

OURSPACE: THE EFFICACY OF A GROUP DYNAMICS-BASED SOCIAL SUPPORT  
APPLICATION IN INCREASING COHESION AND PHYSICAL ACTIVITY

by

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## Abstract

**Background:** Emerging technologies (i.e. smartphones, Internet) may be effective tools for promoting physical activity (PA); however few studies have provided effective means of using them to enhance social support. Face-to-face programs that use group dynamics-based (GDB) principles of behavior change have been shown to be highly effective in promoting group cohesion and PA however few studies have examined their effects in web-based programs. The present study examines the effect of a GDB application on group cohesion and PA. We expected partner's level of presence to moderate this effect. **Methods:** Subjects (n=135) were randomized into same-sex dyads and randomized to an experimental condition: low cohesion/low presence (LC-LP), high cohesion/low presence (HC-LP), high cohesion/high presence (HC-HP), or individual. Participants performed two blocks of planking exercises (pre-post). Between blocks, participants in partnered conditions were met their partner using either a standard social support application (LC-LP) or a GDB social support application (HC-LP and HC-HP), where they participated in a series of team-building exercises. Individual subjects were given a rest period. Participants in the HC-HP saw a live video stream of their partner exercising during Block 2. Perception of cohesion was measured using a modified Physical Activity Group Environment-Questionnaire (PAGE-Q). PA was calculated as performance during Block 2 controlled for by performance during Block 1. **Results:** Findings show that perception of cohesion was higher for the HC-LP condition compared to the LC-LP conditions in three of the four cohesion dimensions: ATG-S( $p=0.002$ ), GI-T( $p=0.002$ ), GI-S( $p=0.022$ ), but not ATG-T( $p=0.170$ ). Cohesion means did not differ between HC-LP and HC-HP conditions. Only the HC-HP condition produced significant gains in PA compared to other conditions (HC-LP:  $p=0.044$ ; LC-LP:  $p=0.018$ ; Individual:  $p=0.001$ ). **Conclusions:** Findings suggest that a GDB application may

be an effective method of improving group cohesion, however it may be insufficient on its own to improve PA. Increasing presence may be an effective method of improving performance during a single session of PA, however further research is needed to determine its effect on long term behavior change.

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## **List of Abbreviations**

Physical activity - PA

Group Dynamics Based - GDB

Low Cohesion-Low Presence - LC-LP

High Cohesion-Low Presence - HC-LP

High Cohesion-High Presence - HC-HP

Physical Activity Group Environment – Questionnaire - PAGE-Q

Attraction to Group–Task - ATG-T

Attraction to Group–Social - ATG-S

Group Integration–Task - GI-T

Group Integration–Social - GI-S

Rating of Perceived Exertion -RPE

Analysis of Variance - ANOVA

Intraclass correlation coefficient - ICC

Analysis of Covariance - ANCOVA

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## **Dedication**

For the members of the Kansas State University Ultimate Frisbee clubs, who made my college experience infinitely richer.

## **Preface**

This thesis report is submitted in partial completion of the degree of Master of Public Health at the Kansas State University. The following report presents a master's thesis study. A separate document will report my public health field experience. The work conducted is, to the best of my knowledge, original except where references are provided. This master's thesis study is formatted for submission to the International Journal of Behavioral Nutrition and Physical Activity and is presented in Chapter 1.

The first chapter is a research study examining the effects of a Group Dynamics Based web application on the perceptions of cohesion and physical activity of anonymous online partners. Additionally the potential moderating effect of visual presence is examined among groups using the GDB application. A rationale for the study, hypotheses, participant description, methods, results, and discussion of the findings are provided in this chapter.

# Chapter 1 - Master's Thesis Study

## Introduction

Physical inactivity has been identified as the cause of 6-10% of major non-communicable diseases of coronary heart disease, type 2 diabetes, and breast and colon cancers [1] and caused 5.3 million premature deaths in 2008 [1]. Regular physical activity (PA) has been shown to aid in weight loss and prevent obesity, as well as help improve bodily metabolic functions, including lower resting heart rates, help manage blood glucose levels (improving diabetes), improve bone health (reducing osteoporosis rates), reduce blood pressure and cholesterol levels (reducing cardiovascular disease), and reduce the incidence rate of some cancers [2]. To achieve these benefits, the United State Department of Health and Human Services recommends that adults ages 18 - 65 participate in at least 150 minutes of moderate to vigorous physical activity per week with more health benefits being gained at 300 minutes per week [3]. However, despite the broad benefits PA has, only ~5% of US citizens actually are meeting PA recommendations [4].

The Community Guide to Preventive Services has identified several evidence-based, approaches to promoting PA, including social support-based interventions [5]. Among social support-based interventions are those that involve peer groups [6] and other group-based approaches to promoting PA [7]. While there are a variety of group-based practices, a meta-analysis shows that highly effective group interventions are those that include group dynamics-based (GDB) activities [7]. GDB interventions include team-building activities to facilitate group member interactions with the ultimate goal of enhancing group cohesion (e.g. group goal setting) [8]. In comparison to non-GDB groups and individual based physical activity programs, GDB programs are associated with higher physical activity rates, adherence, and social interactions [7].

Despite the evidence in support of GDB interventions, there exist several drawbacks to this approach. For example, groups are often required to meet in person, which may restrict participation due to geographic location, and requires participants to coordinate among meeting times amid busy schedules. Additionally, there is a burden placed on staff and practitioners to manage and facilitate the group activities. Thus, strategies that overcome these challenges can help optimize GDB interventions and free resources to allow for broader reach and effectiveness.

One such strategy might involve the use of the Internet [9]. The Internet provides a unique potential to be used by a vast population of people, both sedentary and active, to seek out health information and/or support for behavior change. Additionally, Internet based tools (e.g., social media) can automate the facilitation of group interactions, thus decreasing the burden of staff/practitioners. This potential has not gone unnoticed, as Internet-based interventions are now being used more often for promoting positive health behaviors, such as PA [10-12]. However, although significant, the overall effects of Internet-delivered interventions focusing on PA promotion have been small [13] and are prone to a variety of drawbacks [14]. For example, participant attrition in Internet-based weight loss programs is typically high (>25%) [14] and those who adhere to the programs often have reduced engagement over time [14]. Additionally, few studies have examined the maintenance of behavior change in Internet-delivered interventions [15].

Given the effectiveness of GDB programs to impact PA and the Internet's ability to connect people from across different geographic locations, a sensible strategy for improving Internet-based interventions would be to pair individuals into exercise/PA groups through the Internet and design and use GDB web tools to facilitate their interactions. In this study, we developed a GDB web application (OurSpace) to lead users through a series of automated, online

team building activities. The application was designed according to Carron and Spink's (1993) team building model and targeted several key aspects of cohesion development including the structuring of a group environment, a group structure, and the guidance of group processes [16].

### ***Purpose of the Study***

The primary aim of this study was to develop and test the efficacy of an online GDB application in increasing group cohesion. The secondary aim was to test if increases in cohesion would lead to increases in PA during a brief exercise task. A tertiary aim was to test the potential moderating effects of specific design features. In this case, we tested the moderating effects of presence, or the degree to which participants could monitor/be monitored by their partner's actions in real time.

### ***Hypotheses***

1. Participants using the GDB application would have higher perceptions of cohesion than those who used a standard social support application.
2. Participants who report higher degrees of cohesion would have higher PA than individuals who report lower degrees of cohesion.
3. Participants in the high presence condition would receive additional gains in cohesion and exercise task motivation compared to those in low presence conditions.

## **Methods**

### ***Participants***

Participants (n = 135; 66 males, 69 females;  $M_{\text{age}} = 19.54$ ,  $SD = 1.809$ ) were recruited from an introductory level Kinesiology course at a large Midwestern university to participate in a

single session of a one-hour “video game” study. Data was collected at two separate time periods, the first wave was from March 2014 through April 2014 (n = 103) and the second wave was done from November 2014 through December 2014 (n=32). All participants were screened for health risks using the Physical Activity Readiness Questionnaire [17] and were awarded course credit for the completion of the study. An alternate assignment for credit was available for the students that did not participate in the research study. Ethical approval for the study was granted by the University’s Institutional Review Board (IRB #6318.1).

### *Design*

The present study used a randomized 2 (gender) x 4 (condition) x 2 (block) experimental design with repeated measures on the last factor. Each block consisted of an identical series of five planking exercises: front plank, side plank (left), one leg plank (left), side plank (right), and one leg plank (right).

Participants were randomly selected weekly from a subject pool and asked to provide times and dates they were available to participate. Subjects were then, unknowingly, assigned to same-sex dyads based on their availability. Dyad members were scheduled to participate in the study concurrently. Individual dyad members were sent to separate testing rooms to avoid any interactions outside of the experiment. Three individuals were unable to be scheduled into a dyad; their results were included in the individual condition. Upon arrival to the lab, dyads were randomly assigned to a condition, Individual (n=35, 16 dyads), Low Cohesion-Low Presence (LC-LP) (n=34, 17 dyads), High Cohesion-Low Presence (HC-LP) (n=34, 17 dyads), or High Cohesion-High Presence (HC-HP) (n=32, 16 dyads) (*figure C.1*). In the case that a dyad member failed to appear for their session the present member was told by the experimenter that



“we are experiencing technical difficulties and unable to run the trial today” and was rescheduled for a future time slot (n=17; 14 males, 3 females).

### *Procedures*

Participants arrived individually, signed an informed consent form, and were instructed to sit in an isolated room – separated from the experimenter and their partner – in front of a computer and began by watching a video tutorial that included instructions for their participation during the experiment. Subjects were given instructions for proper technique for a series of abdominal planking exercises that they would be performing during the experiment. A computer-generated trainer demonstrated the exercises during both the instructional video and during each block of exercise. Participants were instructed to hold each planking exercise for as long as they can without causing any undue discomfort or pain to themselves.

To minimize the risk of partners becoming aware of the other’s proximity, all participants wore a pair of noise cancelling headphones for the full duration of the experiment. The headphones doubled as speakers for the computers. Subjects were further instructed that if they needed assistance or had questions they should use a chat box provided on their computer, which directly linked them to the experimenter, in lieu of trying to verbally communicate.

Once subjects completed the video tutorial they were instructed to sit on an exercise mat, wait for the virtual trainer to start the exercise, and follow along with that trainer during each exercise (Block 1). Once both dyad members were ready to begin, the experimenter initiated the virtual trainer and participants completed the first series of exercises independently and unaware of their partner. All participants performed the planks in the same order with a short (40 sec) rest period between each plank. During each planking exercise, participants were shown a live stream video of themselves exercising, allowing them to check their form against the virtual

trainer. This constituted the first block of exercises (Block 1). At the end of Block 1 all subjects were asked to return to their computer and wait for further instructions. For subjects in the individual condition, participants were given a 15 minute rest period where they were told the average duration they held the planking exercises for, asked to fill out a brief task predicted performance survey, and given a generic magazine to occupy their time until Block 2 began. For subjects in any of the partner conditions (LC-LP, HC-LP, or HC-HP), participants were introduced to their partner through the web application, OurSpace (*description below*). Participants in a high cohesion condition received the full version of OurSpace while participants in the low cohesion condition received a modified version of OurSpace that removed the majority of team building activities found in the full version. The low cohesion version of the application was intended to mimic the features found in standard social support applications (e.g., a discussion board), where communication is limited to text chat and minimally facilitated (e.g., through prompts). In both versions participants were given the following team task, "...The two of you will be performing together as a team. Your team's task is to hold the exercise for as long as possible. Your team's time will be the total number of seconds that your team holds the exercises." Block 2 began following the completion of the GDB application (when applicable), the second task predicted performance survey, and a brief rest period.

For Block 2, the individual condition followed the same procedures as Block 1 while the HC-LP and LC-LP conditions followed the same procedures as Block 1 except they were now aware they have a partner and were given the aforementioned team task. Participants in the HC-HP condition would follow the same procedure as the HC-LP and LC-LP conditions, however instead of seeing the live video stream of themselves exercising they were shown the live stream of their partner instead (video streams were blurred to protect participants' confidentiality). By

being able to monitor one's partner and have oneself monitored the sense of presence was increased. This set of planking exercises constituted the second and final block of exercises (Block 2).

Following Block 2 all participants returned to their computers to complete the final task predicted performance survey and in addition partnered conditions completed the cohesion questionnaire. Once completed subjects were thanked, debriefed, asked to not discuss the study with their classmates, and dismissed separately to avoid partners having the chance to meet each other in person.

### ***OurSpace Description***

OurSpace was designed to be a highly interactive web application. In this regard a feature was included to allow dyad members to directly observe their partner's response in real time, in this way as one partner began typing the other could instantly see the keystrokes made. Two versions of the application were created: a full version for the high cohesion groups and a modified version for the low cohesion group (a feature comparison can be found in *table D.1*; models of the full application can be seen in Appendix A). Individuals did not use the application. In the full version of OurSpace participants entered their personal information (*Figure A.3*) and selected an avatar from a list of generic preset characters (*Figure A.2*). Again all personal information was visible to their partner upon entry. On the following page each subject was asked to share something they struggled with during the exercises. Partners then exchanged advice on how the other could overcome their struggles (*Figure A.4*). Next, group distinctiveness was established by having the partners vote on and select a team icon (*Figure A.5*) and team name (*Figure A.6*). Next, partners worked to solve a simple team based puzzle together (*Figure A.7*). Completion of the puzzle required partners to cooperatively control an

onscreen character using directional arrows. One dyad member was given control of the character up/down movements while the other controlled the right/left movement; coordination and cooperation were required to complete the task. Partners then established a group norm of what they believe the groups expected effort level should be, individually and collectively agreeing on the expected group effort value using a 1-10 scale (*Figure A.8*). Finally, individual positions within the group were established by telling each dyad member how long they held each exercise and how long their partner held each exercise during Block 1 (*Figure A.9*). The modified version of OurSpace concluded after the social support slide. Following the completion of OurSpace participants returned to complete the second page of the task predicted performance survey before beginning the Block 2 exercises.

### ***Measures/Outcomes***

#### ***Perception of Cohesion***

Subject's perception of cohesion with their partner was measured using a modified Physical Activity Group Environment – Questionnaire (PAGE-Q) [18]. Original PAGE-Q questions were modified to fit the context of the present study (e.g. PAGE-Q: “Members of our physical activity group often socialize during exercise time” was modified to: “Members of our exercise group often socialized during time spent online”). Three items from the original PAGE-Q items were omitted from the modified version due to lack of relevance within this study. (For the full modified PAGE-Q See *Appendix B.1*).

The modified PAGE-Q measured subject's perceived cohesion based on four dimensions: Attraction to Group–Task (ATG-T) (i.e. “I like the exercise done in this group”), Attraction to Group–Social (ATG-S) (i.e. “I enjoyed my social interactions within this online exercise group”), Group Integration–Task (GI-T) (i.e. “Our group is united in its beliefs about the benefits

of the exercises offered in this program”), and Group Integration–Social (GI-S) (“Members of our group would likely spend time together after the program ends”). Consistent with the original PAGE-Q, each question was answered using a 9-point Likert scale, (i.e. 1 = “Very strongly disagree”, 5 = “Neither agree nor disagree”, and 9 = “Very strongly agree” [18]. Cronbach’s Alpha was used to determine internal consistency reliability, scores for ATG-T, ATG-S, GI-T, and GI-S ( $\alpha = .74, .85, .80, .76$ , respectively) were deemed acceptable.

### ***Physical Activity***

PA was operationally defined as exercise task performance or the total amount of time (in seconds) that subjects persist during a block of 5 planking exercises. The sum of the time spent performing the five planking exercises constituted the block score.

Online digital stopwatches were used to measure time spent in each exercise. Time was measured from the moment participants got into position for the first planking exercise until the participant quit the first exercise, a split time was recorded and the stopwatch was then used to record the duration of the rest period. Next, once the participant got into position for the second planking exercise, another split was recorded to measure the time spent in the rest period. This process was repeated until the end of the fifth planking exercise. Average times spent holding the planks were then calculated. These methods were used to measure all planking exercises during Blocks 1 and 2.

### ***Task Predicted Performance***

Task predicted performance was measured using a scale from similar past studies [19]. The survey consisted of five questions each with a corresponding picture of a different planking exercise above it and asked “How many seconds do you believe you can hold the exercise shown above” (see *Appendix B.2*). The survey was completed at three separate times during the study:

pre Block 1, post Block 1, and post Block 2. A task predicted performance score was calculated by taking the sum of the five questions for each time measured.

### ***Rating of Perceived Exertion***

Ratings of Perceived Exertion (RPE) were measured using a 10-point RPE scale. Scale measures ranged from 1 meaning “no exertion at all” to 10 meaning “maximal exertion” (See *Appendix B.3*). Participants recorded their own RPEs on a sheet provided to them during the rest period immediately after completing each planking exercise. Scores were calculated as the average reported RPE for each block.

### ***Data Analysis***

All statistical analyses were performed on SPSS 20.0.0.1 for Mac SPSS, Chicago Illinois, USA). When applicable, Tukey’s HSD test was ran as the post hoc analysis tool. The significance level was set to  $p < 0.05$  (2-tailed). Statistical analysis procedures for each dimension are as follows.

*Sample Power.* An a priori power analysis following  $f$  index recommendations indicated that a sample size of  $n = 32$  per condition would be sufficient for detecting a moderate ( $f = .25$ ) effect with probability  $> .80$ . Effect size was determined by a power analysis based on the findings of similar studies [19].

*History Effect* A preliminary analysis was done to test for a possible history or cohort effect that could be attributable to differences in time periods between collection points (March 2014-April 2014 vs. November 2014-Dec 2014). Two separate analyses of variances (ANOVA) were conducted for each study examining the difference between 1) perceptions of cohesion and 2) PA for the two time periods of data collection.

*Intraclass correlation analysis.* An intra class correlation analysis was run to detect potential clustering of scores within dyads on perception of cohesion. Results for perception of cohesion were analyzed according Carron and colleagues (2003) recommendations on determining groupness of cohesion results. Criteria for detecting a small groupness effect was set at an Intraclass correlation coefficient (ICC) of greater than or equal to .40 for ATG-S and ATG-T and an ICC of greater than or equal to .60 for GI-S and GI-T [20].

*Perception of Cohesion.* To test the main hypotheses that the perception of cohesion could be increased by utilizing an online GDB application and further increased by increasing presence, four separate 3 (condition: LC-LP, HC-LP, and HC-HP) x 2 (gender) ANOVA were conducted with each dimension of cohesion (ATG-S, ATG-T, GI-S, and GI-T) as the dependent variable.

*Physical Activity.* To test the hypotheses that PA would be greater in the partnered conditions than in the individual conditions and greater in high presence conditions than low presence conditions a 4 (condition: Individual, LC-LP, HC-LP, HC-HP) x 2 (gender) an analysis of covariance (ANCOVA) was ran with Block 2 scores as the dependent variable and Block 1 scores as the covariate to control for individual differences in fitness. The methodology used in the present analysis of physical activity is consistent with methodology of similar past experiments [21].

*RPE and task predicted performance.* Ancillary analyses were done to examine the effects of RPE and task predicted performance. To analyze any effects on RPE a 4 (condition: Individual, LC-LP, HC-LP, and HC-HP) x 2 (gender) an ANOVA was conducted with RPE scores as the dependent variable. The same analysis was performed for each task predicted performance.

## Results

### *Sample populations*

The total sample consisted of 135 college-aged participants (66 males, 69 female;  $M_{\text{age}} = 19.54 \pm 1.809$ ). No participants dropped out of the study prior to completing their sessions.

### *Preliminary analysis*

*History Effect.* No significant difference was found between the data collection time points for perception of cohesion ( $F_{1, 98} = 0.035, p = 0.852$ ) or PA ( $F_{1, 133} = 0.726, p = 0.396$ ). Thus it was determined that any effects of the GDB application were comparable across both waves of data collection. Hence, data from all waves were combined for all further analysis.

*Intraclass correlation analysis.* No evidence of a group clustering for perception of cohesion scores (ATG-T:  $ICC = 0.258, p = 0.150$ ; ATG-S:  $ICC = 0.088, p = 0.374$ ; GI-S:  $ICC = 0.505, p = 0.008$ ; GI-T:  $ICC = 0.253, p = 0.155$ ).

### *Perception of Cohesion*

*Attraction to Group- Task.* ANOVA for ATG-T resulted in no significant findings between conditions ( $F_{2, 92} = 1.652, p = 0.197$ ) and a gender effect that approaches significance ( $F_{1, 92} = 4.075, p = 0.057$ ); no gender by condition interaction was observed ( $F_{2, 92} = 0.956, p = 0.422$ ). ATG-T marginal means are reported in Table D.2.

*Attraction to Group – Social.* ANOVA for ATG-S resulted in a significant finding between conditions ( $F_{2, 94} = 6.494, p = 0.002$ ) and no significant difference between gender ( $F_{1, 94} = 0.280, p = 0.598$ ); no gender by condition interaction was observed ( $F_{2, 94} = 0.472, p = 0.625$ ). Post hoc analysis of conditions showed HC-LP was significantly higher than LC-LP ( $p = 0.002$ ), but was no different than HC-HP scores ( $p = 0.259$ ). Additionally, there was no difference



between HC-HP and LC-LP scores ( $p = 0.140$ ). ATG-S marginal means are reported in *Table D.3*.

*Group Integration – Task.* ANOVA for GI-T resulted in a significant difference between conditions ( $F_{2, 91} = 6.576, p = 0.002$ ) and no significant difference between genders ( $F_{1, 91} = 1.185, p = 0.279$ ); no gender by condition interaction was observed ( $F_{2, 91} = 0.201, p = 0.818$ ). A Post hoc analysis of conditions found HC-LP was significantly higher than LC-LP ( $p = 0.002$ ), but was no different than HC-HP scores ( $p = 0.446$ ). Additionally, HC-HP approached being significantly greater than LC-LP ( $p = 0.058$ ). GI-T marginal means are reported in *Table D.4*.

*Group Integration – Social.* ANOVA for GI-S resulted in a significant difference between conditions ( $F_{2, 94} = 3.787, p = 0.026$ ) and no significant difference between genders ( $F_{1, 94} = 1.464, p = 0.229$ ); no gender by condition interaction was observed ( $F_{2, 94} = 0.237, p = 0.790$ ). Post hoc analysis of conditions found the HC-LP condition reported significantly higher GI-S scores than LC-LP ( $p = 0.022$ ), but was no different than HC-HP scores ( $p = 0.317$ ). Additionally, there was no difference between HC-HP and LC-LP scores ( $p = 0.447$ ). GI-S marginal means are reported in *Table D.5*.

### ***Physical Activity***

ANCOVA for PA resulted in a significant difference between conditions ( $F_{3, 126} = 3.877, p = 0.011$ ) and genders ( $F_{1, 126} = 3.962, p = 0.049$ ). Pairwise comparisons of conditions found the HC-HP conditions' average time spent in planking exercises during block 2 was significantly greater than Individuals ( $M_{\text{diff}} = 8.3\text{s}, p = .001$ ), LC-LP ( $M_{\text{diff}} = 6.0\text{s}, p = 0.018$ ) and HC-LP ( $M_{\text{diff}} = 5.1\text{s}, p = 0.044$ ). No other significant differences were found between conditions. Males PA was significantly greater than females ( $M_{\text{diff}} = 3.6\text{s}, p = 0.049$ ). Means of the PA analysis can be found in *Table D.6*.

### *Ancillary Analyses*

*RPE.* ANOVA results show no significant difference was found between conditions for reported RPE in Block 1 ( $F_{3, 127} = 1.403, p = 0.245$ ) or Block 2 ( $F_{3, 127} = 0.276, p = 0.843$ ).

Additionally, no significant differences were found between males and females for Block 1 ( $F_{1, 127} = 0.1274, p = 0.261$ ) or Block 2 ( $F_{1, 127} = 0.514, p = 0.475$ ).

*Task predicted performance.* ANOVA results show no significant differences between conditions at any measurement point (pre-Block 1:  $F_{3, 132} = 0.965, p = 0.412$ ; post-Block 1:  $F_{3, 134} = 2.062, p = 0.109$ ; post-Block 2:  $F_{3, 133} = 0.908, p = 0.439$ ). Additionally significant effect for gender was seen for each measurement point (pre-Block 1:  $F_{1, 132} = 9.209, p = 0.003$ ; post-Block 1:  $F_{1, 134} = 8.813, p = 0.004$ ; post-Block 2:  $F_{1, 133} = 4.177, p = 0.043$ , respectively) with males consistently reporting higher predictions of task performance than females.

### **Discussion**

The primary aims of this study were to test the efficacy of a GDB web application in promoting group cohesion and PA among virtual partners. We also examined the moderating effect of presence on both cohesion and PA. We hypothesized that use of the GDB application would produce higher perceptions of cohesion than a standard social support application, participants with higher degrees of cohesion would have higher exercise task performance, and that participants that were more visually present to their partner would receive additional gains in cohesion and exercise task performance. Our hypotheses were partially supported.

The first hypothesis that groups using the GDB application would report higher perceptions of cohesion compared to the standard social support application was supported for three of the four cohesion dimensions. Results showed the ATG-S, GI-T, and GI-S dimensions of cohesion were higher for participants in the HC-LP condition, which utilized the full GDB

application, compared to participants in the LC-LP condition who only received a minimal social support application. This finding is consistent with past face-to-face GDB studies where the use of GDB principles has been shown to improve perceptions of cohesion among groups [8]. This finding is encouraging for online social support programs, considering the present study consisted of a single 1-hour visit during which only 7-9 minutes were spent using the GDB application. This suggests that GDB applications may be an effective method of quickly promoting cohesion within online groups even if group members have had no prior interactions. Additionally, it is not surprising that ATG-T cohesion scores did not differ between conditions. ATG-T questions are designed to evaluate an individual's feelings of the task the group is participating in and not their attraction to the group itself [22]. Since the task given to each group was the same it is reasonable that each participant had similar perceptions of the task regardless of their feelings towards their group.

The second hypothesis that increases in perception of cohesion would increase physical activity was not supported. There were no significant differences in PA found between the HC-LP and LC-LP conditions, despite an overall increase in perceived cohesion. This finding is inconsistent with past research, which has found that more cohesive groups often perform better in exercise-related tasks [23 - 26]. There are three likely explanations for our results. The first is that our design lacked a true group and may have lacked a meaningful task. The cohesion-performance relationship has been found to be strongest in "true groups" [7][27][28], or a group of individuals with a common goal who undergo some form of team building to improve group cohesion. The increase in the cohesion-performance relationship is predominantly due to true groups having an increased commitment to the team goal [27] (i.e. "win the game") that is selected and is perceived to be valuable by the group. However, in the present study no team

goal was present. Instead, a preselected task (“...The two of you will be performing together as a team. Your team’s task is to hold the exercise for as long as possible. ...”) was given to groups and may not have been valuable to individual members much less the group. Additionally, groups were artificially created and members only had a short amount of time to interact; making them more characteristic of a minimal group than a true group [29]. Thus although, groups used in the present study were intended to mimic true groups through the use of a GDB application, without a valuable/agreed upon team goal and having only minimal time to interact prior to performing, our sample population was probably less influenced by group-level factors (e.g., cohesion, group goals) than groups in other GDB studies.

The second possible reason for a lack of increased performance relates to the nature of the task given to the groups. The task was an additive task that requires group members to work independently towards a collective team score. Although the end result is a team score, the work required to achieve it requires a minimal degree of teamwork. Meta analysis data shows that performance of group tasks that require little or no interdependence rarely benefit from strong perceptions of cohesion, [30]. In other words, group members who focus on their own individual performance instead of a group goal receive little to no benefit to performance as a result of improved group cohesion [28]. Community- and group-based walking programs (e.g., Walk Kansas [31]) that require cooperation among team members in achieving a team goal of accumulating a specific amount of steps or walking distance, however, may stand to benefit from a GDB app, especially if group members are geographically distributed.

The third and final reason that increases in perceptions of cohesion did not increase physical activity is that, despite our efforts to facilitate meaningful and evidence-based group interaction, the online medium may still have inhibited the necessary group processes for

performance gains. Performance in online groups, like face-to-face groups, is the result of a complex set of processes such as communication [32], trust [32][33], and coordination [34], which may need to work in tandem to produce meaningful performance gains [35]. However, group interactions of participants in our study may not have had adequate levels of such processes due to limited time, presence, and lack of a meaningful task [35][36]. However, past face-to-face GDB research suggests that an online GDB application may still foster performance gains by utilizing more interdependent tasks within “true groups” who have more intergroup communication/coordination [8]. Future research will be needed to test this possibility and whether performance gains in the laboratory translate into behavior change in real world settings.

The third hypothesis that increased group member presence would result in higher 1) perceptions of cohesion and 2) physical activity, was partially supported. There was no significant difference between perceptions of cohesion between HC-LP dyads and HC-HP dyads; however PA did significantly increase when participant’s sense of presence was increased. Regarding presence, results indicate that the use of a GDB application is sufficient for improving perceptions of cohesion without any additional presence needed (i.e., video feed of partner). Additionally, although not significant, mean results suggest there is a potential negative correlation between presence and perception of cohesion. Computer-mediated-communication research has also identified this correlation. Findings suggest that computer-mediated groups will experience greater social cohesion than face-to-face groups due to decreased personalizing cues from other group members. It is reasoned that individuals tend to focus on the common group characteristics and group norms, instead of the other individuals within in the group, when personalized cues from other group members are removed [37][38]. In other words, participant’s

perception of the group as a whole decreased and instead they interpreted the group as two distinct individuals by increasing the group member's presence.

With regards to PA, increased presence did increase performance in the planking tasks, however this improvement was independent of perceptions of cohesion. This finding is likely due to a decrease in social loafing. Social loafing is the tendency of individuals to decrease their performance because their individual contributions are not identifiable [39] or they are not visually present to the group and their performance cannot be monitored [40]. The present study's findings are consistent with past research, which shows that during face-to-face settings, publicizing group members' performances or having partners be visually present was enough to negate the social loafing effect and increase performance [41]. This finding should be interpreted with caution. Although PA was significantly increased during a single session of PA due to an increase in presence, research indicates that longer term behavior changes (i.e. daily MVPA, exercise adherence) can be promoted through increased cohesion [7][8]. This suggests that although presence was more effective at promoting PA behavior during a single exercise session, cohesion may be a more effective mediator for behavior change.

The present study did present some limitations. First, due to a limited sample population a Low Cohesion-High Presence condition was not included; as a result we cannot draw any conclusions based on whether or not presence without a GDB application would have an effect on online groups' perceptions of cohesion or physical activity. Another limitation of this study is the generalizability of our results to other settings and populations. The sample population used was college students recruited from in an introductory level Kinesiology course, who may be more used to and respond differently to digital technology and exercise tasks than other populations (e.g., adults, elderly). Also, in this study we focused on testing feasibility and basic

psychological processes in a highly controlled laboratory, and thus our findings may not translate to real-world settings where group interactions and tasks are much less controlled.

## **Conclusion**

The present study acts as an exploratory analysis of how to best promote interactions within anonymous online groups to better promote cohesion and PA. It was shown that perception of cohesion can be increased within anonymous online groups through the use of a GDB application, however the effects of improving cohesion on increasing PA was not found to be significant in this study and requires further investigation. Additionally, it was found the visual presence of group members had no effect on either perceptions of cohesion but may increase PA during a single exercise session for groups using the GDB application.

In summary, online GDB applications are a practical resource that may be used to overcome traditional barriers to utilizing group dynamics such as the geographic distance between partners and the burden of staff/practitioners having to facilitate team-building exercises. In addition, the present study found that GDB apps provide a more engaging social environment for Internet users to interact in than those of a standard social support application. It is recommended that future Internet and mHealth interventions seeking to utilize social support should consider integrating GDB principles into their design to create stronger social ties between study participants.

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# Appendix A - OurSpace Application

## Figure A.1 - Task Introduction

Subject 1 page for experiment 44 started Fri Mar 28 11:45:27 CDT 2014 Time left: 9 sec

On the next series of exercises, you will perform the same series of exercises again, except now you will perform along with another person. The other person is in another lab and has just completed the same series of exercises as you. The two of you will be performing together as a team. Your team's task is to hold the exercise for as long as possible. Your team's time will be the total number of seconds that your team holds the exercises:

**your team's time = your time + your partners time**

On each page, including this one, there will be a timer counting down. This timer is only meant to be indicative of the amount of time you are expected to spend on a page. If you spend more time, nothing bad will happen.

Before you begin, there are a few brief activities you need to complete.

Last refreshed Fri Mar 28 2014 11:48:12 GMT-0500 (CDT)






**Chat**

type here and press enter to chat

## Figure A.2 Avatar Selection

Subject 1 page for experiment 44 started Fri Mar 28 11:45:27 CDT 2014 Time left: 15 sec

Select the avatar image that will represent you





Last refreshed Fri Mar 28 2014 11:48:34 GMT-0500 (CDT)

**Chat**

type here and press enter to chat

**Figure A.3 - Share Personal Information**

Subject 1 page for experiment 44 started Fri Mar 28 11:45:27 CDT 2014 Time left: 28 sec

<p> <b>Danny</b></p> <p><b>More about you</b></p> <p>Year in school <input type="text" value="Graduate"/></p> <p>Major <input type="text"/></p> <p>Career Plans <input type="text"/></p> <p>Favorite TV show(s) <input type="text"/></p> <p>Something interesting about you <input type="text"/></p> <p>I have read my partner's introductory information <input type="checkbox"/></p> <p><input type="button" value="Next"/></p>	<p><b>Take a minute to get to know each other</b></p> <p>Answer the given questions. Once you have finished answering and you have read your partners answers, move on to the next page.</p>	<p> <b>Rick</b></p> <p><b>More about you</b></p> <p>Year in school <input type="text" value="Choose ..."/></p> <p>Major <input type="text"/></p> <p>Career Plans <input type="text"/></p> <p>Favorite TV show(s) <input type="text"/></p> <p>Something interesting about you <input type="text"/></p> <p>I have read my partner's introductory information <input type="checkbox"/></p> <p><input type="button" value="Next"/></p>
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**Figure A.4 - Social Support**

Subject 1 page for experiment 44 started Fri Mar 28 11:45:27 CDT 2014 Time left: 52 sec




<p> <b>Danny</b></p> <p>My biggest challenge was <input type="text"/></p> <p>How might your partner overcome this challenge? <input type="text"/></p> <p>I have read my partner's suggestion for how I might improve. <input type="checkbox"/></p> <p><input type="button" value="Next"/></p>	<p><b>What is one thing that you <i>struggled with</i> during the last series of exercises?</b></p> <p>E.g., was one of the planks particularly challenging? Describe one challenge you faced.</p> <p><b>What challenge did your partner face and how might he/she improve?</b></p> <p>Once you've read your partner's challenge, offer him/her some support for the next trial by typing a message into the respective text.</p>	<p> <b>Rick</b></p> <p>My biggest challenge was <input type="text"/></p> <p>How might your partner overcome this challenge? <input type="text"/></p> <p>I have read my partner's suggestion for how I might improve. <input type="checkbox"/></p> <p><input type="button" value="Next"/></p>
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










Figure A.5 - Selection of Team Icon

 **Danny**

**Choose a team insignia (visual symbol)**


Drag the images to reorder them. Your preferred image should be the first (top-left), in the grid, with image preference decreasing as you go to the right and then down.


You do not need to reorder them all, but at least place your **top three** choices first.

**Choosing an insignia (visual symbol) to represent your team.**

The highest ranking image, when taking both partner's choices into account, is:



 **Rick**

**Choose a team insignia (visual symbol)**

Drag the images to reorder them. Your preferred image should be the first (top-left), in the grid, with image preference decreasing as you go to the right and then down.

You do not need to reorder them all, but at least place your **top three** choices first.














		
		
		
		

Figure A.6 - Selection of Team Name

 **Danny**

**Choose a team name**

Drag the suggested team names below to reorder them. Your preferred name should be the first (top-most), in the list, with name preference decreasing as you go down.

If you would like to suggest a team name (which will be added to the list) enter it here:


You do not need to reorder them all, but at least place your **top three** choices first.

- The "A" Team
- Wildcats
- Team America
- The Planksters
- Your suggested name (if any)
- Your partner's suggested team name (optional)

**Choosing a name to represent your team.**

The highest ranking name, when taking both partner's choices into account, is:

**The "A" Team**

 **Rick**

**Choose a team name**

Drag the suggested team names below to reorder them. Your preferred name should be the first (top-most), in the list, with name preference decreasing as you go down.

If you would like to suggest a team name (which will be added to the list) enter it here:

You do not need to reorder them all, but at least place your **top three** choices first.

- The "A" Team
- Wildcats
- Team America
- The Planksters
- Your suggested name (if any)
- Your partner's suggested team name (optional)



Figure A.7 - Teamwork Based Game



## The "A" Team

Subject 1 page for experiment 44 started Fri Mar 28 11:45:27 CDT 2014

Time left: 79 sec



Danny

**Teamwork**

On this page, you will help an animated character **visit all the houses in a village, collecting funds** so that your team can participate in the *village Olympics!*

Use the **arrow keys** to move the character. You will need to **cooperate** on this task since:

- one partner will control the left/right movement
- the other partner will control the up/down movement.

Next

**Visit all houses in the village.**

Click anywhere on the game scene to start, then use the arrow keys to move around.





Rick

**Teamwork**


On this page, you will help an animated character **visit all the houses in a village, collecting funds** so that your team can participate in the *village Olympics!*

Use the **arrow keys** to move the character. You will need to **cooperate** on this task since:

- one partner will control the left/right movement
- the other partner will control the up/down movement.

Next


Figure A.8 - Establishing Group Position



## The "A" Team

Subject 1 page for experiment 44 started Fri Mar 28 11:45:27 CDT 2014

Time left: 7 sec



Danny


**Individual Positions**

Recall the series of plank exercises that you just performed. Below is the number of seconds, on average, that you held each plank. Your partner is shown his/her results as well.

Your average plank duration (sec):

Who performed better?

Next



Rick

**Individual Positions**


Recall the series of plank exercises that you just performed. Below is the number of seconds, on average, that you held each plank. Your partner is shown his/her results as well.

Your average plank duration (sec):

Who performed better?

Next


Figure A.9 - Establishing Group Norms



## The "A" Team

Subject 1 page for experiment 44 started Fri Mar 28 11:45:27 CDT 2014

Time left: 14 sec



Danny

**Team Norm**

On a scale of 0-10 (with 0 being no effort and 10 being the maximum effort possible), what level of effort do you expect from the members of your team (including yourself)?

Expected effort:

Based on individual expectations an expected "team effort level" will be computed (by averaging).


I agree with the team's computed expected effort.

[Next](#)

### Expected Team Effort Level

Average of individual expectations:

**7.0**



Rick

**Team Norm**

On a scale of 0-10 (with 0 being no effort and 10 being the maximum effort possible), what level of effort do you expect from the members of your team (including yourself)?

Expected effort:

Based on individual expectations an expected "team effort level" will be computed (by averaging).

I agree with the team's computed expected effort.

[Next](#)

## Appendix B - Measures

**Figure B.1 - Modified Physical Activity Group Environment–Questionnaire (PAGE-Q)**

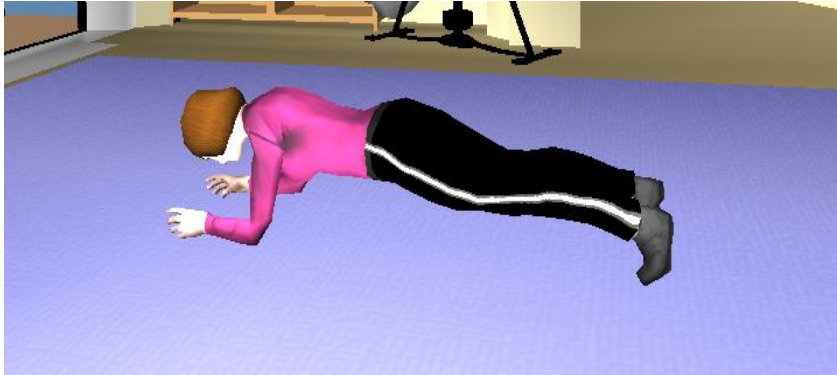
	Very Strongly Disagree	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree	Very Strongly Agree	Prefer not to answer
I like the amount of exercise I got in this session.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My group was important to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My group provided me with a good opportunity to improve in areas of fitness I consider important.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoyed my social interactions with my group.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was happy with the intensity of the exercise in this session.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I liked meeting my online partner.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I liked the exercise done in this group.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I will miss my contact with my partner.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My partner provided me with a good opportunity to improve my personal fitness.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The social interaction I had online in this exercise group was important to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Very Strongly Disagree	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree	Very Strongly Agree	Prefer not to answer
My partner and I were united in our belief about the benefits of the exercises offered in this program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My partner and I often socialized during time spent online.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My partner and I are satisfied with the intensity of exercise in this program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My partner and I would likely spend time together after the program ends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My partner and I enjoyed helping to improve our exercise group.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My partner and I would probably socialize together outside of activity time.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We encouraged each other in order to get the most out of the program.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My partner and I would probably spend time socializing with each other before and after our exercise sessions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

***Figure B.2 – Predicted Task Performance***

Please type in the NUMERICAL response in EACH of the boxes in response to the question.

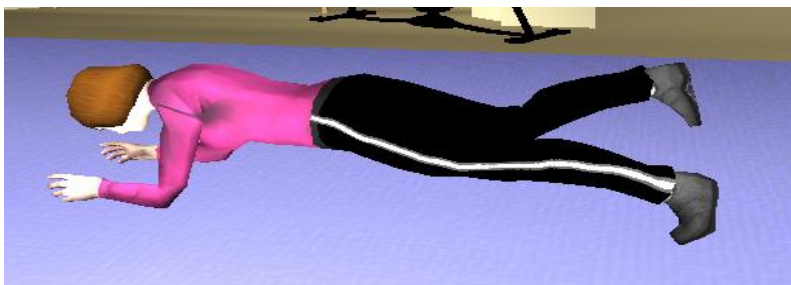
Refer to the images below for each exercise.



How many seconds do you believe you can hold the exercise shown above (Front Plank)



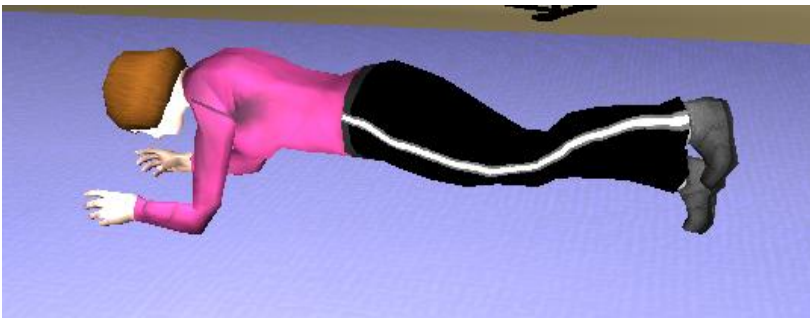
How many seconds do you believe you can hold the exercise shown above (Right Side Plank)



How many seconds do you believe you can hold the exercise shown above (Right One-Legged Plank)



How many seconds do you believe you can hold the exercise shown above (Left Side Plank)



How many seconds do you believe you can hold the exercise shown above (Left One-Legged Plank)

**Figure B.3 - Borg's 10-Item RPE Scale**

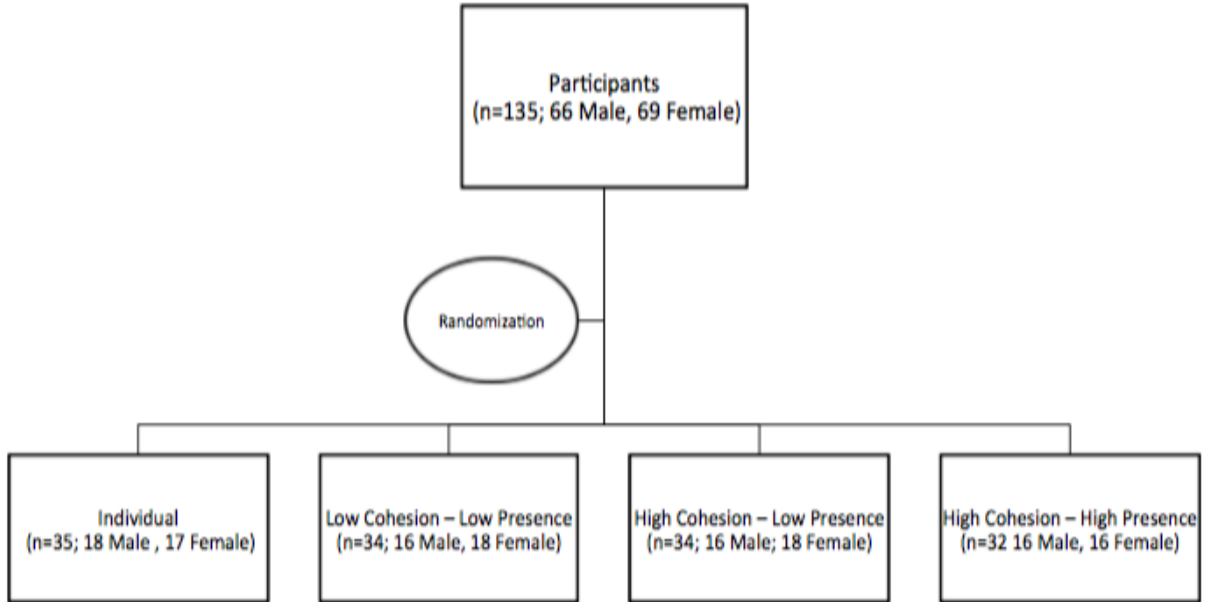
<b>Rating</b>	<b>Description</b>
0	No Exertion at all
0.5	Very, Very Light
1	Very Light
2	Fairly Light
3	Moderate
4	Somewhat Hard
5	Hard
6	
7	Very Hard
8	
9	
10	Very Very Hard (Maximal)

Please Circle the number that best represents your feeling of exertion for each exercise.

<b>Plank 1</b> (Circle One)
0   1   2   3   4   5   6   7   8   9   10
<b>Plank 2</b> (Circle One)
0   1   2   3   4   5   6   7   8   9   10
<b>Plank 3</b> (Circle One)
0   1   2   3   4   5   6   7   8   9   10
<b>Plank 4</b> (Circle One)
0   1   2   3   4   5   6   7   8   9   10
<b>Plank 5</b> (Circle One)
0   1   2   3   4   5   6   7   8   9   10

# Appendix C - Figures

*Figure C.1 - Flowchart of Participant Distribution*





## Appendix D - Tables

*Table D.1 - Description of the OurSpace Application*

Theoretical Construct	Application Feature	GDB Application	Standard Application
Group Environment	Share personal information	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Team name and icon	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Group Structure	Establish group exercise norms	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Establish positions within group	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Group Process	Team-based puzzle	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Social Support	Prompts to provide and receive support	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

**Table D.2 –Cohesion: Attraction to Group - Task by Condition and Gender**

Condition	Overall			Males			Females		
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Low Cohesion – Low Presence	32	5.84	0.68	14	6.03	0.56	18	5.69	0.75
High Cohesion – Low Presence	34	6.31	1.19	16	6.72	1.16	18	5.94	1.13
High Cohesion – High Presence	32	6.13	1.21	16	6.32	1.47	16	6.08	0.95

Means are reported as average score from a 9-point Likert scale

**Table D.3 –Cohesion: Attraction to Group - Social by Condition and Gender**

Condition	Overall			Males			Females		
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Low Cohesion – Low Presence	34	4.86	1.19	16	4.78	1.39	18	4.94	1.01
High Cohesion – Low Presence	34	5.99	1.37	16	6.23	1.39	18	5.78	1.34
High Cohesion – High Presence	32	5.48	1.33	16	5.55	1.52	16	5.41	1.16

Means are reported as average score from a 9-point Likert scale

**Table D.4 –Cohesion: Group Integration - Task by Condition and Gender**

Condition	Overall			Males			Females		
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Low Cohesion – Low Presence	32	4.32	0.94	16	4.38	0.83	16	4.27	1.05
High Cohesion – Low Presence	33	5.14	0.9	15	5.21	0.81	18	5.08	0.98
High Cohesion – High Presence	32	4.86	0.93	16	5.05	1.04	16	4.67	0.8

Means are reported as average score from a 9-point Likert scale

**Table D.5 –Cohesion: Group Integration – Social by Condition and Gender**

Condition	Overall			Males			Females		
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Low Cohesion – Low Presence	34	4.61	1.64	16	4.69	1.45	18	4.61	1.64
High Cohesion – Low Presence	34	5.52	1.24	16	5.83	1.08	18	5.52	1.24
High Cohesion – High Presence	32	5.02	1.17	16	5.16	1.45	16	5.02	1.17

Means are reported as average score from a 9-point Likert scale

**Table D.6 - Physical activity Measured as Persistence (s) by Condition and Gender**

Condition	Overall			Males			Females		
	n	Mean	SD	n	Mean	SD	n	Mean	SD
Individual	35	50.56	18.43	18	55.74	20.32	17	45.07	24.85
Low Cohesion – Low Presence	33	54.04	16.48	15	55.25	13.72	18	53.03	18.80
High Cohesion – Low Presence	34	54.36	16.50	16	60.48	16.98	18	48.93	14.41
High Cohesion – High Presence	32	64.51	20.26	16	73.94	17.19	16	55.09	19.06

Means are reported as average time (sec.) spent in a planking exercise during Block 2 with Block 1 as a covariate.