 100$
- First Place Data Blitz Winner at University of Mississippi Psychology Research Symposium, 2022 – 50$
- First Place Winner in "Elevator Pitch" Category at University of Mississippi Graduate Student Council Research Symposium, 2021 – $500
- First Place Doctoral Winner in University of Mississippi 3-Minute Thesis Competition, 2021 – $100
- Society for Personality and Social Psychology Graduate Student Travel Award, 2018 - $500
- Society for Personality and Social Psychology Graduate Student Travel Award, 2017 - $500
- President's Award for Academic Excellence – Received award for graduating with the highest GPA in the college of Arts, Humanities, and Social Sciences, 2014
- Recipient of the Southeastern Outstanding Graduating Senior in Psychology award, 2014

Additional Training and Skills

Additional Training

Summer Statistics Institute at University of Texas at Austin
> 1-week workshop*: Introduction to Data Analysis and Graphics Using R Workshop*, 2020

Curran-Bauer Analytics
> 1-week workshop: *Multi-level Modeling*, 2020

Data Collection and Analytical Software

- SPSS
- R
- SAS
- STATA
- Empirsoft MediaLab
- Qualtrics
- Survey Monkey