

**BEHAVIORAL AND PHYSIOLOGICAL EVIDENCE THAT INCREASING GROUP SIZE
AMELIORATES THE IMPACTS OF SOCIAL DISTURBANCE**

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SUMMARY STATEMENT

Social stability is vital for group productivity and long-term persistence. Here, both behavioral and physiological evidence conveys that larger groups are less susceptible to social disturbance.

ABSTRACT

Intra-group social stability is important for the long-term productivity and health of social organisms. We evaluated the effect of group size on group stability in the face of repeated social perturbations using a cooperatively breeding fish, *Neolamprologus pulcher*. In a laboratory study, we compared both the social and physiological responses of individuals from small versus large groups to the repeated removal and replacement of the most dominant group member (the breeder male), either with a new male (treatment condition) or with the same male (control condition). Individuals living in large groups were overall more resistant to instability but were seemingly slower to recover from perturbation. Members of small groups were more vulnerable to instability but recovered faster. Breeder females in smaller groups also showed greater physiological preparedness for instability following social perturbations. In sum, we discover both behavioral and physiological evidence that living in larger groups helps to dampen the impacts of social instability in this system.

INTRODUCTION

Living in groups has various costs and benefits. For instance, group living can increase foraging efficiency (Berger, 1978), decrease predation risk (Foster and Treherne, 1981), and increase collective reproductive output (Modlmeier et al., 2012). In contrast, living in groups can sometimes decrease average per capita reproductive output (Bilde et al., 2007), promote disease transmission (Kappeler et al., 2015), and increase competition for food (Symington, 1988). For group living to evolve, the weight of the combined benefits of grouping must exceed the costs, and any factor that maximizes benefits whilst minimizing the costs of living in groups should promote the evolution of group-living and help to optimize sociality once it has evolved.

Social stability is one factor thought to help maximize benefits while minimizing the costs of group living. For instance, increased familiarity among group members can create a stabilizing effect caused by increased predictability (Dall et al., 2004) and increase group productivity (Modlmeier et al., 2012; Pruitt and Riechert, 2011). Further, familiarity may be a mechanism for reducing within-group competition (Laskowski and Bell, 2013). Familiarity among groupmates can also enhance the effects of social buffering against environmental challenges (Hennessy et al., 2000; Livia Terranova et al., 1999) and decrease overall stress levels (Culbert et al., 2018; Kikusui et al., 2006; Nadler et al., 2016). Group stability also helps to reduce the costs of group living. For example, stable groups composed of familiar individuals experience less internal conflict, and so experience less stress from the threat of aggression or eviction (Pardon et al., 2004), reduced risk of injury, and waste fewer resources in competition (Marler et al., 1995). Even in non-cooperative territorial species, familiarity among neighbors commonly begets reduced aggression via dear enemy effects (e.g., Getty, 1987; Siracusa et al., 2017).

Despite the common finding that group stability helps to maximize group success, all groups in nature must endure some level of instability. Immigration/emigration, birth/death, and alterations to dominance hierarchies, for example, result in alterations in group membership, and thus decrease within-group familiarity and stability. Many social species have therefore evolved mechanisms to help mitigate the negative impacts of such disruptive forces. For instance, some groups exhibit social rules that allow dominance hierarchies to swiftly reorganize following perturbation (Goldenberg et al., 2016). In other cases, reconciliatory communication mechanisms (e.g., specialized vocalization) aid in re-galvanizing damaged social bonds (Reddon et al., 2011; Waal, 2000) and even particular individuals can help to dampen the negative impacts of group instability (Flack et al., 2005;

Flack et al., 2006; McCowan et al., 2011). The traits that enable groups to dampen the acute impacts of social instability and to resume their former predictable states swiftly are important, because *i*) stabilizing traits are potentially important targets for selection and *ii*) forces that compromise these traits risk imperiling the integrity and function of the social system.

Here we examined how one group trait, group size, impacts the acute behavioral and physiological responses of group members to social disturbances and recoverability from them. We elected to focus on group size because it is known to mediate many costs and benefits associated with group living (Avilés and Tufino, 1998), and because natural groups vary considerably in their size, with profound impacts on social selection (Brown et al., 2016). We predicted that living in large groups would diminish the acute impacts of social perturbations and increase group recoverability by distributing the negative impacts of social disturbance (e.g., acts of aggression) across more individuals. Larger groups may also recover more swiftly via enhanced affiliative behavior following social perturbations. We term this the ***distributed perturbation hypothesis*** here. Alternatively, living in larger groups might increase the negative impacts of social perturbations (e.g., via increased aggression) or prevent groups from resuming quiescent behavioral states following disturbance. For instance, aggressive acts might initiate positive feedback fostering additional aggressive interactions in high-density environments and thus prevent groups from resuming their former stable states. We term this the ***aggressive feedback hypothesis***.

The impacts of social disturbances are likely to be evidenced physiologically as well. We therefore evaluated whether group size alters the degree to which group members are metabolically poised for intense bouts of acute or sustained physical activity following social perturbation. A higher capacity for intense activity might be necessary in preparation for, or as a training effect of, increased aggression. Many studies have identified links between various social behaviors and metabolic rates (see Huntingford, Tamilselvan, & Jenjan, 2012 for review). However, reliance on oxygen consumption as a proxy for energy metabolism neglects the anaerobic processes that fuel burst-type movements typically associated with dominance behaviors (Plaut, 2001). Thus, a more refined focus on the biochemical pathways that underlie metabolic phenotypes should help elucidate links between physiology and behaviour.

Enzymes are catalytic proteins that regulate biochemical reaction rates (Boyer and Krebs, 1986). Their expression is often plastic and can change in response to environmental stressors over a period of days to weeks (Beaman et al., 2016). Enzymes that catalyze

regulatory steps of greater biochemical pathways can thus be plastically adjusted to meet an organism's peak metabolic demands in contrasting environments. Thus, *in vitro* measures of regulatory enzyme activities can represent upper thresholds for their respective pathways, and reflect the maximal capacity for these pathways to fuel peak activity *in vivo* (e.g. Vigelsø, Andersen, & Dela, 2014). Indeed, a number of studies have shown that activities of specific metabolic enzymes correlate strongly with intense social behaviors in a range of animal systems (AMP-activated protein kinase, Gilmour et al., 2017; lactate dehydrogenase, citrate synthase, cytochrome oxidase, Guderley, 2009; lactate dehydrogenase, citrate synthase, cytochrome oxidase, Guderley and Couture, 2005; citrate synthase, Kasumovic and Seebacher, 2013; lactate dehydrogenase, pyruvate kinase, Le François et al., 2005; citrate synthase, Regan et al., 2015). In this study we focused on a key regulatory glycolytic enzyme (lactate dehydrogenase; LDH) and a key regulatory oxidative enzyme (citrate synthase; CS) that have been shown to reflect capacities for quick burst movements and more sustained aerobic activities, respectively (e.g. Alp, Newsholme, & Zammit, 1976; Childress & Somero, 1979; Johnston & Moon, 1981). We hypothesized that LDH and CS activities would scale with the most intense bouts of dominant actions displayed by an individual, and that these activities would be highest in individuals from destabilized groups.

To address these questions, we use the cooperative breeding cichlid *Neolamprologus pulcher*, endemic to Lake Tanganyika in the African Rift Valley. In the wild groups are usually comprised of one dominant male-female breeding pair and 1-20 smaller, subordinate, non-breeding helpers (Balshine et al., 2001; Heg et al., 2005). Groups cooperate to care for the young of the dominant pair, maintain the group's territory, and defend the territory from both competitors and predators (Taborsky & Limberger, 1981; Wong & Balshine, 2011a). These fish also have a clear linear size-based dominance hierarchy, with increasing body size associated with increasing rank (Balshine-Earn et al., 1998). Natural groups regularly experience turnover of group members as helpers join or leave a group, or when group members perish (Heg et al., 2005; Stiver et al., 2004; Wong and Balshine, 2011b), with breeders estimated to be replaced a median of every 198-274 day (Dierkes et al., 2005). Thus, this system provides a convenient evolutionary context to evaluate the impacts of group size on behavioral and metabolic responses to social instability and recoverability.

METHODS

Ethics

All experimental protocols were approved by the Animal Research Ethics Board of McMaster University (Animal Utilization Protocol No. 18-04-16), and were in compliance with the guidelines set by the Canadian Council on Animal Care (CCAC) regarding the use of animals in research.

Behavioral Methods

Focal fish were haphazardly selected from a lab population containing approximately third-generation descendants of wild-caught *N. pulcher* captured in 2014. Each social group was formed with a dominant pair (the largest male and female in each social group), and either four (small groups) or eight (large groups) subordinate helper fish. Thus there were a total of six fish in each “small group” and ten fish in each “large group”. These group sizes reflect natural variation seen in the wild (Balshine et al., 2001; Heg et al., 2005). In total we formed 12 small groups and 14 large groups. Small and large social groups were randomly allocated to either control (large, n=6; small, n=6) or treatment (large, n=8, small, n=6) conditions. Unbalanced group distribution was due excessive aggression of some groups during the habituation period. To help reduce aggression and mortality, established breeding pairs were used. All helpers were unfamiliar to the dominant pair and had not previously cohabitated with them. Following group formation, the social groups were given five weeks to habituate and stabilize.

Each social group was maintained in separate, 189 L aquariums containing two terracotta pot halves and two small PVC tubes (that served as both shelter and breeding substrate), two 10 cm x 10 cm mirrors, two sponge aeration filters, a heater, and 3 cm deep coral sand as substrate. The mirrors served as a target of aggression to reduce within-group conflict. A water temperature of 27° C and 13:11 light to dark hour photoperiod was maintained throughout the study. Each dominant male and female received an identifying dorsal fin clip, which has a minimal effect on behavior (Stiver et al., 2004). Fish were fed six days a week ad libitum with Nutrafin® basix large cichlid flakes.

The dominant male (standard length, SL: average=7.57 cm, SEM=0.92) and dominant female (SL: average=6.66 cm, SEM=0.86) were measured at the start of the experiment. To avoid confusion with later measures of dominance, these fish will subsequently be referred to as the *breeder male* and *breeder female*, though not all of these fish were observed breeding prior to the end of the experiment. The standard lengths of all helpers were estimated by an

experienced observer (SB) (SL: average=2.5 cm). Helper size was used only for group standardization purposes and not included in the analyses, and so estimation was used in place of physical measurement to reduce the need for further capture and minimise the stress experienced by the fish during group stabilization. In the treatment condition, the social perturbation consisted of the removal of the breeder male from one social group and replacing him with a new, unfamiliar breeder male. Breeder males were only exchanged with other males of the same group size. Therefore, breeder male fish in the treatment groups were swapped between tanks, and throughout the course of the experiment no treatment group experienced the same male twice. We ensured that the breeder males were always larger than the females, as is observed in the wild (Balshine et al., 2001; Desjardins et al., 2008; Wong et al., 2012). In the control condition, the breeder male fish were removed from their tanks, handled for the same duration as the treatment males, but then returned to their home tank. This social disturbance procedure occurred twice (trial 1 and trial 2), with the manipulations conducted one week apart. All tanks were perturbed on the same day. Acclimation responses occur over a period of hours to weeks. Thus, as a conservative measure, perturbations were conducted twice to permit group members time to deploy morphological and enzymatic responses to reliably stable vs. perturbed social conditions.

Behavioral observations were recorded using Canon VIXIA HF r-series cameras immediately before the manipulation, immediately following the manipulation, and then four, and twenty-four hours following the manipulation. Focal observation recordings were all fifteen minutes long. The first five minutes of each recording were discarded to account for potential disturbance on remaining group members from capturing and returning the breeder male fish and human presence. All videos were scored by the same observer (HA), who was blind to treatment condition and time recording session. Behaviors were coded using McMaster University's Animal Behavior Ecology Laboratory (ABEL) *N. pulcher* ethogram (Sopinka et al., 2009) and Behavioral Observation Research Interactive Software (BORIS) (Friard and Gamba, 2016). Behaviors were subdivided into the categories, "aggression" (chase, bite, ram, puffed throat, mouth-fighting, pseudo-mouth-fighting and head shake), "submission", (submissive posture, submissive display, flee/chased and bitten) and "affiliation" (soft touch, following, and parallel swim).

We calculated a Dominance Index (DI) for each breeder male, breeder female, and for each group of helpers divided per capita, for each recording session. The DI is a well-established method for calculating dominance rank and = (sum of aggressive acts given + sum of submissive acts received) - (sum of aggressive acts received + sum of submissive acts

given) (Aubin-Horth et al., 2007). We also calculated an affiliation index for each breeder male and female, as well as a collective, per capita affiliation index across all helpers within a group, for each recording session, where affiliation index = sum of social acts given + sum of social acts received. We also recorded the observation period containing the highest DI score for breeder females in each tank, herein referred to as the *maximum dominance index observed*. Specifically, the maximum dominance index observed represents the DI of the time period with the highest levels of aggressive behavior in relation to submissive behaviors. This term therefore reflects what are presumably the most stressful and metabolically demanding moments we observed (Grantner and Taborsky, 1998).

The breeder female of each group was captured and rapidly (<3 minutes) euthanized via overdose of benzocaine two days after the final perturbation; all breeder females were euthanized within a five-hour timeframe. Females were measured and their skeletal muscle just posterior to the dorsal fin, heart, and liver were harvested and massed for further analyses. Breeder females were targeted for this analysis due to both their importance to the reproduction of the group, their high care activity and also their key position as both a breeder and subordinate (Fitzpatrick et al., 2008).

Enzyme Assays

In short, tissues were homogenized in 1:10 (m/v) homogenization buffer (0.1% Triton, 50 mM Hepes, 1mM EDTA, pH 7.4; CAT: 100 mM K phosphate buffer, 100 mM KCl, 1 mM EDTA, pH 7.4) on ice. Skeletal muscle homogenates were further diluted to 1:400 for the LDH activity assay, whereas liver homogenates were diluted to 1:20 for both LDH and CS activity assays. Skeletal muscle homogenates were not further diluted for CS activity assays. All assays were run at 27°C in 96-well format on a Spectramax Plus 384 microplate reader (Molecular Devices, Sunnyvale, CA). We used a wavelength of 340 nm to measure the disappearance of NADH (for LDH activity), and a wavelength of 412 nm to measure the production of 2-nitro-5-thiobenzoic acid (TNB; as a proxy of CS activity). Extinction coefficients of 6.22 mM⁻¹ cm⁻¹ and 13.6 mM⁻¹ cm⁻¹ were used for LDH and CS, respectively.

Analyses and Statistical Methods

Dominance and affiliation indices were analyzed using a mixed linear model (GLMM) fit by REML using the free and open software JAMOMI (Version 0.9; GAMLj module; <https://www.jamovi.org>). We fitted tank number and male ID as a random effect, and focal individual class (i.e. breeder female, breeder male, helpers), treatment type (i.e. control vs.

treatment), group size, trial number (i.e. trial 1 or trial 2), and time point (i.e. immediately before the manipulation, immediately after, four hours after and twenty-four hours after the manipulation) as fixed effects. We started with a maximal model and pruned non-significant terms (starting with high-order interactions) until we arrived at a model where all fixed effects were significant (Crawley, 2012; but see Harrison et al., 2018 for limitations to this approach). *Post-hoc* analyses consisted of Bonferroni-corrected pairwise comparisons. We note here that with 6-8 groups per treatment, our power to test higher-order interactions may be low. However, we have nonetheless opted for the statistical model that best reflects our experimental design.

To analyze the relationship between morphology (mass, relative heart mass, liver mass), maximum dominance index, and metabolic capacity (glycolytic and aerobic) across breeder females, we used general linear models (GLM) fit by ordinary least squares (OLS). For the maximum dominance index observed, we fitted treatment type and group size (factors) and body mass, relative heart mass, and liver mass (continuous covariates) as fixed effects. For metabolic capacity, LDH activity in either the skeletal muscle or the liver, or CS activity in either the skeletal muscle or the liver represented the dependent variable. Treatment type, group size (factors), maximum dominance index observed, body mass, and other enzyme activity levels (continuous covariates) were fitted as fixed effects. We used the maximum dominance index observed as a fixed effect because LDH and CS measures convey individuals' capacities for peak activity. Thus, in addition to generalized locomotor activity these effects also likely determine maximum capacities for social activities (e.g., aggression, flight, and dominance), rather than baseline averages. We again started with a maximal model and pruned non-significant terms (starting with high-order interactions) until we arrived at a model where all fixed effects were significant. As a *post-hoc* approach to test whether the effects of maximum dominance on enzyme activities were a potential effect of activity levels, we fitted respective models using mean activity measures as a covariate in place of maximum dominance. For all statistical tests, we used a significance threshold of $\alpha = 0.05$.

RESULTS

Behavioral responses

We detected a significant four-way interaction between class, treatment type, group size, and time point on individuals' dominance scores (Table 1; Fig. 1A-D). We note again that our relatively limited power to test this effect means that results should be interpreted with

caution. Consideration of the effect size (Table 1) and examination of the figures (Fig. 1A-D) gives a guide as to the biological importance of this term. In control tanks housing small groups, breeder male dominance was consistently more than five-fold greater than that of breeder females, although this trend was significant only immediately after the control perturbation (Fig. 1A; S1 for pairwise comparisons). In control tanks housing large groups, there were no significant differences in dominance between the breeder males, breeder females, and helpers; although the helpers consistently had a five-fold lower dominance scores than both the breeder males and breeder females (Fig. 1B; S1). These results suggest that male aggression is more pronounced in small control groups and that breeder females display more submissive acts in response.

In treatment tanks housing small groups, we found that the dominance indices of the breeder females were significantly lower than that of the breeder males at all time points, especially immediately following the perturbation (Fig. 1C; S1). However, in treatment tanks housing large groups there was a delayed spike in breeder male dominance relative to breeder females, in that no significant difference in dominance between breeder males and females was apparent until four-hours after the perturbation (Fig. 1D; S1). Helper dominance remained significantly lower than breeder male dominance in treatment groups across all time points and for both group sizes. There was no significant effect of trial number (i.e. perturbation 1 vs. perturbation 2) in any of the analyses.

There was a significant interaction term between group size, treatment, and time point on social affiliation scores. We further detected a significant interaction term between trial number and time point, and a main effect of individuals' class (breeder female, breeder male, helper) on social affiliation scores (Table 1; Fig. 1E-H). While there was no effect of group size on affiliation scores in the control groups, affiliation conspicuously increased following perturbation in the large treatment groups relative to the small treatment groups. Groups gradually increased affiliative behaviors following the introduction of a new breeder male, but somewhat decreased affiliative behavior following the introduction of a second new breeder male (Table 1; see appendix for pairwise comparisons). Finally, breeder females had the highest affiliation index followed by breeder males, and then by helpers in the treatment groups (Fig. 1E-H; Table 1; S2 for pairwise comparisons).

Morphometric and Enzyme responses

We found an interaction between body mass and group size on the maximum dominance index observed (Table 2; Fig. 2a). Here, maximum scores for dominance

increased with breeder female body size in small groups and decreased with body size in large groups. There were no significant effects of relative heart, however, there was a significant interaction between treatment and group size on relative liver size (hepatosomatic index; HSI; Table 2; Fig. 2b). Specifically, the mean HSI was elevated in breeder females of small groups in control tanks and large groups in treatment tanks.

There was a significant interaction between the dominance indices of breeder females and treatment on liver LDH activity (Table 2; Fig. 2c). Liver LDH activity scaled negatively with breeder female dominance in control groups, and positively with breeder female dominance in treatment groups. This result suggests that our social perturbation treatment was successful in priming breeder females to be more enzymatically prepared for sudden bursts of activity. We found no significant effects of dominance on muscle LDH activity, or liver and skeletal muscle CS activity (Table 2). *Post-hoc*, we found no significant effects of mean level of breeder female activity on liver LDH activities (see appendix 4 for the liver model, which is identical to Table 2 but with “mean activity” replacing “max dominance” as a covariate), suggesting that maximum dominance affects glycolytic capacity independently from greater levels of general locomotor activity.

DISCUSSION

Group stability tends to increase the benefits and decrease the costs of social living (Berger, 1978; Modlmeier et al., 2012; Pruitt and Riechert, 2011), and groups often exhibit mechanisms to return to a stable state following disturbance (Goldenberg et al., 2016; McCowan et al., 2011; Waal, 2000). We sought to determine the effects of group size on the group’s ability to return to social homeostasis in the face of a repeated social stressor. Specifically, we hypothesized a large group would either reduce overall aggression, through the *distributed perturbation hypothesis*, or increase and sustain overall aggression, through the *aggressive feedback hypothesis*. Here we found more support for the *distributed perturbation hypothesis*, though additional moderating forces are also likely at play.

Small groups showed more disparate dominance indices between the most dominant fish (breeder males) and the subordinate fish (breeder females and helpers). This is most obvious when comparing the control groups (Fig. 1A,B). Previous work has found large groups benefitting from larger territories with increased shelter and more opportunities to feed (Balshine et al., 2001). Our results further imply that small groups may be inherently more polarized (and less stable) than large groups, even when social conditions remain relatively steady. In other words, large groups likely benefit from both material and non-

material social advantages. The timing of dominance index spikes varied with group size in our treatment groups: in small groups, changes to and inequality of dominance indices appeared immediately following the perturbation (Fig. 1C), while in large groups change in the indices lagged following perturbation (Fig. 1D). Small groups also appear to return to baseline states faster, as observed in the apparent reduction in breeder male dominance twenty-four hours following the perturbations, while the dominance of large group breeder males remain elevated. Together, these results suggest that large groups are more resistant to social state change and/or that state change in large groups is slower than in small groups. This could be because new breeder males delay asserting their dominance in larger groups until they have had time to evaluate their new social setting and potential competitors. Regardless of the mechanism, this conveys that larger groups might offer their constituents buffering effects against ephemeral social perturbations in a manner that small groups do not.

Additional circumstantial evidence from affiliation indices and body mass hint that smaller groups are more stressful social environments following perturbation. One can observe an increase in the affiliative behaviors of breeder males and especially breeder females following social perturbations in large groups (Fig. 1H). This conveys that the new breeder pair begins establishing a social bond in these groups. If this happens in small groups too, then it is certainly less conspicuous (Fig. 1G). We further note that large breeder females exhibit higher dominance in small groups, irrespective of control vs. treatment, whereas no relationship between body size and dominance was observed in large social groups. This group-size dependent relationship conveys that more acts of dominance transpire in small groups occupied by large breeder females, whereas the dominance indices of breeder females in large groups are near uniformly low (Fig. 2A). This lack of variation in large groups provides further evidence that large social groups are less volatile and more stable social environments than small groups. In *N. pulcher* the strength of social buffering is largely managed by aggression rates (Culbert et al., 2019), so the decreased aggression found in these large groups might facilitate recovery from social perturbation.

The significant interaction of treatment type and group size on HSI further reveals that social disturbance affects breeder female physiology as a factor of group size. Decreased liver size in treated females from small groups and enhanced liver size in treated females from large groups may indicate changes in metabolic energy demands, short-term nutritional status, growth rates, synthesis of vitellogenin and eggshell proteins, or a combination thereof (e.g., Adams and McLean, 1985; Berg et al., 2004; Everaarts et al., 1993; Korsgaard et al., 1986; Larsen et al., 1992). While we lack the resolution to disentangle the mechanisms

affecting treatment- and group size-driven differences in HSI here, higher HSI has been linked to increased dominance in sticklebacks (Guderley and Couture, 2005). Furthermore, concurrent changes in liver LDH activities can indicate that metabolic energy demands, at least in part, contribute to this effect. Specifically, we show that treatment type directionally mediates the relationship between dominance and glycolytic capacity.

The divergent relationship between dominance and LDH activity provides evidence that our social perturbations were successful in instigating an enzymatic response in breeder females. Liver LDH activity increased with breeder female dominance in treatment groups, which were characterized by the largest gaps in dominance between breeder males and females. This further suggests that breeder female dominance increases metabolic preparedness for aggression in these groups relative to controls. By contrast, in the control condition, LDH activity levels decreased with breeder female dominance, suggesting greater dominance is associated with reduced glycolytic capacity and potentially greater stability in these groups. Because the control perturbation was characterized by a familiar breeder male, we suggest that pre-established social relationships dampen the aggressive actions that foster glycolytic capacity. Whether these phenotypic differences reflect a regulated response to social stress, a positive feedback effect of training, or a combination of the two, remains to be examined. However, the lack of relationship between liver LDH activity and greater breeder female activity levels suggests these trends are not simply a feedback effect of exercise training.

Overall, we found more support for the *distributed perturbation hypothesis* from both behavioral and physiological indicators. Physiologically, breeder females elevated their glycolytic capacity in small groups and when faced with strong social perturbations (treatment). Behaviorally, small groups also showed a larger difference in dominance indices across group members, while in large groups' dominance indices were slower to polarize following a perturbation and were associated with a surge of affiliative behaviors as well, both observations circumstantially supporting the *distributed perturbation hypothesis*. On the other hand, the gap in dominance indices shrunk faster following the perturbation in small groups compared to large, potentially supporting the *aggressive feedback hypothesis*. It therefore appears that different group sizes create different responses to the forces of instability: small groups experience larger instability following a social perturbation but recover more rapidly and appear physiologically primed for more instability, whereas large groups are more resistant to the instability of perturbation but appear to recover more slowly. In aggregate, these results convey that the demographic traits of social groups can play a

large role in shaping group susceptibility to and recoverability from social disturbance and that larger groups could exhibit greater levels of social stability and social inertia.

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Competing Interests

No competing interests declared.

Data Availability

Behavioral data uploaded as supplementary document.

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Tables

Table 1. Statistical parameters for final (minimal) GLMM for dominance and affiliation indices.

Dominance	Fixed Factor	F	Num df	Den df	p
	Treatment	5.431	1	21	0.030
	Time point	1.137	3	552	0.334
	Group Size	8.089	1	22	0.009
	Class	146.421	2	552	<.001
	Treatment * Time point	0.440	3	552	0.724
	Treatment * Group Size	4.746	1	22	0.040
	Time point * Group Size	0.514	3	552	0.673
	Treatment * Class	31.269	2	552	<.001
	Time point * Class	3.944	6	552	<.001
	Group Size * Class	4.463	2	552	0.012
	Treatment * Time point * Group Size	0.527	3	552	0.664
	Treatment * Time point * Class	3.809	6	552	<.001
	Treatment * Group Size * Class	2.242	2	552	0.107
	Time point * Group Size * Class	5.069	6	552	<.001
	Treatment * Hours * Group Size * Class	3.686	6	552	0.001
Affiliation					
	Group Size	0.004	1	22	0.947
	Treatment	3.112	1	22	0.092
	Trial #	11.446	1	580	<.001
	Class	8.027	2	580	<.001
	Time point	1.985	3	580	0.115
	Group Size * Treatment	1.248	1	22	0.276
	Treatment * Time point	1.758	3	580	0.154
	Trial # * Time point	5.451	3	580	0.001
	Group Size * Time point	1.196	3	580	0.310
	Group Size * Treatment * Time point	2.749	3	580	0.042

Class of individual (i.e. female, male, helpers), treatment type (i.e. control vs. treatment), group size, trial number (i.e. trial 1 or trial 2), and time point (i.e. immediately before the manipulation, immediately after, four hours after and twenty-four hours after the manipulation). Numerator degrees of freedom = Num df; Denominator degrees of freedom = Den df; Shading means $p < 0.05$.

Table 2. Statistical parameters for final (minimal) GLM for female-level effects.

Morphometrics on Max Dom	SS	df	F	p
BM	247	1	1.38	0.059
Group Size	621	1	3.48	0.075
Group Size * BM	866	1	4.85	0.038
Residuals	5307	22		
Relative Liver Size (HSI)				
Group Size	0.007	1	0.04	0.846
Treatment	0.105	1	0.54	0.469
Group Size * Treatment	0.831	1	4.31	0.050
Residuals	4.239	22		
Liver LDH				
BM	0.174	1	0.73	0.402
Treatment	0.238	1	1.00	0.329
Max Dominance	0.212	1	0.89	0.357
Muscle LDH	1.094	1	4.61	0.045
Treatment * Max Dominance	1.732	1	7.30	0.014
Residuals	4.541	19		
Muscle LDH				
BM	154	1	1.647	0.212
Residuals	2256	24		
Liver CS				
BM	0.004	1	0.184	0.672
Residuals	0.531	22		
Muscle CS				
BM	0.300	1	0.211	0.650
Residuals	34.19	24		

BM, body mass; Max Dominance is the Maximum Dominance Index Observed; Shading means $p < 0.05$.

Figures

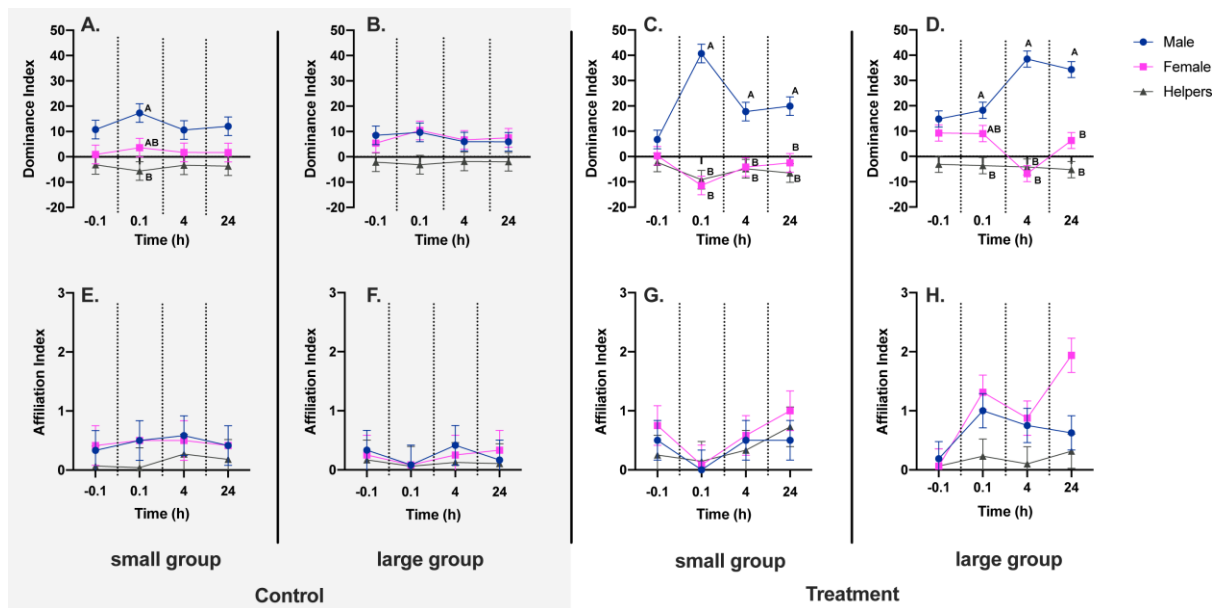


Figure 1. Time courses for mean dominance and affiliation indices. Mean dominance indices in males (blue), females (pink), and helpers (grey) from small and large control (A and B, respectively) and treatment (C and D, respectively) groups. Mean affiliation indices from small and large control (E and F, respectively) and treatment (G and H, respectively) groups. Different letters represent differences between males, females and helpers within each respective time point, as determined by *post hoc* comparisons. Behavioural results from control groups (no male replacement) are shaded in grey while the results from the treatment (male replacement) groups are not shaded.

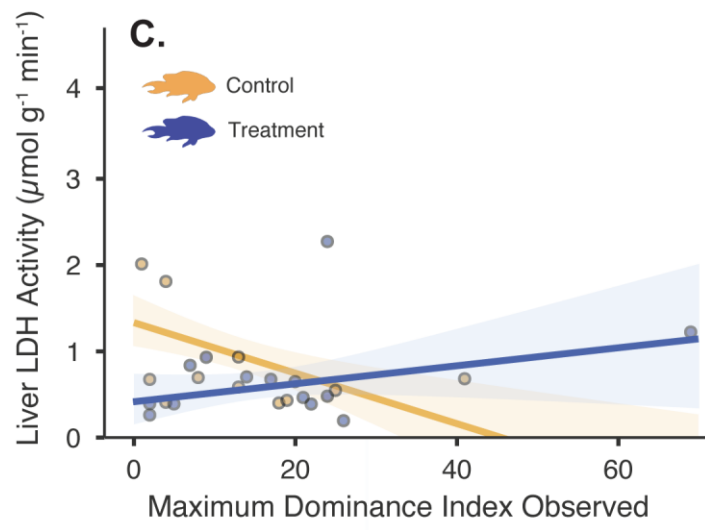
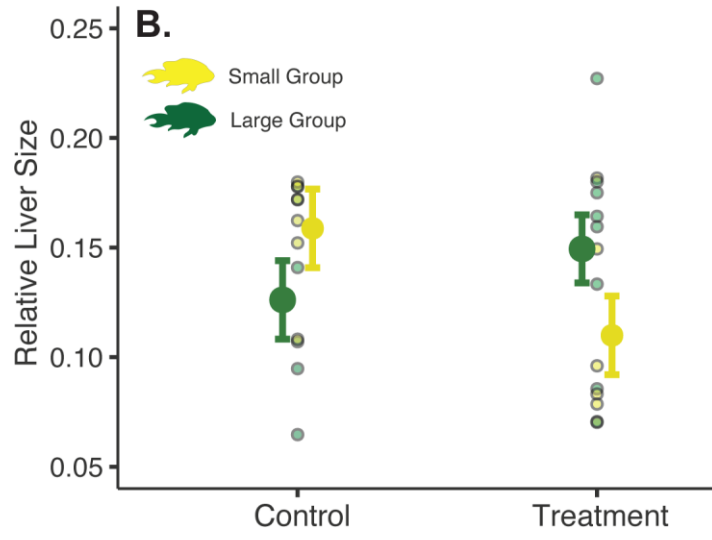
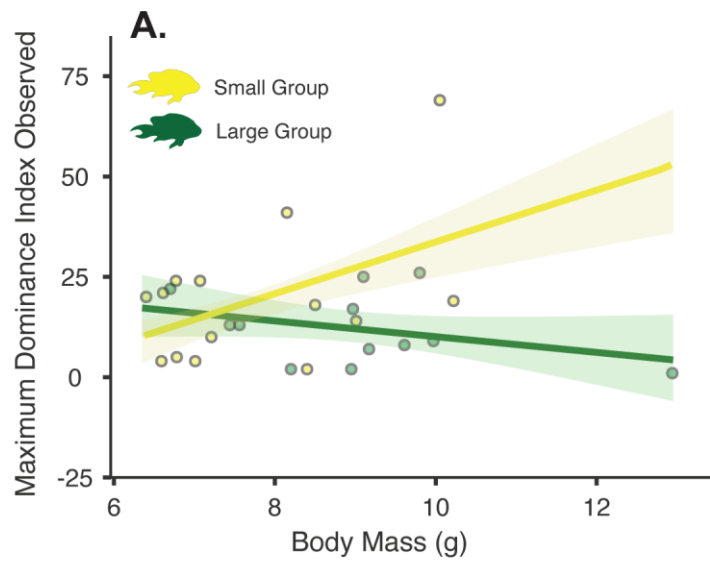


Figure 2. Relationships between behavioural, morphometric and enzymatic traits.

Maximum dominance index observed scales with body mass depending on group size (A), hepatosomatic index (HSI) changes as a function of group size depending on treatment type (B), and liver LDH activity scales with maximum dominance index observed depending on treatment type (C). Small and large groups (A, B) are represented by yellow and green, respectively, whereas treatment and control groups (C) are represented by violet and orange, respectively. Enclosed circles represent observed scores. Note, the directionality and patterns of the relationship remain when we remove the two most extreme data points.

Table S1

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Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison													
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni	
Control	-0.1	Large	Female	-	Control	-0.1	Large	Male	-3.0833	5.19	-0.59395	554	1.000
Control	-0.1	Large	Female	-	Control	-0.1	Small	Female	4.5000	5.20	0.86593	543	1.000
Control	-0.1	Large	Female	-	Control	-0.1	Small	Male	-5.3333	5.20	-1.02629	543	1.000
Control	-0.1	Large	Female	-	Control	0.1	Large	Female	-5.0000	5.19	-0.96316	554	1.000
Control	-0.1	Large	Female	-	Control	0.1	Large	Male	-4.2500	5.19	-0.81869	554	1.000
Control	-0.1	Large	Female	-	Control	0.1	Small	Female	1.8333	5.20	0.35279	543	1.000
Control	-0.1	Large	Female	-	Control	0.1	Small	Male	-11.9167	5.20	-2.29312	543	1.000
Control	-0.1	Large	Female	-	Control	24	Large	Female	-2.0833	5.19	-0.40132	554	1.000
Control	-0.1	Large	Female	-	Control	24	Large	Male	-0.5000	5.19	-0.09632	554	1.000
Control	-0.1	Large	Female	-	Control	24	Small	Female	3.7500	5.20	0.72161	543	1.000
Control	-0.1	Large	Female	-	Control	24	Small	Male	-6.6667	5.20	-1.28287	543	1.000
Control	-0.1	Large	Female	-	Control	4	Large	Female	-1.2500	5.19	-0.24079	554	1.000
Control	-0.1	Large	Female	-	Control	4	Large	Male	-0.5833	5.19	-0.11237	554	1.000
Control	-0.1	Large	Female	-	Control	4	Small	Female	3.6667	5.20	0.70558	543	1.000
Control	-0.1	Large	Female	-	Control	4	Small	Male	-5.1667	5.20	-0.99422	543	1.000
Control	-0.1	Large	Female	-	Treatment	-0.1	Large	Female	-3.8333	4.86	-0.78858	543	1.000
Control	-0.1	Large	Female	-	Treatment	-0.1	Large	Male	-9.3958	4.86	-1.93287	543	1.000
Control	-0.1	Large	Female	-	Treatment	-0.1	Small	Female	5.0833	5.20	0.97818	543	1.000
Control	-0.1	Large	Female	-	Treatment	-0.1	Small	Male	-1.3333	5.20	-0.25657	543	1.000
Control	-0.1	Large	Female	-	Treatment	0.1	Large	Female	-3.5833	4.86	-0.73715	543	1.000
Control	-0.1	Large	Female	-	Treatment	0.1	Large	Male	-12.8333	4.86	-2.64002	543	1.000
Control	-0.1	Large	Female	-	Treatment	0.1	Small	Female	16.8333	5.20	3.23924	543	1.000
Control	-0.1	Large	Female	-	Treatment	0.1	Small	Male	-35.2500	5.20	-6.78315	543	< .001
Control	-0.1	Large	Female	-	Treatment	24	Large	Female	-0.8333	4.86	-0.17143	543	1.000
Control	-0.1	Large	Female	-	Treatment	24	Large	Male	-28.8958	4.86	-5.94434	543	< .001
Control	-0.1	Large	Female	-	Treatment	24	Small	Female	7.9167	5.20	1.52340	543	1.000
Control	-0.1	Large	Female	-	Treatment	24	Small	Male	-14.5000	5.20	-2.79023	543	1.000
Control	-0.1	Large	Female	-	Treatment	4	Large	Female	12.2292	4.86	2.51574	543	1.000
Control	-0.1	Large	Female	-	Treatment	4	Large	Male	-33.0833	4.86	-6.80578	543	< .001
Control	-0.1	Large	Female	-	Treatment	4	Small	Female	9.5833	5.20	1.84412	543	1.000
Control	-0.1	Large	Female	-	Treatment	4	Small	Male	-12.3333	5.20	-2.37330	543	1.000
Control	-0.1	Large	Helpers	-	Control	-0.1	Large	Female	-7.5211	5.19	-1.44881	554	1.000
Control	-0.1	Large	Helpers	-	Control	-0.1	Large	Male	-10.6045	5.19	-2.04276	554	1.000
Control	-0.1	Large	Helpers	-	Control	-0.1	Small	Female	-3.0211	5.20	-0.58136	543	1.000
Control	-0.1	Large	Helpers	-	Control	-0.1	Small	Helpers	1.0483	5.20	0.20173	543	1.000
Control	-0.1	Large	Helpers	-	Control	-0.1	Small	Male	-12.8545	5.20	-2.47358	543	1.000
Control	-0.1	Large	Helpers	-	Control	0.1	Large	Female	-12.5211	5.19	-2.41198	554	1.000
Control	-0.1	Large	Helpers	-	Control	0.1	Large	Helpers	0.9842	5.19	0.18959	554	1.000
Control	-0.1	Large	Helpers	-	Control	0.1	Large	Male	-11.7711	5.19	-2.26750	554	1.000
Control	-0.1	Large	Helpers	-	Control	0.1	Small	Female	-5.6878	5.20	-1.09450	543	1.000
Control	-0.1	Large	Helpers	-	Control	0.1	Small	Helpers	3.5414	5.20	0.68147	543	1.000
Control	-0.1	Large	Helpers	-	Control	0.1	Small	Male	-19.4378	5.20	-3.74041	543	0.229
Control	-0.1	Large	Helpers	-	Control	24	Large	Female	-9.6045	5.19	-1.85013	554	1.000
Control	-0.1	Large	Helpers	-	Control	24	Large	Helpers	-0.1765	5.19	-0.03400	554	1.000
Control	-0.1	Large	Helpers	-	Control	24	Large	Male	-8.0211	5.19	-1.54513	554	1.000
Control	-0.1	Large	Helpers	-	Control	24	Small	Female	-3.7711	5.20	-0.72568	543	1.000
Control	-0.1	Large	Helpers	-	Control	24	Small	Helpers	1.6108	5.20	0.30997	543	1.000
Control	-0.1	Large	Helpers	-	Control	24	Small	Male	-14.1878	5.20	-2.73016	543	1.000
Control	-0.1	Large	Helpers	-	Control	4	Large	Female	-8.7711	5.19	-1.68960	554	1.000
Control	-0.1	Large	Helpers	-	Control	4	Large	Helpers	-0.2560	5.19	-0.04930	554	1.000
Control	-0.1	Large	Helpers	-	Control	4	Large	Male	-8.1045	5.19	-1.56118	554	1.000
Control	-0.1	Large	Helpers	-	Control	4	Small	Female	-3.8545	5.20	-0.74171	543	1.000
Control	-0.1	Large	Helpers	-	Control	4	Small	Helpers	1.2358	5.20	0.23781	543	1.000
Control	-0.1	Large	Helpers	-	Control	4	Small	Male	-12.6878	5.20	-2.44151	543	1.000
Control	-0.1	Large	Helpers	-	Treatment	-0.1	Large	Female	-11.3545	4.86	-2.33580	543	1.000
Control	-0.1	Large	Helpers	-	Treatment	-0.1	Large	Helpers	1.0228	4.86	0.21040	543	1.000
Control	-0.1	Large	Helpers	-	Treatment	-0.1	Large	Male	-16.9170	4.86	-3.48009	543	0.611
Control	-0.1	Large	Helpers	-	Treatment	-0.1	Small	Female	-2.4378	5.20	-0.46910	543	1.000
Control	-0.1	Large	Helpers	-	Treatment	-0.1	Small	Helpers	0.1664	5.20	0.03201	543	1.000

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison												
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni
Control	-0.1	Large	Helpers	- Treatment	-0.1	Small	Male	-8.8545	5.20	-1.70386	543	1.000
Control	-0.1	Large	Helpers	- Treatment	0.1	Large	Female	-11.1045	4.86	-2.28437	543	1.000
Control	-0.1	Large	Helpers	- Treatment	0.1	Large	Helpers	1.5213	4.86	0.31295	543	1.000
Control	-0.1	Large	Helpers	- Treatment	0.1	Large	Male	-20.3545	4.86	-4.18724	543	0.037
Control	-0.1	Large	Helpers	- Treatment	0.1	Small	Female	9.3122	5.20	1.79195	543	1.000
Control	-0.1	Large	Helpers	- Treatment	0.1	Small	Helpers	7.0205	5.20	1.35096	543	1.000
Control	-0.1	Large	Helpers	- Treatment	0.1	Small	Male	-42.7711	5.20	-8.23044	543	< .001
Control	-0.1	Large	Helpers	- Treatment	24	Large	Female	-8.3545	4.86	-1.71865	543	1.000
Control	-0.1	Large	Helpers	- Treatment	24	Large	Helpers	3.1169	4.86	0.64119	543	1.000
Control	-0.1	Large	Helpers	- Treatment	24	Large	Male	-36.4170	4.86	-7.49156	543	< .001
Control	-0.1	Large	Helpers	- Treatment	24	Small	Female	0.3955	5.20	0.07611	543	1.000
Control	-0.1	Large	Helpers	- Treatment	24	Small	Helpers	4.3955	5.20	0.84583	543	1.000
Control	-0.1	Large	Helpers	- Treatment	24	Small	Male	-22.0211	5.20	-4.23752	543	0.030
Control	-0.1	Large	Helpers	- Treatment	4	Large	Female	4.7080	4.86	0.96852	543	1.000
Control	-0.1	Large	Helpers	- Treatment	4	Large	Helpers	2.0324	4.86	0.41811	543	1.000
Control	-0.1	Large	Helpers	- Treatment	4	Large	Male	-40.6045	4.86	-8.35299	543	< .001
Control	-0.1	Large	Helpers	- Treatment	4	Small	Female	2.0622	5.20	0.39683	543	1.000
Control	-0.1	Large	Helpers	- Treatment	4	Small	Helpers	2.7080	5.20	0.52111	543	1.000
Control	-0.1	Large	Helpers	- Treatment	4	Small	Male	-19.8545	5.20	-3.82059	543	0.168
Control	-0.1	Large	Male	- Control	-0.1	Small	Male	-2.2500	5.20	-0.43297	543	1.000
Control	-0.1	Large	Male	- Control	0.1	Large	Male	-1.1667	5.19	-0.22474	554	1.000
Control	-0.1	Large	Male	- Control	0.1	Small	Male	-8.8333	5.20	-1.69980	543	1.000
Control	-0.1	Large	Male	- Control	24	Large	Male	2.5833	5.19	0.49763	554	1.000
Control	-0.1	Large	Male	- Control	24	Small	Male	-3.5833	5.20	-0.68954	543	1.000
Control	-0.1	Large	Male	- Control	4	Large	Male	2.5000	5.19	0.48158	554	1.000
Control	-0.1	Large	Male	- Control	4	Small	Male	-2.0833	5.20	-0.40090	543	1.000
Control	-0.1	Large	Male	- Treatment	-0.1	Large	Male	-6.3125	4.86	-1.29858	543	1.000
Control	-0.1	Large	Male	- Treatment	-0.1	Small	Male	1.7500	5.20	0.33675	543	1.000
Control	-0.1	Large	Male	- Treatment	0.1	Large	Male	-9.7500	4.86	-2.00573	543	1.000
Control	-0.1	Large	Male	- Treatment	0.1	Small	Male	-32.1667	5.20	-6.18983	543	< .001
Control	-0.1	Large	Male	- Treatment	24	Large	Male	-25.8125	4.86	-5.31005	543	< .001
Control	-0.1	Large	Male	- Treatment	24	Small	Male	-11.4167	5.20	-2.19691	543	1.000
Control	-0.1	Large	Male	- Treatment	4	Large	Male	-30.0000	4.86	-6.17148	543	< .001
Control	-0.1	Large	Male	- Treatment	4	Small	Male	-9.2500	5.20	-1.77998	543	1.000
Control	-0.1	Small	Female	- Control	-0.1	Large	Male	-7.5833	5.20	-1.45926	543	1.000
Control	-0.1	Small	Female	- Control	-0.1	Small	Male	-9.8333	5.19	-1.89422	554	1.000
Control	-0.1	Small	Female	- Control	0.1	Large	Male	-8.7500	5.20	-1.68376	543	1.000
Control	-0.1	Small	Female	- Control	0.1	Small	Female	-2.6667	5.19	-0.51369	554	1.000
Control	-0.1	Small	Female	- Control	0.1	Small	Male	-16.4167	5.19	-3.16238	554	1.000
Control	-0.1	Small	Female	- Control	24	Large	Male	-5.0000	5.20	-0.96215	543	1.000
Control	-0.1	Small	Female	- Control	24	Small	Female	-0.7500	5.19	-0.14447	554	1.000
Control	-0.1	Small	Female	- Control	24	Small	Male	-11.1667	5.19	-2.15106	554	1.000
Control	-0.1	Small	Female	- Control	4	Large	Male	-5.0833	5.20	-0.97818	543	1.000
Control	-0.1	Small	Female	- Control	4	Small	Female	-0.8333	5.19	-0.16053	554	1.000
Control	-0.1	Small	Female	- Control	4	Small	Male	-9.6667	5.19	-1.86211	554	1.000
Control	-0.1	Small	Female	- Treatment	-0.1	Large	Male	-13.8958	4.86	-2.85860	543	1.000
Control	-0.1	Small	Female	- Treatment	-0.1	Small	Female	0.5833	5.20	0.11225	543	1.000
Control	-0.1	Small	Female	- Treatment	-0.1	Small	Male	-5.8333	5.20	-1.12251	543	1.000
Control	-0.1	Small	Female	- Treatment	0.1	Large	Male	-17.3333	4.86	-3.56575	543	0.445
Control	-0.1	Small	Female	- Treatment	0.1	Small	Female	12.3333	5.20	2.37330	543	1.000
Control	-0.1	Small	Female	- Treatment	0.1	Small	Male	-39.7500	5.20	-7.64909	543	< .001
Control	-0.1	Small	Female	- Treatment	24	Large	Male	-33.3958	4.86	-6.87006	543	< .001
Control	-0.1	Small	Female	- Treatment	24	Small	Female	3.4167	5.20	0.65747	543	1.000
Control	-0.1	Small	Female	- Treatment	24	Small	Male	-19.0000	5.20	-3.65617	543	0.317
Control	-0.1	Small	Female	- Treatment	4	Large	Male	-37.5833	4.86	-7.73150	543	< .001
Control	-0.1	Small	Female	- Treatment	4	Small	Female	5.0833	5.20	0.97818	543	1.000
Control	-0.1	Small	Female	- Treatment	4	Small	Male	-16.8333	5.20	-3.23924	543	1.000
Control	-0.1	Small	Helpers	- Control	-0.1	Large	Female	-8.5694	5.20	-1.64902	543	1.000
Control	-0.1	Small	Helpers	- Control	-0.1	Large	Male	-11.6528	5.20	-2.24234	543	1.000
Control	-0.1	Small	Helpers	- Control	-0.1	Small	Female	-4.0694	5.19	-0.78391	554	1.000

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison													
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni	
Control	-0.1	Small	Helpers	-	Control	-0.1	Small	Male	-13.9028	5.19	-2.67813	554	1.000
Control	-0.1	Small	Helpers	-	Control	0.1	Large	Female	-13.5694	5.20	-2.61117	543	1.000
Control	-0.1	Small	Helpers	-	Control	0.1	Large	Male	-12.8194	5.20	-2.46684	543	1.000
Control	-0.1	Small	Helpers	-	Control	0.1	Small	Female	-6.7361	5.19	-1.29759	554	1.000
Control	-0.1	Small	Helpers	-	Control	0.1	Small	Helpers	2.4931	5.19	0.48024	554	1.000
Control	-0.1	Small	Helpers	-	Control	0.1	Small	Male	-20.4861	5.19	-3.94629	554	0.101
Control	-0.1	Small	Helpers	-	Control	24	Large	Female	-10.6528	5.20	-2.04991	543	1.000
Control	-0.1	Small	Helpers	-	Control	24	Large	Male	-9.0694	5.20	-1.74523	543	1.000
Control	-0.1	Small	Helpers	-	Control	24	Small	Female	-4.8194	5.19	-0.92838	554	1.000
Control	-0.1	Small	Helpers	-	Control	24	Small	Helpers	0.5625	5.19	0.10836	554	1.000
Control	-0.1	Small	Helpers	-	Control	24	Small	Male	-15.2361	5.19	-2.93497	554	1.000
Control	-0.1	Small	Helpers	-	Control	4	Large	Female	-9.8194	5.20	-1.88955	543	1.000
Control	-0.1	Small	Helpers	-	Control	4	Large	Male	-9.1528	5.20	-1.76127	543	1.000
Control	-0.1	Small	Helpers	-	Control	4	Small	Female	-4.9028	5.19	-0.94443	554	1.000
Control	-0.1	Small	Helpers	-	Control	4	Small	Helpers	0.1875	5.19	0.03612	554	1.000
Control	-0.1	Small	Helpers	-	Control	4	Small	Male	-13.7361	5.19	-2.64602	554	1.000
Control	-0.1	Small	Helpers	-	Treatment	-0.1	Large	Female	-12.4028	4.86	-2.55145	543	1.000
Control	-0.1	Small	Helpers	-	Treatment	-0.1	Large	Male	-17.9653	4.86	-3.69575	543	0.272
Control	-0.1	Small	Helpers	-	Treatment	-0.1	Small	Female	-3.4861	5.20	-0.67083	543	1.000
Control	-0.1	Small	Helpers	-	Treatment	-0.1	Small	Helpers	-0.8819	5.20	-0.16971	543	1.000
Control	-0.1	Small	Helpers	-	Treatment	-0.1	Small	Male	-9.9028	5.20	-1.90559	543	1.000
Control	-0.1	Small	Helpers	-	Treatment	0.1	Large	Female	-12.1528	4.86	-2.50002	543	1.000
Control	-0.1	Small	Helpers	-	Treatment	0.1	Large	Male	-21.4028	4.86	-4.40290	543	0.015
Control	-0.1	Small	Helpers	-	Treatment	0.1	Small	Female	8.2639	5.20	1.59022	543	1.000
Control	-0.1	Small	Helpers	-	Treatment	0.1	Small	Helpers	5.9722	5.20	1.14923	543	1.000
Control	-0.1	Small	Helpers	-	Treatment	0.1	Small	Male	-43.8194	5.20	-8.43217	543	< .001
Control	-0.1	Small	Helpers	-	Treatment	24	Large	Female	-9.4028	4.86	-1.93430	543	1.000
Control	-0.1	Small	Helpers	-	Treatment	24	Large	Male	-37.4653	4.86	-7.70721	543	< .001
Control	-0.1	Small	Helpers	-	Treatment	24	Small	Female	-0.6528	5.20	-0.12561	543	1.000
Control	-0.1	Small	Helpers	-	Treatment	24	Small	Helpers	3.3472	5.20	0.64411	543	1.000
Control	-0.1	Small	Helpers	-	Treatment	24	Small	Male	-23.0694	5.20	-4.43925	543	0.012
Control	-0.1	Small	Helpers	-	Treatment	4	Large	Female	3.6597	4.86	0.75286	543	1.000
Control	-0.1	Small	Helpers	-	Treatment	4	Large	Male	-41.6528	4.86	-8.56865	543	< .001
Control	-0.1	Small	Helpers	-	Treatment	4	Small	Female	1.0139	5.20	0.19510	543	1.000
Control	-0.1	Small	Helpers	-	Treatment	4	Small	Helpers	1.6597	5.20	0.31938	543	1.000
Control	-0.1	Small	Helpers	-	Treatment	4	Small	Male	-20.9028	5.20	-4.02232	543	0.074
Control	-0.1	Small	Male	-	Control	0.1	Small	Male	-6.5833	5.19	-1.26816	554	1.000
Control	-0.1	Small	Male	-	Control	24	Small	Male	-1.3333	5.19	-0.25684	554	1.000
Control	-0.1	Small	Male	-	Control	4	Small	Male	0.1667	5.19	0.03211	554	1.000
Control	-0.1	Small	Male	-	Treatment	-0.1	Small	Male	4.0000	5.20	0.76972	543	1.000
Control	-0.1	Small	Male	-	Treatment	0.1	Small	Male	-29.9167	5.20	-5.75686	543	< .001
Control	-0.1	Small	Male	-	Treatment	24	Small	Male	-9.1667	5.20	-1.76394	543	1.000
Control	-0.1	Small	Male	-	Treatment	4	Small	Male	-7.0000	5.20	-1.34701	543	1.000
Control	0.1	Large	Female	-	Control	-0.1	Large	Male	1.9167	5.19	0.36921	554	1.000
Control	0.1	Large	Female	-	Control	-0.1	Small	Female	9.5000	5.20	1.82808	543	1.000
Control	0.1	Large	Female	-	Control	-0.1	Small	Male	-0.3333	5.20	-0.06414	543	1.000
Control	0.1	Large	Female	-	Control	0.1	Large	Male	0.7500	5.19	0.14447	554	1.000
Control	0.1	Large	Female	-	Control	0.1	Small	Female	6.8333	5.20	1.31494	543	1.000
Control	0.1	Large	Female	-	Control	0.1	Small	Male	-6.9167	5.20	-1.33097	543	1.000
Control	0.1	Large	Female	-	Control	24	Large	Female	2.9167	5.19	0.56184	554	1.000
Control	0.1	Large	Female	-	Control	24	Large	Male	4.5000	5.19	0.86685	554	1.000
Control	0.1	Large	Female	-	Control	24	Small	Female	8.7500	5.20	1.68376	543	1.000
Control	0.1	Large	Female	-	Control	24	Small	Male	-1.6667	5.20	-0.32072	543	1.000
Control	0.1	Large	Female	-	Control	4	Large	Female	3.7500	5.19	0.72237	554	1.000
Control	0.1	Large	Female	-	Control	4	Large	Male	4.4167	5.19	0.85079	554	1.000
Control	0.1	Large	Female	-	Control	4	Small	Female	8.6667	5.20	1.66773	543	1.000
Control	0.1	Large	Female	-	Control	4	Small	Male	-0.1667	5.20	-0.03207	543	1.000
Control	0.1	Large	Female	-	Treatment	-0.1	Large	Male	-4.3958	4.86	-0.90429	543	1.000
Control	0.1	Large	Female	-	Treatment	-0.1	Small	Female	10.0833	5.20	1.94033	543	1.000
Control	0.1	Large	Female	-	Treatment	-0.1	Small	Male	3.6667	5.20	0.70558	543	1.000

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison												
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni
Control	0.1	Large	Female	- Treatment	0.1	Large	Female	1.4167	4.86	0.29143	543	1.000
Control	0.1	Large	Female	- Treatment	0.1	Large	Male	-7.8333	4.86	-1.61144	543	1.000
Control	0.1	Large	Female	- Treatment	0.1	Small	Female	21.8333	5.20	4.20138	543	0.035
Control	0.1	Large	Female	- Treatment	0.1	Small	Male	-30.2500	5.20	-5.82100	543	< .001
Control	0.1	Large	Female	- Treatment	24	Large	Female	4.1667	4.86	0.85715	543	1.000
Control	0.1	Large	Female	- Treatment	24	Large	Male	-23.8958	4.86	-4.91576	543	0.001
Control	0.1	Large	Female	- Treatment	24	Small	Female	12.9167	5.20	2.48555	543	1.000
Control	0.1	Large	Female	- Treatment	24	Small	Male	-9.5000	5.20	-1.82808	543	1.000
Control	0.1	Large	Female	- Treatment	4	Large	Female	17.2292	4.86	3.54432	543	0.482
Control	0.1	Large	Female	- Treatment	4	Large	Male	-28.0833	4.86	-5.77719	543	< .001
Control	0.1	Large	Female	- Treatment	4	Small	Female	14.5833	5.20	2.80627	543	1.000
Control	0.1	Large	Female	- Treatment	4	Small	Male	-7.3333	5.20	-1.41115	543	1.000
Control	0.1	Large	Helpers	- Control	-0.1	Large	Female	-8.5054	5.19	-1.63841	554	1.000
Control	0.1	Large	Helpers	- Control	-0.1	Large	Male	-11.5887	5.19	-2.23236	554	1.000
Control	0.1	Large	Helpers	- Control	-0.1	Small	Female	-4.0054	5.20	-0.77075	543	1.000
Control	0.1	Large	Helpers	- Control	-0.1	Small	Helpers	0.0641	5.20	0.01233	543	1.000
Control	0.1	Large	Helpers	- Control	-0.1	Small	Male	-13.8387	5.20	-2.66298	543	1.000
Control	0.1	Large	Helpers	- Control	0.1	Large	Female	-13.5054	5.19	-2.60157	554	1.000
Control	0.1	Large	Helpers	- Control	0.1	Large	Male	-12.7554	5.19	-2.45709	554	1.000
Control	0.1	Large	Helpers	- Control	0.1	Small	Female	-6.6720	5.20	-1.28390	543	1.000
Control	0.1	Large	Helpers	- Control	0.1	Small	Helpers	2.5571	5.20	0.49207	543	1.000
Control	0.1	Large	Helpers	- Control	0.1	Small	Male	-20.4220	5.20	-3.92981	543	0.108
Control	0.1	Large	Helpers	- Control	24	Large	Female	-10.5887	5.19	-2.03972	554	1.000
Control	0.1	Large	Helpers	- Control	24	Large	Helpers	-1.1607	5.19	-0.22359	554	1.000
Control	0.1	Large	Helpers	- Control	24	Large	Male	-9.0054	5.19	-1.73472	554	1.000
Control	0.1	Large	Helpers	- Control	24	Small	Female	-4.7554	5.20	-0.91507	543	1.000
Control	0.1	Large	Helpers	- Control	24	Small	Helpers	0.6266	5.20	0.12057	543	1.000
Control	0.1	Large	Helpers	- Control	24	Small	Male	-15.1720	5.20	-2.91955	543	1.000
Control	0.1	Large	Helpers	- Control	4	Large	Female	-9.7554	5.19	-1.87920	554	1.000
Control	0.1	Large	Helpers	- Control	4	Large	Helpers	-1.2402	5.19	-0.23890	554	1.000
Control	0.1	Large	Helpers	- Control	4	Large	Male	-9.0887	5.19	-1.75078	554	1.000
Control	0.1	Large	Helpers	- Control	4	Small	Female	-4.8387	5.20	-0.93111	543	1.000
Control	0.1	Large	Helpers	- Control	4	Small	Helpers	0.2516	5.20	0.04841	543	1.000
Control	0.1	Large	Helpers	- Control	4	Small	Male	-13.6720	5.20	-2.63091	543	1.000
Control	0.1	Large	Helpers	- Treatment	-0.1	Large	Female	-12.3387	4.86	-2.53827	543	1.000
Control	0.1	Large	Helpers	- Treatment	-0.1	Large	Male	-17.9012	4.86	-3.68256	543	0.286
Control	0.1	Large	Helpers	- Treatment	-0.1	Small	Female	-3.4220	5.20	-0.65850	543	1.000
Control	0.1	Large	Helpers	- Treatment	-0.1	Small	Helpers	-0.8179	5.20	-0.15738	543	1.000
Control	0.1	Large	Helpers	- Treatment	-0.1	Small	Male	-9.8387	5.20	-1.89326	543	1.000
Control	0.1	Large	Helpers	- Treatment	0.1	Large	Female	-12.0887	4.86	-2.48684	543	1.000
Control	0.1	Large	Helpers	- Treatment	0.1	Large	Helpers	0.5371	4.86	0.11048	543	1.000
Control	0.1	Large	Helpers	- Treatment	0.1	Large	Male	-21.3387	4.86	-4.38971	543	0.015
Control	0.1	Large	Helpers	- Treatment	0.1	Small	Female	8.3280	5.20	1.60255	543	1.000
Control	0.1	Large	Helpers	- Treatment	0.1	Small	Helpers	6.0363	5.20	1.16157	543	1.000
Control	0.1	Large	Helpers	- Treatment	0.1	Small	Male	-43.7554	5.20	-8.41984	543	< .001
Control	0.1	Large	Helpers	- Treatment	24	Large	Female	-9.3387	4.86	-1.92112	543	1.000
Control	0.1	Large	Helpers	- Treatment	24	Large	Helpers	2.1327	4.86	0.43872	543	1.000
Control	0.1	Large	Helpers	- Treatment	24	Large	Male	-37.4012	4.86	-7.69403	543	< .001
Control	0.1	Large	Helpers	- Treatment	24	Small	Female	-0.5887	5.20	-0.11328	543	1.000
Control	0.1	Large	Helpers	- Treatment	24	Small	Helpers	3.4113	5.20	0.65644	543	1.000
Control	0.1	Large	Helpers	- Treatment	24	Small	Male	-23.0054	5.20	-4.42692	543	0.013
Control	0.1	Large	Helpers	- Treatment	4	Large	Female	3.7238	4.86	0.76605	543	1.000
Control	0.1	Large	Helpers	- Treatment	4	Large	Helpers	1.0482	4.86	0.21563	543	1.000
Control	0.1	Large	Helpers	- Treatment	4	Large	Male	-41.5887	4.86	-8.55546	543	< .001
Control	0.1	Large	Helpers	- Treatment	4	Small	Female	1.0780	5.20	0.20743	543	1.000
Control	0.1	Large	Helpers	- Treatment	4	Small	Helpers	1.7238	5.20	0.33171	543	1.000
Control	0.1	Large	Helpers	- Treatment	4	Small	Male	-20.8387	5.20	-4.00999	543	0.078
Control	0.1	Large	Male	- Control	-0.1	Small	Male	-1.0833	5.20	-0.20847	543	1.000
Control	0.1	Large	Male	- Control	0.1	Small	Male	-7.6667	5.20	-1.47530	543	1.000
Control	0.1	Large	Male	- Control	24	Large	Male	3.7500	5.19	0.72237	554	1.000

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison												
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni
Control	0.1	Large	Male	- Control	24	Small	Male	-2.4167	5.20	-0.46504	543	1.000
Control	0.1	Large	Male	- Control	4	Large	Male	3.6667	5.19	0.70632	554	1.000
Control	0.1	Large	Male	- Control	4	Small	Male	-0.9167	5.20	-0.17639	543	1.000
Control	0.1	Large	Male	- Treatment	-0.1	Small	Male	2.9167	5.20	0.56125	543	1.000
Control	0.1	Large	Male	- Treatment	0.1	Large	Male	-8.5833	4.86	-1.76573	543	1.000
Control	0.1	Large	Male	- Treatment	0.1	Small	Male	-31.0000	5.20	-5.96532	543	< .001
Control	0.1	Large	Male	- Treatment	24	Large	Male	-24.6458	4.86	-5.07005	543	< .001
Control	0.1	Large	Male	- Treatment	24	Small	Male	-10.2500	5.20	-1.97241	543	1.000
Control	0.1	Large	Male	- Treatment	4	Large	Male	-28.8333	4.86	-5.93148	543	< .001
Control	0.1	Large	Male	- Treatment	4	Small	Male	-8.0833	5.20	-1.55547	543	1.000
Control	0.1	Small	Female	- Control	-0.1	Large	Male	-4.9167	5.20	-0.94611	543	1.000
Control	0.1	Small	Female	- Control	-0.1	Small	Male	-7.1667	5.19	-1.38053	554	1.000
Control	0.1	Small	Female	- Control	0.1	Large	Male	-6.0833	5.20	-1.17061	543	1.000
Control	0.1	Small	Female	- Control	0.1	Small	Male	-13.7500	5.19	-2.64870	554	1.000
Control	0.1	Small	Female	- Control	24	Large	Male	-2.3333	5.20	-0.44900	543	1.000
Control	0.1	Small	Female	- Control	24	Small	Female	1.9167	5.19	0.36921	554	1.000
Control	0.1	Small	Female	- Control	24	Small	Male	-8.5000	5.19	-1.63738	554	1.000
Control	0.1	Small	Female	- Control	4	Large	Male	-2.4167	5.20	-0.46504	543	1.000
Control	0.1	Small	Female	- Control	4	Small	Female	1.8333	5.19	0.35316	554	1.000
Control	0.1	Small	Female	- Control	4	Small	Male	-7.0000	5.19	-1.34843	554	1.000
Control	0.1	Small	Female	- Treatment	-0.1	Large	Male	-11.2292	4.86	-2.31002	543	1.000
Control	0.1	Small	Female	- Treatment	-0.1	Small	Male	-3.1667	5.20	-0.60936	543	1.000
Control	0.1	Small	Female	- Treatment	0.1	Large	Male	-14.6667	4.86	-3.01717	543	1.000
Control	0.1	Small	Female	- Treatment	0.1	Small	Female	15.0000	5.20	2.88645	543	1.000
Control	0.1	Small	Female	- Treatment	0.1	Small	Male	-37.0833	5.20	-7.13594	543	< .001
Control	0.1	Small	Female	- Treatment	24	Large	Male	-30.7292	4.86	-6.32149	543	< .001
Control	0.1	Small	Female	- Treatment	24	Small	Female	6.0833	5.20	1.17061	543	1.000
Control	0.1	Small	Female	- Treatment	24	Small	Male	-16.3333	5.20	-3.14302	543	1.000
Control	0.1	Small	Female	- Treatment	4	Large	Male	-34.9167	4.86	-7.18292	543	< .001
Control	0.1	Small	Female	- Treatment	4	Small	Female	7.7500	5.20	1.49133	543	1.000
Control	0.1	Small	Female	- Treatment	4	Small	Male	-14.1667	5.20	-2.72609	543	1.000
Control	0.1	Small	Helpers	- Control	-0.1	Large	Female	-11.0625	5.20	-2.12875	543	1.000
Control	0.1	Small	Helpers	- Control	-0.1	Large	Male	-14.1458	5.20	-2.72208	543	1.000
Control	0.1	Small	Helpers	- Control	-0.1	Small	Female	-6.5625	5.19	-1.26415	554	1.000
Control	0.1	Small	Helpers	- Control	-0.1	Small	Male	-16.3958	5.19	-3.15837	554	1.000
Control	0.1	Small	Helpers	- Control	0.1	Large	Female	-16.0625	5.20	-3.09090	543	1.000
Control	0.1	Small	Helpers	- Control	0.1	Large	Male	-15.3125	5.20	-2.94658	543	1.000
Control	0.1	Small	Helpers	- Control	0.1	Small	Female	-9.2292	5.19	-1.77784	554	1.000
Control	0.1	Small	Helpers	- Control	0.1	Small	Male	-22.9792	5.19	-4.42653	554	0.013
Control	0.1	Small	Helpers	- Control	24	Large	Female	-13.1458	5.20	-2.52965	543	1.000
Control	0.1	Small	Helpers	- Control	24	Large	Male	-11.5625	5.20	-2.22497	543	1.000
Control	0.1	Small	Helpers	- Control	24	Small	Female	-7.3125	5.19	-1.40862	554	1.000
Control	0.1	Small	Helpers	- Control	24	Small	Helpers	-1.9306	5.19	-0.37189	554	1.000
Control	0.1	Small	Helpers	- Control	24	Small	Male	-17.7292	5.19	-3.41521	554	0.772
Control	0.1	Small	Helpers	- Control	4	Large	Female	-12.3125	5.20	-2.36929	543	1.000
Control	0.1	Small	Helpers	- Control	4	Large	Male	-11.6458	5.20	-2.24101	543	1.000
Control	0.1	Small	Helpers	- Control	4	Small	Female	-7.3958	5.19	-1.42468	554	1.000
Control	0.1	Small	Helpers	- Control	4	Small	Helpers	-2.3056	5.19	-0.44412	554	1.000
Control	0.1	Small	Helpers	- Control	4	Small	Male	-16.2292	5.19	-3.12626	554	1.000
Control	0.1	Small	Helpers	- Treatment	-0.1	Large	Female	-14.8958	4.86	-3.06431	543	1.000
Control	0.1	Small	Helpers	- Treatment	-0.1	Large	Male	-20.4583	4.86	-4.20861	543	0.034
Control	0.1	Small	Helpers	- Treatment	-0.1	Small	Female	-5.9792	5.20	-1.15057	543	1.000
Control	0.1	Small	Helpers	- Treatment	-0.1	Small	Male	-12.3958	5.20	-2.38533	543	1.000
Control	0.1	Small	Helpers	- Treatment	0.1	Large	Female	-14.6458	4.86	-3.01288	543	1.000
Control	0.1	Small	Helpers	- Treatment	0.1	Large	Male	-23.8958	4.86	-4.91576	543	0.001
Control	0.1	Small	Helpers	- Treatment	0.1	Small	Female	5.7708	5.20	1.11048	543	1.000
Control	0.1	Small	Helpers	- Treatment	0.1	Small	Helpers	3.4792	5.20	0.66950	543	1.000
Control	0.1	Small	Helpers	- Treatment	0.1	Small	Male	-46.3125	5.20	-8.91191	543	< .001
Control	0.1	Small	Helpers	- Treatment	24	Large	Female	-11.8958	4.86	-2.44716	543	1.000
Control	0.1	Small	Helpers	- Treatment	24	Large	Male	-39.9583	4.86	-8.22007	543	< .001

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison												
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni
Control	0.1	Small	Helpers	- Treatment	24	Small	Female	-3.1458	5.20	-0.60535	543	1.000
Control	0.1	Small	Helpers	- Treatment	24	Small	Helpers	0.8542	5.20	0.16437	543	1.000
Control	0.1	Small	Helpers	- Treatment	24	Small	Male	-25.5625	5.20	-4.91899	543	0.001
Control	0.1	Small	Helpers	- Treatment	4	Large	Female	1.1667	4.86	0.24000	543	1.000
Control	0.1	Small	Helpers	- Treatment	4	Large	Male	-44.1458	4.86	-9.08151	543	< .001
Control	0.1	Small	Helpers	- Treatment	4	Small	Female	-1.4792	5.20	-0.28464	543	1.000
Control	0.1	Small	Helpers	- Treatment	4	Small	Helpers	-0.8333	5.20	-0.16036	543	1.000
Control	0.1	Small	Helpers	- Treatment	4	Small	Male	-23.3958	5.20	-4.50206	543	0.009
Control	0.1	Small	Male	- Control	24	Small	Male	5.2500	5.19	1.01132	554	1.000
Control	0.1	Small	Male	- Control	4	Small	Male	6.7500	5.19	1.30027	554	1.000
Control	0.1	Small	Male	- Treatment	0.1	Small	Male	-23.3333	5.20	-4.49003	543	0.010
Control	0.1	Small	Male	- Treatment	24	Small	Male	-2.5833	5.20	-0.49711	543	1.000
Control	0.1	Small	Male	- Treatment	4	Small	Male	-0.4167	5.20	-0.08018	543	1.000
Control	24	Large	Female	- Control	-0.1	Large	Male	-1.0000	5.19	-0.19263	554	1.000
Control	24	Large	Female	- Control	-0.1	Small	Female	6.5833	5.20	1.26683	543	1.000
Control	24	Large	Female	- Control	-0.1	Small	Male	-3.2500	5.20	-0.62540	543	1.000
Control	24	Large	Female	- Control	0.1	Large	Male	-2.1667	5.19	-0.41737	554	1.000
Control	24	Large	Female	- Control	0.1	Small	Female	3.9167	5.20	0.75368	543	1.000
Control	24	Large	Female	- Control	0.1	Small	Male	-9.8333	5.20	-1.89223	543	1.000
Control	24	Large	Female	- Control	24	Large	Male	1.5833	5.19	0.30500	554	1.000
Control	24	Large	Female	- Control	24	Small	Female	5.8333	5.20	1.12251	543	1.000
Control	24	Large	Female	- Control	24	Small	Male	-4.5833	5.20	-0.88197	543	1.000
Control	24	Large	Female	- Control	4	Large	Male	1.5000	5.19	0.28895	554	1.000
Control	24	Large	Female	- Control	4	Small	Female	5.7500	5.20	1.10647	543	1.000
Control	24	Large	Female	- Control	4	Small	Male	-3.0833	5.20	-0.59333	543	1.000
Control	24	Large	Female	- Treatment	-0.1	Large	Male	-7.3125	4.86	-1.50430	543	1.000
Control	24	Large	Female	- Treatment	-0.1	Small	Female	7.1667	5.20	1.37908	543	1.000
Control	24	Large	Female	- Treatment	-0.1	Small	Male	0.7500	5.20	0.14432	543	1.000
Control	24	Large	Female	- Treatment	0.1	Large	Male	-10.7500	4.86	-2.21145	543	1.000
Control	24	Large	Female	- Treatment	0.1	Small	Female	18.9167	5.20	3.64013	543	0.337
Control	24	Large	Female	- Treatment	0.1	Small	Male	-33.1667	5.20	-6.38226	543	< .001
Control	24	Large	Female	- Treatment	24	Large	Female	1.2500	4.86	0.25715	543	1.000
Control	24	Large	Female	- Treatment	24	Large	Male	-26.8125	4.86	-5.51576	543	< .001
Control	24	Large	Female	- Treatment	24	Small	Female	10.0000	5.20	1.92430	543	1.000
Control	24	Large	Female	- Treatment	24	Small	Male	-12.4167	5.20	-2.38934	543	1.000
Control	24	Large	Female	- Treatment	4	Large	Male	-31.0000	4.86	-6.37720	543	< .001
Control	24	Large	Female	- Treatment	4	Small	Female	11.6667	5.20	2.24501	543	1.000
Control	24	Large	Female	- Treatment	4	Small	Male	-10.2500	5.20	-1.97241	543	1.000
Control	24	Large	Helpers	- Control	-0.1	Large	Female	-7.3446	5.19	-1.41482	554	1.000
Control	24	Large	Helpers	- Control	-0.1	Large	Male	-10.4280	5.19	-2.00877	554	1.000
Control	24	Large	Helpers	- Control	-0.1	Small	Female	-2.8446	5.20	-0.54739	543	1.000
Control	24	Large	Helpers	- Control	-0.1	Small	Helpers	1.2248	5.20	0.23569	543	1.000
Control	24	Large	Helpers	- Control	-0.1	Small	Male	-12.6780	5.20	-2.43962	543	1.000
Control	24	Large	Helpers	- Control	0.1	Large	Female	-12.3446	5.19	-2.37798	554	1.000
Control	24	Large	Helpers	- Control	0.1	Large	Male	-11.5946	5.19	-2.23350	554	1.000
Control	24	Large	Helpers	- Control	0.1	Small	Female	-5.5113	5.20	-1.06054	543	1.000
Control	24	Large	Helpers	- Control	0.1	Small	Helpers	3.7179	5.20	0.71543	543	1.000
Control	24	Large	Helpers	- Control	0.1	Small	Male	-19.2613	5.20	-3.70645	543	0.261
Control	24	Large	Helpers	- Control	24	Large	Female	-9.4280	5.19	-1.81613	554	1.000
Control	24	Large	Helpers	- Control	24	Large	Male	-7.8446	5.19	-1.51113	554	1.000
Control	24	Large	Helpers	- Control	24	Small	Female	-3.5946	5.20	-0.69172	543	1.000
Control	24	Large	Helpers	- Control	24	Small	Helpers	1.7873	5.20	0.34393	543	1.000
Control	24	Large	Helpers	- Control	24	Small	Male	-14.0113	5.20	-2.69619	543	1.000
Control	24	Large	Helpers	- Control	4	Large	Female	-8.5946	5.19	-1.65561	554	1.000
Control	24	Large	Helpers	- Control	4	Large	Male	-7.9280	5.19	-1.52719	554	1.000
Control	24	Large	Helpers	- Control	4	Small	Female	-3.6780	5.20	-0.70775	543	1.000
Control	24	Large	Helpers	- Control	4	Small	Helpers	1.4123	5.20	0.27177	543	1.000
Control	24	Large	Helpers	- Control	4	Small	Male	-12.5113	5.20	-2.40755	543	1.000
Control	24	Large	Helpers	- Treatment	-0.1	Large	Female	-11.1780	4.86	-2.29949	543	1.000
Control	24	Large	Helpers	- Treatment	-0.1	Large	Male	-16.7405	4.86	-3.44379	543	0.697

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison												
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni
Control	24	Large	Helpers	- Treatment	-0.1	Small	Female	-2.2613	5.20	-0.43514	543	1.000
Control	24	Large	Helpers	- Treatment	-0.1	Small	Helpers	0.3429	5.20	0.06598	543	1.000
Control	24	Large	Helpers	- Treatment	-0.1	Small	Male	-8.6780	5.20	-1.66990	543	1.000
Control	24	Large	Helpers	- Treatment	0.1	Large	Female	-10.9280	4.86	-2.24806	543	1.000
Control	24	Large	Helpers	- Treatment	0.1	Large	Male	-20.1780	4.86	-4.15094	543	0.043
Control	24	Large	Helpers	- Treatment	0.1	Small	Female	9.4887	5.20	1.82591	543	1.000
Control	24	Large	Helpers	- Treatment	0.1	Small	Helpers	7.1970	5.20	1.38492	543	1.000
Control	24	Large	Helpers	- Treatment	0.1	Small	Male	-42.5946	5.20	-8.19648	543	< .001
Control	24	Large	Helpers	- Treatment	24	Large	Female	-8.1780	4.86	-1.68234	543	1.000
Control	24	Large	Helpers	- Treatment	24	Large	Helpers	3.2934	4.86	0.67750	543	1.000
Control	24	Large	Helpers	- Treatment	24	Large	Male	-36.2405	4.86	-7.45525	543	< .001
Control	24	Large	Helpers	- Treatment	24	Small	Female	0.5720	5.20	0.11007	543	1.000
Control	24	Large	Helpers	- Treatment	24	Small	Helpers	4.5720	5.20	0.87979	543	1.000
Control	24	Large	Helpers	- Treatment	24	Small	Male	-21.8446	5.20	-4.20356	543	0.035
Control	24	Large	Helpers	- Treatment	4	Large	Female	4.8845	4.86	1.00483	543	1.000
Control	24	Large	Helpers	- Treatment	4	Large	Male	-40.4280	4.86	-8.31669	543	< .001
Control	24	Large	Helpers	- Treatment	4	Small	Female	2.2387	5.20	0.43079	543	1.000
Control	24	Large	Helpers	- Treatment	4	Small	Helpers	2.8845	5.20	0.55507	543	1.000
Control	24	Large	Helpers	- Treatment	4	Small	Male	-19.6780	5.20	-3.78663	543	0.191
Control	24	Large	Male	- Control	-0.1	Small	Male	-4.8333	5.20	-0.93008	543	1.000
Control	24	Large	Male	- Control	0.1	Small	Male	-11.4167	5.20	-2.19691	543	1.000
Control	24	Large	Male	- Control	24	Small	Male	-6.1667	5.20	-1.18665	543	1.000
Control	24	Large	Male	- Control	4	Small	Male	-4.6667	5.20	-0.89801	543	1.000
Control	24	Large	Male	- Treatment	-0.1	Small	Male	-0.8333	5.20	-0.16036	543	1.000
Control	24	Large	Male	- Treatment	0.1	Small	Male	-34.7500	5.20	-6.68694	543	< .001
Control	24	Large	Male	- Treatment	24	Large	Male	-28.3958	4.86	-5.84148	543	< .001
Control	24	Large	Male	- Treatment	24	Small	Male	-14.0000	5.20	-2.69402	543	1.000
Control	24	Large	Male	- Treatment	4	Small	Male	-11.8333	5.20	-2.27709	543	1.000
Control	24	Small	Female	- Control	-0.1	Large	Male	-6.8333	5.20	-1.31494	543	1.000
Control	24	Small	Female	- Control	-0.1	Small	Male	-9.0833	5.19	-1.74974	554	1.000
Control	24	Small	Female	- Control	0.1	Large	Male	-8.0000	5.20	-1.53944	543	1.000
Control	24	Small	Female	- Control	0.1	Small	Male	-15.6667	5.19	-3.01791	554	1.000
Control	24	Small	Female	- Control	24	Large	Male	-4.2500	5.20	-0.81783	543	1.000
Control	24	Small	Female	- Control	24	Small	Male	-10.4167	5.19	-2.00659	554	1.000
Control	24	Small	Female	- Control	4	Large	Male	-4.3333	5.20	-0.83386	543	1.000
Control	24	Small	Female	- Control	4	Small	Male	-8.9167	5.19	-1.71764	554	1.000
Control	24	Small	Female	- Treatment	-0.1	Large	Male	-13.1458	4.86	-2.70431	543	1.000
Control	24	Small	Female	- Treatment	-0.1	Small	Male	-5.0833	5.20	-0.97818	543	1.000
Control	24	Small	Female	- Treatment	0.1	Large	Male	-16.5833	4.86	-3.41146	543	0.783
Control	24	Small	Female	- Treatment	0.1	Small	Male	-39.0000	5.20	-7.50476	543	< .001
Control	24	Small	Female	- Treatment	24	Large	Male	-32.6458	4.86	-6.71577	543	< .001
Control	24	Small	Female	- Treatment	24	Small	Female	4.1667	5.20	0.80179	543	1.000
Control	24	Small	Female	- Treatment	24	Small	Male	-18.2500	5.20	-3.51184	543	0.544
Control	24	Small	Female	- Treatment	4	Large	Male	-36.8333	4.86	-7.57721	543	< .001
Control	24	Small	Female	- Treatment	4	Small	Male	-16.0833	5.20	-3.09491	543	1.000
Control	24	Small	Helpers	- Control	-0.1	Large	Female	-9.1319	5.20	-1.75726	543	1.000
Control	24	Small	Helpers	- Control	-0.1	Large	Male	-12.2153	5.20	-2.35058	543	1.000
Control	24	Small	Helpers	- Control	-0.1	Small	Female	-4.6319	5.19	-0.89226	554	1.000
Control	24	Small	Helpers	- Control	-0.1	Small	Male	-14.4653	5.19	-2.78648	554	1.000
Control	24	Small	Helpers	- Control	0.1	Large	Female	-14.1319	5.20	-2.71941	543	1.000
Control	24	Small	Helpers	- Control	0.1	Large	Male	-13.3819	5.20	-2.57509	543	1.000
Control	24	Small	Helpers	- Control	0.1	Small	Female	-7.2986	5.19	-1.40595	554	1.000
Control	24	Small	Helpers	- Control	0.1	Small	Male	-21.0486	5.19	-4.05464	554	0.065
Control	24	Small	Helpers	- Control	24	Large	Female	-11.2153	5.20	-2.15815	543	1.000
Control	24	Small	Helpers	- Control	24	Large	Male	-9.6319	5.20	-1.85347	543	1.000
Control	24	Small	Helpers	- Control	24	Small	Female	-5.3819	5.19	-1.03674	554	1.000
Control	24	Small	Helpers	- Control	24	Small	Male	-15.7986	5.19	-3.04332	554	1.000
Control	24	Small	Helpers	- Control	4	Large	Female	-10.3819	5.20	-1.99780	543	1.000
Control	24	Small	Helpers	- Control	4	Large	Male	-9.7153	5.20	-1.86951	543	1.000
Control	24	Small	Helpers	- Control	4	Small	Female	-5.4653	5.19	-1.05279	554	1.000

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison												
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni
Control	24	Small	Helpers	- Control	4	Small	Male	-14.2986	5.19	-2.75438	554	1.000
Control	24	Small	Helpers	- Treatment	-0.1	Large	Female	-12.9653	4.86	-2.66717	543	1.000
Control	24	Small	Helpers	- Treatment	-0.1	Large	Male	-18.5278	4.86	-3.81146	543	0.174
Control	24	Small	Helpers	- Treatment	-0.1	Small	Female	-4.0486	5.20	-0.77907	543	1.000
Control	24	Small	Helpers	- Treatment	-0.1	Small	Male	-10.4653	5.20	-2.01383	543	1.000
Control	24	Small	Helpers	- Treatment	0.1	Large	Female	-12.7153	4.86	-2.61574	543	1.000
Control	24	Small	Helpers	- Treatment	0.1	Large	Male	-21.9653	4.86	-4.51861	543	0.009
Control	24	Small	Helpers	- Treatment	0.1	Small	Female	7.7014	5.20	1.48198	543	1.000
Control	24	Small	Helpers	- Treatment	0.1	Small	Male	-44.3819	5.20	-8.54041	543	< .001
Control	24	Small	Helpers	- Treatment	24	Large	Female	-9.9653	4.86	-2.05002	543	1.000
Control	24	Small	Helpers	- Treatment	24	Large	Male	-38.0278	4.86	-7.82293	543	< .001
Control	24	Small	Helpers	- Treatment	24	Small	Female	-1.2153	5.20	-0.23386	543	1.000
Control	24	Small	Helpers	- Treatment	24	Small	Helpers	2.7847	5.20	0.53586	543	1.000
Control	24	Small	Helpers	- Treatment	24	Small	Male	-23.6319	5.20	-4.54749	543	0.008
Control	24	Small	Helpers	- Treatment	4	Large	Female	3.0972	4.86	0.63715	543	1.000
Control	24	Small	Helpers	- Treatment	4	Large	Male	-42.2153	4.86	-8.68436	543	< .001
Control	24	Small	Helpers	- Treatment	4	Small	Female	0.4514	5.20	0.08686	543	1.000
Control	24	Small	Helpers	- Treatment	4	Small	Male	-21.4653	5.20	-4.13056	543	0.047
Control	24	Small	Male	- Treatment	24	Small	Male	-7.8333	5.20	-1.50737	543	1.000
Control	4	Large	Female	- Control	-0.1	Large	Male	-1.8333	5.19	-0.35316	554	1.000
Control	4	Large	Female	- Control	-0.1	Small	Female	5.7500	5.20	1.10647	543	1.000
Control	4	Large	Female	- Control	-0.1	Small	Male	-4.0833	5.20	-0.78576	543	1.000
Control	4	Large	Female	- Control	0.1	Large	Male	-3.0000	5.19	-0.57790	554	1.000
Control	4	Large	Female	- Control	0.1	Small	Female	3.0833	5.20	0.59333	543	1.000
Control	4	Large	Female	- Control	0.1	Small	Male	-10.6667	5.20	-2.05258	543	1.000
Control	4	Large	Female	- Control	24	Large	Female	-0.8333	5.19	-0.16053	554	1.000
Control	4	Large	Female	- Control	24	Large	Male	0.7500	5.19	0.14447	554	1.000
Control	4	Large	Female	- Control	24	Small	Female	5.0000	5.20	0.96215	543	1.000
Control	4	Large	Female	- Control	24	Small	Male	-5.4167	5.20	-1.04233	543	1.000
Control	4	Large	Female	- Control	4	Large	Male	0.6667	5.19	0.12842	554	1.000
Control	4	Large	Female	- Control	4	Small	Female	4.9167	5.20	0.94611	543	1.000
Control	4	Large	Female	- Control	4	Small	Male	-3.9167	5.20	-0.75368	543	1.000
Control	4	Large	Female	- Treatment	-0.1	Large	Male	-8.1458	4.86	-1.67573	543	1.000
Control	4	Large	Female	- Treatment	-0.1	Small	Female	6.3333	5.20	1.21872	543	1.000
Control	4	Large	Female	- Treatment	-0.1	Small	Male	-0.0833	5.20	-0.01604	543	1.000
Control	4	Large	Female	- Treatment	0.1	Large	Male	-11.5833	4.86	-2.38288	543	1.000
Control	4	Large	Female	- Treatment	0.1	Small	Female	18.0833	5.20	3.47977	543	0.612
Control	4	Large	Female	- Treatment	0.1	Small	Male	-34.0000	5.20	-6.54261	543	< .001
Control	4	Large	Female	- Treatment	24	Large	Female	0.4167	4.86	0.08572	543	1.000
Control	4	Large	Female	- Treatment	24	Large	Male	-27.6458	4.86	-5.68719	543	< .001
Control	4	Large	Female	- Treatment	24	Small	Female	9.1667	5.20	1.76394	543	1.000
Control	4	Large	Female	- Treatment	24	Small	Male	-13.2500	5.20	-2.54970	543	1.000
Control	4	Large	Female	- Treatment	4	Large	Female	13.4792	4.86	2.77288	543	1.000
Control	4	Large	Female	- Treatment	4	Large	Male	-31.8333	4.86	-6.54863	543	< .001
Control	4	Large	Female	- Treatment	4	Small	Female	10.8333	5.20	2.08466	543	1.000
Control	4	Large	Female	- Treatment	4	Small	Male	-11.0833	5.20	-2.13276	543	1.000
Control	4	Large	Helpers	- Control	-0.1	Large	Female	-7.2652	5.19	-1.39951	554	1.000
Control	4	Large	Helpers	- Control	-0.1	Large	Male	-10.3485	5.19	-1.99346	554	1.000
Control	4	Large	Helpers	- Control	-0.1	Small	Female	-2.7652	5.20	-0.53210	543	1.000
Control	4	Large	Helpers	- Control	-0.1	Small	Helpers	1.3043	5.20	0.25098	543	1.000
Control	4	Large	Helpers	- Control	-0.1	Small	Male	-12.5985	5.20	-2.42433	543	1.000
Control	4	Large	Helpers	- Control	0.1	Large	Female	-12.2652	5.19	-2.36267	554	1.000
Control	4	Large	Helpers	- Control	0.1	Large	Male	-11.5152	5.19	-2.21820	554	1.000
Control	4	Large	Helpers	- Control	0.1	Small	Female	-5.4318	5.20	-1.04525	543	1.000
Control	4	Large	Helpers	- Control	0.1	Small	Helpers	3.7973	5.20	0.73072	543	1.000
Control	4	Large	Helpers	- Control	0.1	Small	Male	-19.1818	5.20	-3.69116	543	0.277
Control	4	Large	Helpers	- Control	24	Large	Female	-9.3485	5.19	-1.80083	554	1.000
Control	4	Large	Helpers	- Control	24	Large	Helpers	0.0795	5.19	0.01531	554	1.000
Control	4	Large	Helpers	- Control	24	Large	Male	-7.7652	5.19	-1.49582	554	1.000
Control	4	Large	Helpers	- Control	24	Small	Female	-3.5152	5.20	-0.67643	543	1.000

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison												
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni
Control	4	Large	Helpers	- Control	24	Small	Helpers	1.8668	5.20	0.35922	543	1.000
Control	4	Large	Helpers	- Control	24	Small	Male	-13.9318	5.20	-2.68090	543	1.000
Control	4	Large	Helpers	- Control	4	Large	Female	-8.5152	5.19	-1.64030	554	1.000
Control	4	Large	Helpers	- Control	4	Large	Male	-7.8485	5.19	-1.51188	554	1.000
Control	4	Large	Helpers	- Control	4	Small	Female	-3.5985	5.20	-0.69246	543	1.000
Control	4	Large	Helpers	- Control	4	Small	Helpers	1.4918	5.20	0.28706	543	1.000
Control	4	Large	Helpers	- Control	4	Small	Male	-12.4318	5.20	-2.39226	543	1.000
Control	4	Large	Helpers	- Treatment	-0.1	Large	Female	-11.0985	4.86	-2.28314	543	1.000
Control	4	Large	Helpers	- Treatment	-0.1	Large	Male	-16.6610	4.86	-3.42744	543	0.739
Control	4	Large	Helpers	- Treatment	-0.1	Small	Female	-2.1818	5.20	-0.41985	543	1.000
Control	4	Large	Helpers	- Treatment	-0.1	Small	Helpers	0.4223	5.20	0.08127	543	1.000
Control	4	Large	Helpers	- Treatment	-0.1	Small	Male	-8.5985	5.20	-1.65461	543	1.000
Control	4	Large	Helpers	- Treatment	0.1	Large	Female	-10.8485	4.86	-2.23171	543	1.000
Control	4	Large	Helpers	- Treatment	0.1	Large	Male	-20.0985	4.86	-4.13459	543	0.046
Control	4	Large	Helpers	- Treatment	0.1	Small	Female	9.5682	5.20	1.84120	543	1.000
Control	4	Large	Helpers	- Treatment	0.1	Small	Helpers	7.2765	5.20	1.40021	543	1.000
Control	4	Large	Helpers	- Treatment	0.1	Small	Male	-42.5152	5.20	-8.18119	543	< .001
Control	4	Large	Helpers	- Treatment	24	Large	Female	-8.0985	4.86	-1.66599	543	1.000
Control	4	Large	Helpers	- Treatment	24	Large	Helpers	3.3728	4.86	0.69385	543	1.000
Control	4	Large	Helpers	- Treatment	24	Large	Male	-36.1610	4.86	-7.43890	543	< .001
Control	4	Large	Helpers	- Treatment	24	Small	Female	0.6515	5.20	0.12537	543	1.000
Control	4	Large	Helpers	- Treatment	24	Small	Helpers	4.6515	5.20	0.89509	543	1.000
Control	4	Large	Helpers	- Treatment	24	Small	Male	-21.7652	5.20	-4.18827	543	0.037
Control	4	Large	Helpers	- Treatment	4	Large	Female	4.9640	4.86	1.02117	543	1.000
Control	4	Large	Helpers	- Treatment	4	Large	Helpers	2.2884	4.86	0.47076	543	1.000
Control	4	Large	Helpers	- Treatment	4	Large	Male	-40.3485	4.86	-8.30034	543	< .001
Control	4	Large	Helpers	- Treatment	4	Small	Female	2.3182	5.20	0.44608	543	1.000
Control	4	Large	Helpers	- Treatment	4	Small	Helpers	2.9640	5.20	0.57036	543	1.000
Control	4	Large	Helpers	- Treatment	4	Small	Male	-19.5985	5.20	-3.77134	543	0.203
Control	4	Large	Male	- Control	-0.1	Small	Male	-4.7500	5.20	-0.91404	543	1.000
Control	4	Large	Male	- Control	0.1	Small	Male	-11.3333	5.20	-2.18087	543	1.000
Control	4	Large	Male	- Control	24	Large	Male	0.0833	5.19	0.01605	554	1.000
Control	4	Large	Male	- Control	24	Small	Male	-6.0833	5.20	-1.17061	543	1.000
Control	4	Large	Male	- Control	4	Small	Male	-4.5833	5.20	-0.88197	543	1.000
Control	4	Large	Male	- Treatment	-0.1	Small	Male	-0.7500	5.20	-0.14432	543	1.000
Control	4	Large	Male	- Treatment	0.1	Small	Male	-34.6667	5.20	-6.67090	543	< .001
Control	4	Large	Male	- Treatment	24	Large	Male	-28.3125	4.86	-5.82434	543	< .001
Control	4	Large	Male	- Treatment	24	Small	Male	-13.9167	5.20	-2.67798	543	1.000
Control	4	Large	Male	- Treatment	4	Large	Male	-32.5000	4.86	-6.68577	543	< .001
Control	4	Large	Male	- Treatment	4	Small	Male	-11.7500	5.20	-2.26105	543	1.000
Control	4	Small	Female	- Control	-0.1	Large	Male	-6.7500	5.20	-1.29890	543	1.000
Control	4	Small	Female	- Control	-0.1	Small	Male	-9.0000	5.19	-1.73369	554	1.000
Control	4	Small	Female	- Control	0.1	Large	Male	-7.9167	5.20	-1.52340	543	1.000
Control	4	Small	Female	- Control	0.1	Small	Male	-15.5833	5.19	-3.00185	554	1.000
Control	4	Small	Female	- Control	24	Large	Male	-4.1667	5.20	-0.80179	543	1.000
Control	4	Small	Female	- Control	24	Small	Female	0.0833	5.19	0.01605	554	1.000
Control	4	Small	Female	- Control	24	Small	Male	-10.3333	5.19	-1.99053	554	1.000
Control	4	Small	Female	- Control	4	Large	Male	-4.2500	5.20	-0.81783	543	1.000
Control	4	Small	Female	- Control	4	Small	Male	-8.8333	5.19	-1.70159	554	1.000
Control	4	Small	Female	- Treatment	-0.1	Large	Male	-13.0625	4.86	-2.68717	543	1.000
Control	4	Small	Female	- Treatment	-0.1	Small	Male	-5.0000	5.20	-0.96215	543	1.000
Control	4	Small	Female	- Treatment	0.1	Large	Male	-16.5000	4.86	-3.39432	543	0.833
Control	4	Small	Female	- Treatment	0.1	Small	Male	-38.9167	5.20	-7.48873	543	< .001
Control	4	Small	Female	- Treatment	24	Large	Male	-32.5625	4.86	-6.69863	543	< .001
Control	4	Small	Female	- Treatment	24	Small	Female	4.2500	5.20	0.81783	543	1.000
Control	4	Small	Female	- Treatment	24	Small	Male	-18.1667	5.20	-3.49581	543	0.577
Control	4	Small	Female	- Treatment	4	Large	Male	-36.7500	4.86	-7.56007	543	< .001
Control	4	Small	Female	- Treatment	4	Small	Female	5.9167	5.20	1.13854	543	1.000
Control	4	Small	Female	- Treatment	4	Small	Male	-16.0000	5.20	-3.07888	543	1.000
Control	4	Small	Helpers	- Control	-0.1	Large	Female	-8.7569	5.20	-1.68510	543	1.000

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison												
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni
Control	4	Small	Helpers	- Control	-0.1	Large	Male	-11.8403	5.20	-2.27842	543	1.000
Control	4	Small	Helpers	- Control	-0.1	Small	Female	-4.2569	5.19	-0.82003	554	1.000
Control	4	Small	Helpers	- Control	-0.1	Small	Male	-14.0903	5.19	-2.71424	554	1.000
Control	4	Small	Helpers	- Control	0.1	Large	Female	-13.7569	5.20	-2.64725	543	1.000
Control	4	Small	Helpers	- Control	0.1	Large	Male	-13.0069	5.20	-2.50292	543	1.000
Control	4	Small	Helpers	- Control	0.1	Small	Female	-6.9236	5.19	-1.33371	554	1.000
Control	4	Small	Helpers	- Control	0.1	Small	Male	-20.6736	5.19	-3.98241	554	0.087
Control	4	Small	Helpers	- Control	24	Large	Female	-10.8403	5.20	-2.08599	543	1.000
Control	4	Small	Helpers	- Control	24	Large	Male	-9.2569	5.20	-1.78131	543	1.000
Control	4	Small	Helpers	- Control	24	Small	Female	-5.0069	5.19	-0.96450	554	1.000
Control	4	Small	Helpers	- Control	24	Small	Helpers	0.3750	5.19	0.07224	554	1.000
Control	4	Small	Helpers	- Control	24	Small	Male	-15.4236	5.19	-2.97109	554	1.000
Control	4	Small	Helpers	- Control	4	Large	Female	-10.0069	5.20	-1.92563	543	1.000
Control	4	Small	Helpers	- Control	4	Large	Male	-9.3403	5.20	-1.79735	543	1.000
Control	4	Small	Helpers	- Control	4	Small	Female	-5.0903	5.19	-0.98055	554	1.000
Control	4	Small	Helpers	- Control	4	Small	Male	-13.9236	5.19	-2.68214	554	1.000
Control	4	Small	Helpers	- Treatment	-0.1	Large	Female	-12.5903	4.86	-2.59002	543	1.000
Control	4	Small	Helpers	- Treatment	-0.1	Large	Male	-18.1528	4.86	-3.73432	543	0.235
Control	4	Small	Helpers	- Treatment	-0.1	Small	Female	-3.6736	5.20	-0.70691	543	1.000
Control	4	Small	Helpers	- Treatment	-0.1	Small	Male	-10.0903	5.20	-1.94167	543	1.000
Control	4	Small	Helpers	- Treatment	0.1	Large	Female	-12.3403	4.86	-2.53859	543	1.000
Control	4	Small	Helpers	- Treatment	0.1	Large	Male	-21.5903	4.86	-4.44147	543	0.012
Control	4	Small	Helpers	- Treatment	0.1	Small	Female	8.0764	5.20	1.55414	543	1.000
Control	4	Small	Helpers	- Treatment	0.1	Small	Male	-44.0069	5.20	-8.46825	543	< .001
Control	4	Small	Helpers	- Treatment	24	Large	Female	-9.5903	4.86	-1.97287	543	1.000
Control	4	Small	Helpers	- Treatment	24	Large	Male	-37.6528	4.86	-7.74578	543	< .001
Control	4	Small	Helpers	- Treatment	24	Small	Female	-0.8403	5.20	-0.16169	543	1.000
Control	4	Small	Helpers	- Treatment	24	Small	Helpers	3.1597	5.20	0.60802	543	1.000
Control	4	Small	Helpers	- Treatment	24	Small	Male	-23.2569	5.20	-4.47533	543	0.010
Control	4	Small	Helpers	- Treatment	4	Large	Female	3.4722	4.86	0.71429	543	1.000
Control	4	Small	Helpers	- Treatment	4	Large	Male	-41.8403	4.86	-8.60722	543	< .001
Control	4	Small	Helpers	- Treatment	4	Small	Female	0.8264	5.20	0.15902	543	1.000
Control	4	Small	Helpers	- Treatment	4	Small	Helpers	1.4722	5.20	0.28330	543	1.000
Control	4	Small	Helpers	- Treatment	4	Small	Male	-21.0903	5.20	-4.05840	543	0.064
Control	4	Small	Male	- Control	24	Small	Male	-1.5000	5.19	-0.28895	554	1.000
Control	4	Small	Male	- Treatment	24	Small	Male	-9.3333	5.20	-1.79601	543	1.000
Control	4	Small	Male	- Treatment	4	Small	Male	-7.1667	5.20	-1.37908	543	1.000
Treatment	-0.1	Large	Female	- Control	-0.1	Large	Male	0.7500	4.86	0.15429	543	1.000
Treatment	-0.1	Large	Female	- Control	-0.1	Small	Female	8.3333	4.86	1.71430	543	1.000
Treatment	-0.1	Large	Female	- Control	-0.1	Small	Male	-1.5000	4.86	-0.30857	543	1.000
Treatment	-0.1	Large	Female	- Control	0.1	Large	Female	-1.1667	4.86	-0.24000	543	1.000
Treatment	-0.1	Large	Female	- Control	0.1	Large	Male	-0.4167	4.86	-0.08572	543	1.000
Treatment	-0.1	Large	Female	- Control	0.1	Small	Female	5.6667	4.86	1.16572	543	1.000
Treatment	-0.1	Large	Female	- Control	0.1	Small	Male	-8.0833	4.86	-1.66287	543	1.000
Treatment	-0.1	Large	Female	- Control	24	Large	Female	1.7500	4.86	0.36000	543	1.000
Treatment	-0.1	Large	Female	- Control	24	Large	Male	3.3333	4.86	0.68572	543	1.000
Treatment	-0.1	Large	Female	- Control	24	Small	Female	7.5833	4.86	1.56001	543	1.000
Treatment	-0.1	Large	Female	- Control	24	Small	Male	-2.8333	4.86	-0.58286	543	1.000
Treatment	-0.1	Large	Female	- Control	4	Large	Female	2.5833	4.86	0.53143	543	1.000
Treatment	-0.1	Large	Female	- Control	4	Large	Male	3.2500	4.86	0.66858	543	1.000
Treatment	-0.1	Large	Female	- Control	4	Small	Female	7.5000	4.86	1.54287	543	1.000
Treatment	-0.1	Large	Female	- Control	4	Small	Male	-1.3333	4.86	-0.27429	543	1.000
Treatment	-0.1	Large	Female	- Treatment	-0.1	Large	Male	-5.5625	4.50	-1.23728	554	1.000
Treatment	-0.1	Large	Female	- Treatment	-0.1	Small	Female	8.9167	4.86	1.83430	543	1.000
Treatment	-0.1	Large	Female	- Treatment	-0.1	Small	Male	2.5000	4.86	0.51429	543	1.000
Treatment	-0.1	Large	Female	- Treatment	0.1	Large	Female	0.2500	4.50	0.05561	554	1.000
Treatment	-0.1	Large	Female	- Treatment	0.1	Large	Male	-9.0000	4.50	-2.00189	554	1.000
Treatment	-0.1	Large	Female	- Treatment	0.1	Small	Female	20.6667	4.86	4.25147	543	0.028
Treatment	-0.1	Large	Female	- Treatment	0.1	Small	Male	-31.4167	4.86	-6.46292	543	< .001
Treatment	-0.1	Large	Female	- Treatment	24	Large	Female	3.0000	4.50	0.66730	554	1.000

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison													
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni	
Treatment	-0.1	Large	Female	-	Treatment	24	Large	Male	-25.0625	4.50	-5.57472	554	< .001
Treatment	-0.1	Large	Female	-	Treatment	24	Small	Female	11.7500	4.86	2.41716	543	1.000
Treatment	-0.1	Large	Female	-	Treatment	24	Small	Male	-10.6667	4.86	-2.19431	543	1.000
Treatment	-0.1	Large	Female	-	Treatment	4	Large	Female	16.0625	4.50	3.57283	554	0.433
Treatment	-0.1	Large	Female	-	Treatment	4	Large	Male	-29.2500	4.50	-6.50616	554	< .001
Treatment	-0.1	Large	Female	-	Treatment	4	Small	Female	13.4167	4.86	2.76002	543	1.000
Treatment	-0.1	Large	Female	-	Treatment	4	Small	Male	-8.5000	4.86	-1.74859	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	-0.1	Large	Female	-8.5439	4.86	-1.75762	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	-0.1	Large	Male	-11.6272	4.86	-2.39191	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	-0.1	Small	Female	-4.0439	4.86	-0.83190	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	-0.1	Small	Helpers	0.0255	4.86	0.00526	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	-0.1	Small	Male	-13.8772	4.86	-2.85477	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	0.1	Large	Female	-13.5439	4.86	-2.78620	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	0.1	Large	Helpers	-0.0385	4.86	-0.00793	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	0.1	Large	Male	-12.7939	4.86	-2.63191	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	0.1	Small	Female	-6.7106	4.86	-1.38047	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	0.1	Small	Helpers	2.5186	4.86	0.51812	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	0.1	Small	Male	-20.4606	4.86	-4.20907	543	0.034
Treatment	-0.1	Large	Helpers	-	Control	24	Large	Female	-10.6272	4.86	-2.18619	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	24	Large	Helpers	-1.1993	4.86	-0.24671	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	24	Large	Male	-9.0439	4.86	-1.86048	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	24	Small	Female	-4.7939	4.86	-0.98618	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	24	Small	Helpers	0.5880	4.86	0.12097	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	24	Small	Male	-15.2106	4.86	-3.12906	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	4	Large	Female	-9.7939	4.86	-2.01476	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	4	Large	Helpers	-1.2787	4.86	-0.26305	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	4	Large	Male	-9.1272	4.86	-1.87762	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	4	Small	Female	-4.8772	4.86	-1.00333	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	4	Small	Helpers	0.2130	4.86	0.04383	543	1.000
Treatment	-0.1	Large	Helpers	-	Control	4	Small	Male	-13.7106	4.86	-2.82048	543	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	-0.1	Large	Female	-12.3772	4.50	-2.75310	554	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	-0.1	Large	Male	-17.9397	4.50	-3.99038	554	0.084
Treatment	-0.1	Large	Helpers	-	Treatment	-0.1	Small	Female	-3.4606	4.86	-0.71189	543	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	-0.1	Small	Helpers	-0.8564	4.86	-0.17618	543	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	-0.1	Small	Male	-9.8772	4.86	-2.03191	543	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	0.1	Large	Female	-12.1272	4.50	-2.69749	554	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	0.1	Large	Helpers	0.4985	4.50	0.11089	554	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	0.1	Large	Male	-21.3772	4.50	-4.75500	554	0.003
Treatment	-0.1	Large	Helpers	-	Treatment	0.1	Small	Female	8.2894	4.86	1.70527	543	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	0.1	Small	Helpers	5.9978	4.86	1.23384	543	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	0.1	Small	Male	-43.7939	4.86	-9.00911	543	< .001
Treatment	-0.1	Large	Helpers	-	Treatment	24	Large	Female	-9.3772	4.50	-2.08580	554	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	24	Large	Helpers	2.0941	4.50	0.46580	554	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	24	Large	Male	-37.4397	4.50	-8.32782	554	< .001
Treatment	-0.1	Large	Helpers	-	Treatment	24	Small	Female	-0.6272	4.86	-0.12903	543	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	24	Small	Helpers	3.3728	4.86	0.69383	543	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	24	Small	Male	-23.0439	4.86	-4.74050	543	0.003
Treatment	-0.1	Large	Helpers	-	Treatment	4	Large	Female	3.6853	4.50	0.81972	554	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	4	Large	Helpers	1.0097	4.50	0.22458	554	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	4	Large	Male	-41.6272	4.50	-9.25926	554	< .001
Treatment	-0.1	Large	Helpers	-	Treatment	4	Small	Female	1.0394	4.86	0.21383	543	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	4	Small	Helpers	1.6853	4.86	0.34669	543	1.000
Treatment	-0.1	Large	Helpers	-	Treatment	4	Small	Male	-20.8772	4.86	-4.29478	543	0.023
Treatment	-0.1	Large	Male	-	Control	-0.1	Small	Male	4.0625	4.86	0.83572	543	1.000
Treatment	-0.1	Large	Male	-	Control	0.1	Large	Male	5.1458	4.86	1.05858	543	1.000
Treatment	-0.1	Large	Male	-	Control	0.1	Small	Male	-2.5208	4.86	-0.51858	543	1.000
Treatment	-0.1	Large	Male	-	Control	24	Large	Male	8.8958	4.86	1.83002	543	1.000
Treatment	-0.1	Large	Male	-	Control	24	Small	Male	2.7292	4.86	0.56143	543	1.000
Treatment	-0.1	Large	Male	-	Control	4	Large	Male	8.8125	4.86	1.81287	543	1.000
Treatment	-0.1	Large	Male	-	Control	4	Small	Male	4.2292	4.86	0.87001	543	1.000

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison													
Treatment	Hours	Group Size	Subject	-	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni
Treatment	-0.1	Large	Male	-	Treatment	-0.1	Small	Male	8.0625	4.86	1.65859	543	1.000
Treatment	-0.1	Large	Male	-	Treatment	0.1	Large	Male	-3.4375	4.50	-0.76461	554	1.000
Treatment	-0.1	Large	Male	-	Treatment	0.1	Small	Male	-25.8542	4.86	-5.31862	543	< .001
Treatment	-0.1	Large	Male	-	Treatment	24	Large	Male	-19.5000	4.50	-4.33744	554	0.019
Treatment	-0.1	Large	Male	-	Treatment	24	Small	Male	-5.1042	4.86	-1.05001	543	1.000
Treatment	-0.1	Large	Male	-	Treatment	4	Large	Male	-23.6875	4.50	-5.26888	554	< .001
Treatment	-0.1	Large	Male	-	Treatment	4	Small	Male	-2.9375	4.86	-0.60429	543	1.000
Treatment	-0.1	Small	Female	-	Control	-0.1	Large	Male	-8.1667	5.20	-1.57151	543	1.000
Treatment	-0.1	Small	Female	-	Control	-0.1	Small	Male	-10.4167	5.20	-2.00448	543	1.000
Treatment	-0.1	Small	Female	-	Control	0.1	Large	Male	-9.3333	5.20	-1.79601	543	1.000
Treatment	-0.1	Small	Female	-	Control	0.1	Small	Female	-3.2500	5.20	-0.62540	543	1.000
Treatment	-0.1	Small	Female	-	Control	0.1	Small	Male	-17.0000	5.20	-3.27131	543	1.000
Treatment	-0.1	Small	Female	-	Control	24	Large	Male	-5.5833	5.20	-1.07440	543	1.000
Treatment	-0.1	Small	Female	-	Control	24	Small	Female	-1.3333	5.20	-0.25657	543	1.000
Treatment	-0.1	Small	Female	-	Control	24	Small	Male	-11.7500	5.20	-2.26105	543	1.000
Treatment	-0.1	Small	Female	-	Control	4	Large	Male	-5.6667	5.20	-1.09044	543	1.000
Treatment	-0.1	Small	Female	-	Control	4	Small	Female	-1.4167	5.20	-0.27261	543	1.000
Treatment	-0.1	Small	Female	-	Control	4	Small	Male	-10.2500	5.20	-1.97241	543	1.000
Treatment	-0.1	Small	Female	-	Treatment	-0.1	Large	Male	-14.4792	4.86	-2.97860	543	1.000
Treatment	-0.1	Small	Female	-	Treatment	-0.1	Small	Male	-6.4167	5.19	-1.23606	554	1.000
Treatment	-0.1	Small	Female	-	Treatment	0.1	Large	Male	-17.9167	4.86	-3.68575	543	0.283
Treatment	-0.1	Small	Female	-	Treatment	0.1	Small	Female	11.7500	5.19	2.26343	554	1.000
Treatment	-0.1	Small	Female	-	Treatment	0.1	Small	Male	-40.3333	5.19	-7.76951	554	< .001
Treatment	-0.1	Small	Female	-	Treatment	24	Large	Male	-33.9792	4.86	-6.99006	543	< .001
Treatment	-0.1	Small	Female	-	Treatment	24	Small	Female	2.8333	5.19	0.54579	554	1.000
Treatment	-0.1	Small	Female	-	Treatment	24	Small	Male	-19.5833	5.19	-3.77238	554	0.202
Treatment	-0.1	Small	Female	-	Treatment	4	Large	Male	-38.1667	4.86	-7.85150	543	< .001
Treatment	-0.1	Small	Female	-	Treatment	4	Small	Female	4.5000	5.19	0.86685	554	1.000
Treatment	-0.1	Small	Female	-	Treatment	4	Small	Male	-17.4167	5.19	-3.35501	554	0.956
Treatment	-0.1	Small	Helpers	-	Control	-0.1	Large	Female	-7.6875	5.20	-1.47930	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	-0.1	Large	Male	-10.7708	5.20	-2.07263	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	-0.1	Small	Female	-3.1875	5.20	-0.61337	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	-0.1	Small	Male	-13.0208	5.20	-2.50560	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	0.1	Large	Female	-12.6875	5.20	-2.44145	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	0.1	Large	Male	-11.9375	5.20	-2.29713	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	0.1	Small	Female	-5.8542	5.20	-1.12652	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	0.1	Small	Helpers	3.3750	5.20	0.64945	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	0.1	Small	Male	-19.6042	5.20	-3.77243	543	0.202
Treatment	-0.1	Small	Helpers	-	Control	24	Large	Female	-9.7708	5.20	-1.88020	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	24	Large	Male	-8.1875	5.20	-1.57552	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	24	Small	Female	-3.9375	5.20	-0.75769	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	24	Small	Helpers	1.4444	5.20	0.27795	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	24	Small	Male	-14.3542	5.20	-2.76217	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	4	Large	Female	-8.9375	5.20	-1.71984	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	4	Large	Male	-8.2708	5.20	-1.59155	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	4	Small	Female	-4.0208	5.20	-0.77373	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	4	Small	Helpers	1.0694	5.20	0.20579	543	1.000
Treatment	-0.1	Small	Helpers	-	Control	4	Small	Male	-12.8542	5.20	-2.47353	543	1.000
Treatment	-0.1	Small	Helpers	-	Treatment	-0.1	Large	Female	-11.5208	4.86	-2.37002	543	1.000
Treatment	-0.1	Small	Helpers	-	Treatment	-0.1	Large	Male	-17.0833	4.86	-3.51432	543	0.539
Treatment	-0.1	Small	Helpers	-	Treatment	-0.1	Small	Female	-2.6042	5.19	-0.50165	554	1.000
Treatment	-0.1	Small	Helpers	-	Treatment	-0.1	Small	Male	-9.0208	5.19	-1.73770	554	1.000
Treatment	-0.1	Small	Helpers	-	Treatment	0.1	Large	Female	-11.2708	4.86	-2.31859	543	1.000
Treatment	-0.1	Small	Helpers	-	Treatment	0.1	Large	Male	-20.5208	4.86	-4.22147	543	0.032
Treatment	-0.1	Small	Helpers	-	Treatment	0.1	Small	Female	9.1458	5.19	1.76178	554	1.000
Treatment	-0.1	Small	Helpers	-	Treatment	0.1	Small	Helpers	6.8542	5.19	1.32033	554	1.000
Treatment	-0.1	Small	Helpers	-	Treatment	0.1	Small	Male	-42.9375	5.19	-8.27115	554	< .001
Treatment	-0.1	Small	Helpers	-	Treatment	24	Large	Female	-8.5208	4.86	-1.75287	543	1.000
Treatment	-0.1	Small	Helpers	-	Treatment	24	Large	Male	-36.5833	4.86	-7.52578	543	< .001
Treatment	-0.1	Small	Helpers	-	Treatment	24	Small	Female	0.2292	5.19	0.04414	554	1.000

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison												
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni
Treatment	-0.1	Small	Helpers	- Treatment	24	Small	Helpers	4.2292	5.19	0.81467	554	1.000
Treatment	-0.1	Small	Helpers	- Treatment	24	Small	Male	-22.1875	5.19	-4.27403	554	0.025
Treatment	-0.1	Small	Helpers	- Treatment	4	Large	Female	4.5417	4.86	0.93429	543	1.000
Treatment	-0.1	Small	Helpers	- Treatment	4	Large	Male	-40.7708	4.86	-8.38722	543	< .001
Treatment	-0.1	Small	Helpers	- Treatment	4	Small	Female	1.8958	5.19	0.36520	554	1.000
Treatment	-0.1	Small	Helpers	- Treatment	4	Small	Helpers	2.5417	5.19	0.48961	554	1.000
Treatment	-0.1	Small	Helpers	- Treatment	4	Small	Male	-20.0208	5.19	-3.85666	554	0.145
Treatment	-0.1	Small	Male	- Control	0.1	Small	Male	-10.5833	5.20	-2.03655	543	1.000
Treatment	-0.1	Small	Male	- Control	24	Small	Male	-5.3333	5.20	-1.02629	543	1.000
Treatment	-0.1	Small	Male	- Control	4	Small	Male	-3.8333	5.20	-0.73765	543	1.000
Treatment	-0.1	Small	Male	- Treatment	0.1	Small	Male	-33.9167	5.19	-6.53345	554	< .001
Treatment	-0.1	Small	Male	- Treatment	24	Small	Male	-13.1667	5.19	-2.53633	554	1.000
Treatment	-0.1	Small	Male	- Treatment	4	Small	Male	-11.0000	5.19	-2.11896	554	1.000
Treatment	0.1	Large	Female	- Control	-0.1	Large	Male	0.5000	4.86	0.10286	543	1.000
Treatment	0.1	Large	Female	- Control	-0.1	Small	Female	8.0833	4.86	1.66287	543	1.000
Treatment	0.1	Large	Female	- Control	-0.1	Small	Male	-1.7500	4.86	-0.36000	543	1.000
Treatment	0.1	Large	Female	- Control	0.1	Large	Male	-0.6667	4.86	-0.13714	543	1.000
Treatment	0.1	Large	Female	- Control	0.1	Small	Female	5.4167	4.86	1.11430	543	1.000
Treatment	0.1	Large	Female	- Control	0.1	Small	Male	-8.3333	4.86	-1.71430	543	1.000
Treatment	0.1	Large	Female	- Control	24	Large	Female	1.5000	4.86	0.30857	543	1.000
Treatment	0.1	Large	Female	- Control	24	Large	Male	3.0833	4.86	0.63429	543	1.000
Treatment	0.1	Large	Female	- Control	24	Small	Female	7.3333	4.86	1.50858	543	1.000
Treatment	0.1	Large	Female	- Control	24	Small	Male	-3.0833	4.86	-0.63429	543	1.000
Treatment	0.1	Large	Female	- Control	4	Large	Female	2.3333	4.86	0.48000	543	1.000
Treatment	0.1	Large	Female	- Control	4	Large	Male	3.0000	4.86	0.61715	543	1.000
Treatment	0.1	Large	Female	- Control	4	Small	Female	7.2500	4.86	1.49144	543	1.000
Treatment	0.1	Large	Female	- Control	4	Small	Male	-1.5833	4.86	-0.32572	543	1.000
Treatment	0.1	Large	Female	- Treatment	-0.1	Large	Male	-5.8125	4.50	-1.29289	554	1.000
Treatment	0.1	Large	Female	- Treatment	-0.1	Small	Female	8.6667	4.86	1.78287	543	1.000
Treatment	0.1	Large	Female	- Treatment	-0.1	Small	Male	2.2500	4.86	0.46286	543	1.000
Treatment	0.1	Large	Female	- Treatment	0.1	Large	Male	-9.2500	4.50	-2.05750	554	1.000
Treatment	0.1	Large	Female	- Treatment	0.1	Small	Female	20.4167	4.86	4.20004	543	0.035
Treatment	0.1	Large	Female	- Treatment	0.1	Small	Male	-31.6667	4.86	-6.51434	543	< .001
Treatment	0.1	Large	Female	- Treatment	24	Large	Female	2.7500	4.50	0.61169	554	1.000
Treatment	0.1	Large	Female	- Treatment	24	Large	Male	-25.3125	4.50	-5.63033	554	< .001
Treatment	0.1	Large	Female	- Treatment	24	Small	Female	11.5000	4.86	2.36574	543	1.000
Treatment	0.1	Large	Female	- Treatment	24	Small	Male	-10.9167	4.86	-2.24573	543	1.000
Treatment	0.1	Large	Female	- Treatment	4	Large	Female	15.8125	4.50	3.51722	554	0.532
Treatment	0.1	Large	Female	- Treatment	4	Large	Male	-29.5000	4.50	-6.56177	554	< .001
Treatment	0.1	Large	Female	- Treatment	4	Small	Female	13.1667	4.86	2.70860	543	1.000
Treatment	0.1	Large	Female	- Treatment	4	Small	Male	-8.7500	4.86	-1.80002	543	1.000
Treatment	0.1	Large	Helpers	- Control	-0.1	Large	Female	-9.0424	4.86	-1.86017	543	1.000
Treatment	0.1	Large	Helpers	- Control	-0.1	Large	Male	-12.1257	4.86	-2.49446	543	1.000
Treatment	0.1	Large	Helpers	- Control	-0.1	Small	Female	-4.5424	4.86	-0.93445	543	1.000
Treatment	0.1	Large	Helpers	- Control	-0.1	Small	Helpers	-0.4730	4.86	-0.09730	543	1.000
Treatment	0.1	Large	Helpers	- Control	-0.1	Small	Male	-14.3757	4.86	-2.95732	543	1.000
Treatment	0.1	Large	Helpers	- Control	0.1	Large	Female	-14.0424	4.86	-2.88875	543	1.000
Treatment	0.1	Large	Helpers	- Control	0.1	Large	Male	-13.2924	4.86	-2.73446	543	1.000
Treatment	0.1	Large	Helpers	- Control	0.1	Small	Female	-7.2091	4.86	-1.48302	543	1.000
Treatment	0.1	Large	Helpers	- Control	0.1	Small	Helpers	2.0201	4.86	0.41556	543	1.000
Treatment	0.1	Large	Helpers	- Control	0.1	Small	Male	-20.9591	4.86	-4.31162	543	0.022
Treatment	0.1	Large	Helpers	- Control	24	Large	Female	-11.1257	4.86	-2.28875	543	1.000
Treatment	0.1	Large	Helpers	- Control	24	Large	Helpers	-1.6978	4.86	-0.34926	543	1.000
Treatment	0.1	Large	Helpers	- Control	24	Large	Male	-9.5424	4.86	-1.96303	543	1.000
Treatment	0.1	Large	Helpers	- Control	24	Small	Female	-5.2924	4.86	-1.08873	543	1.000
Treatment	0.1	Large	Helpers	- Control	24	Small	Helpers	0.0895	4.86	0.01842	543	1.000
Treatment	0.1	Large	Helpers	- Control	24	Small	Male	-15.7091	4.86	-3.23161	543	1.000
Treatment	0.1	Large	Helpers	- Control	4	Large	Female	-10.2924	4.86	-2.11731	543	1.000
Treatment	0.1	Large	Helpers	- Control	4	Large	Helpers	-1.7772	4.86	-0.36561	543	1.000
Treatment	0.1	Large	Helpers	- Control	4	Large	Male	-9.6257	4.86	-1.98017	543	1.000

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison												
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni
Treatment	0.1	Large	Helpers	- Control	4	Small	Female	-5.3757	4.86	-1.10588	543	1.000
Treatment	0.1	Large	Helpers	- Control	4	Small	Helpers	-0.2855	4.86	-0.05873	543	1.000
Treatment	0.1	Large	Helpers	- Control	4	Small	Male	-14.2091	4.86	-2.92304	543	1.000
Treatment	0.1	Large	Helpers	- Treatment	-0.1	Large	Female	-12.8757	4.50	-2.86399	554	1.000
Treatment	0.1	Large	Helpers	- Treatment	-0.1	Large	Male	-18.4382	4.50	-4.10127	554	0.053
Treatment	0.1	Large	Helpers	- Treatment	-0.1	Small	Female	-3.9591	4.86	-0.81445	543	1.000
Treatment	0.1	Large	Helpers	- Treatment	-0.1	Small	Helpers	-1.3549	4.86	-0.27873	543	1.000
Treatment	0.1	Large	Helpers	- Treatment	-0.1	Small	Male	-10.3757	4.86	-2.13446	543	1.000
Treatment	0.1	Large	Helpers	- Treatment	0.1	Large	Female	-12.6257	4.50	-2.80838	554	1.000
Treatment	0.1	Large	Helpers	- Treatment	0.1	Large	Male	-21.8757	4.50	-4.86588	554	0.002
Treatment	0.1	Large	Helpers	- Treatment	0.1	Small	Female	7.7909	4.86	1.60272	543	1.000
Treatment	0.1	Large	Helpers	- Treatment	0.1	Small	Helpers	5.4993	4.86	1.13129	543	1.000
Treatment	0.1	Large	Helpers	- Treatment	0.1	Small	Male	-44.2924	4.86	-9.11166	543	< .001
Treatment	0.1	Large	Helpers	- Treatment	24	Large	Female	-9.8757	4.50	-2.19669	554	1.000
Treatment	0.1	Large	Helpers	- Treatment	24	Large	Helpers	1.5956	4.50	0.35492	554	1.000
Treatment	0.1	Large	Helpers	- Treatment	24	Large	Male	-37.9382	4.50	-8.43871	554	< .001
Treatment	0.1	Large	Helpers	- Treatment	24	Small	Female	-1.1257	4.86	-0.23158	543	1.000
Treatment	0.1	Large	Helpers	- Treatment	24	Small	Helpers	2.8743	4.86	0.59128	543	1.000
Treatment	0.1	Large	Helpers	- Treatment	24	Small	Male	-23.5424	4.86	-4.84305	543	0.002
Treatment	0.1	Large	Helpers	- Treatment	4	Large	Female	3.1868	4.50	0.70884	554	1.000
Treatment	0.1	Large	Helpers	- Treatment	4	Large	Helpers	0.5112	4.50	0.11370	554	1.000
Treatment	0.1	Large	Helpers	- Treatment	4	Large	Male	-42.1257	4.50	-9.37014	554	< .001
Treatment	0.1	Large	Helpers	- Treatment	4	Small	Female	0.5409	4.86	0.11128	543	1.000
Treatment	0.1	Large	Helpers	- Treatment	4	Small	Helpers	1.1868	4.86	0.24413	543	1.000
Treatment	0.1	Large	Helpers	- Treatment	4	Small	Male	-21.3757	4.86	-4.39734	543	0.015
Treatment	0.1	Large	Male	- Control	-0.1	Small	Male	7.5000	4.86	1.54287	543	1.000
Treatment	0.1	Large	Male	- Control	0.1	Small	Male	0.9167	4.86	0.18857	543	1.000
Treatment	0.1	Large	Male	- Control	24	Large	Male	12.3333	4.86	2.53717	543	1.000
Treatment	0.1	Large	Male	- Control	24	Small	Male	6.1667	4.86	1.26858	543	1.000
Treatment	0.1	Large	Male	- Control	4	Large	Male	12.2500	4.86	2.52002	543	1.000
Treatment	0.1	Large	Male	- Control	4	Small	Male	7.6667	4.86	1.57716	543	1.000
Treatment	0.1	Large	Male	- Treatment	-0.1	Small	Male	11.5000	4.86	2.36574	543	1.000
Treatment	0.1	Large	Male	- Treatment	0.1	Small	Male	-22.4167	4.86	-4.61147	543	0.006
Treatment	0.1	Large	Male	- Treatment	24	Large	Male	-16.0625	4.50	-3.57283	554	0.433
Treatment	0.1	Large	Male	- Treatment	24	Small	Male	-1.6667	4.86	-0.34286	543	1.000
Treatment	0.1	Large	Male	- Treatment	4	Large	Male	-20.2500	4.50	-4.50426	554	0.009
Treatment	0.1	Large	Male	- Treatment	4	Small	Male	0.5000	4.86	0.10286	543	1.000
Treatment	0.1	Small	Female	- Control	-0.1	Large	Male	-19.9167	5.20	-3.83256	543	0.160
Treatment	0.1	Small	Female	- Control	-0.1	Small	Male	-22.1667	5.20	-4.26553	543	0.027
Treatment	0.1	Small	Female	- Control	0.1	Large	Male	-21.0833	5.20	-4.05706	543	0.064
Treatment	0.1	Small	Female	- Control	0.1	Small	Male	-28.7500	5.20	-5.53236	543	< .001
Treatment	0.1	Small	Female	- Control	24	Large	Male	-17.3333	5.20	-3.33545	543	1.000
Treatment	0.1	Small	Female	- Control	24	Small	Female	-13.0833	5.20	-2.51762	543	1.000
Treatment	0.1	Small	Female	- Control	24	Small	Male	-23.5000	5.20	-4.52210	543	0.008
Treatment	0.1	Small	Female	- Control	4	Large	Male	-17.4167	5.20	-3.35149	543	0.970
Treatment	0.1	Small	Female	- Control	4	Small	Female	-13.1667	5.20	-2.53366	543	1.000
Treatment	0.1	Small	Female	- Control	4	Small	Male	-22.0000	5.20	-4.23346	543	0.030
Treatment	0.1	Small	Female	- Treatment	-0.1	Large	Male	-26.2292	4.86	-5.39576	543	< .001
Treatment	0.1	Small	Female	- Treatment	-0.1	Small	Male	-18.1667	5.19	-3.49949	554	0.568
Treatment	0.1	Small	Female	- Treatment	0.1	Large	Male	-29.6667	4.86	-6.10291	543	< .001
Treatment	0.1	Small	Female	- Treatment	0.1	Small	Male	-52.0833	5.19	-10.03294	554	< .001
Treatment	0.1	Small	Female	- Treatment	24	Large	Male	-45.7292	4.86	-9.40723	543	< .001
Treatment	0.1	Small	Female	- Treatment	24	Small	Female	-8.9167	5.19	-1.71764	554	1.000
Treatment	0.1	Small	Female	- Treatment	24	Small	Male	-31.3333	5.19	-6.03581	554	< .001
Treatment	0.1	Small	Female	- Treatment	4	Large	Male	-49.9167	4.86	-10.26866	543	< .001
Treatment	0.1	Small	Female	- Treatment	4	Small	Female	-7.2500	5.19	-1.39658	554	1.000
Treatment	0.1	Small	Female	- Treatment	4	Small	Male	-29.1667	5.19	-5.61844	554	< .001
Treatment	0.1	Small	Helpers	- Control	-0.1	Large	Female	-14.5417	5.20	-2.79825	543	1.000
Treatment	0.1	Small	Helpers	- Control	-0.1	Large	Male	-17.6250	5.20	-3.39158	543	0.841
Treatment	0.1	Small	Helpers	- Control	-0.1	Small	Female	-10.0417	5.20	-1.93232	543	1.000

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison												
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni
Treatment	0.1	Small	Helpers	- Control	-0.1	Small	Male	-19.8750	5.20	-3.82454	543	0.165
Treatment	0.1	Small	Helpers	- Control	0.1	Large	Female	-19.5417	5.20	-3.76040	543	0.212
Treatment	0.1	Small	Helpers	- Control	0.1	Large	Male	-18.7917	5.20	-3.61608	543	0.369
Treatment	0.1	Small	Helpers	- Control	0.1	Small	Female	-12.7083	5.20	-2.44546	543	1.000
Treatment	0.1	Small	Helpers	- Control	0.1	Small	Male	-26.4583	5.20	-5.09137	543	< .001
Treatment	0.1	Small	Helpers	- Control	24	Large	Female	-16.6250	5.20	-3.19915	543	1.000
Treatment	0.1	Small	Helpers	- Control	24	Large	Male	-15.0417	5.20	-2.89447	543	1.000
Treatment	0.1	Small	Helpers	- Control	24	Small	Female	-10.7917	5.20	-2.07664	543	1.000
Treatment	0.1	Small	Helpers	- Control	24	Small	Helpers	-5.4097	5.20	-1.04099	543	1.000
Treatment	0.1	Small	Helpers	- Control	24	Small	Male	-21.2083	5.20	-4.08112	543	0.058
Treatment	0.1	Small	Helpers	- Control	4	Large	Female	-15.7917	5.20	-3.03879	543	1.000
Treatment	0.1	Small	Helpers	- Control	4	Large	Male	-15.1250	5.20	-2.91050	543	1.000
Treatment	0.1	Small	Helpers	- Control	4	Small	Female	-10.8750	5.20	-2.09267	543	1.000
Treatment	0.1	Small	Helpers	- Control	4	Small	Helpers	-5.7847	5.20	-1.11315	543	1.000
Treatment	0.1	Small	Helpers	- Control	4	Small	Male	-19.7083	5.20	-3.79247	543	0.187
Treatment	0.1	Small	Helpers	- Treatment	-0.1	Large	Female	-18.3750	4.86	-3.78003	543	0.196
Treatment	0.1	Small	Helpers	- Treatment	-0.1	Large	Male	-23.9375	4.86	-4.92433	543	0.001
Treatment	0.1	Small	Helpers	- Treatment	-0.1	Small	Female	-9.4583	5.19	-1.82198	554	1.000
Treatment	0.1	Small	Helpers	- Treatment	-0.1	Small	Male	-15.8750	5.19	-3.05804	554	1.000
Treatment	0.1	Small	Helpers	- Treatment	0.1	Large	Female	-18.1250	4.86	-3.72860	543	0.240
Treatment	0.1	Small	Helpers	- Treatment	0.1	Large	Male	-27.3750	4.86	-5.63148	543	< .001
Treatment	0.1	Small	Helpers	- Treatment	0.1	Small	Female	2.2917	5.19	0.44145	554	1.000
Treatment	0.1	Small	Helpers	- Treatment	0.1	Small	Male	-49.7917	5.19	-9.59149	554	< .001
Treatment	0.1	Small	Helpers	- Treatment	24	Large	Female	-15.3750	4.86	-3.16289	543	1.000
Treatment	0.1	Small	Helpers	- Treatment	24	Large	Male	-43.4375	4.86	-8.93579	543	< .001
Treatment	0.1	Small	Helpers	- Treatment	24	Small	Female	-6.6250	5.19	-1.27619	554	1.000
Treatment	0.1	Small	Helpers	- Treatment	24	Small	Helpers	-2.6250	5.19	-0.50566	554	1.000
Treatment	0.1	Small	Helpers	- Treatment	24	Small	Male	-29.0417	5.19	-5.59437	554	< .001
Treatment	0.1	Small	Helpers	- Treatment	4	Large	Female	-2.3125	4.86	-0.47572	543	1.000
Treatment	0.1	Small	Helpers	- Treatment	4	Large	Male	-47.6250	4.86	-9.79723	543	< .001
Treatment	0.1	Small	Helpers	- Treatment	4	Small	Female	-4.9583	5.19	-0.95514	554	1.000
Treatment	0.1	Small	Helpers	- Treatment	4	Small	Helpers	-4.3125	5.19	-0.83073	554	1.000
Treatment	0.1	Small	Helpers	- Treatment	4	Small	Male	-26.8750	5.19	-5.17700	554	< .001
Treatment	0.1	Small	Male	- Control	24	Small	Male	28.5833	5.20	5.50029	543	< .001
Treatment	0.1	Small	Male	- Control	4	Small	Male	30.0833	5.20	5.78893	543	< .001
Treatment	0.1	Small	Male	- Treatment	24	Small	Male	20.7500	5.19	3.99712	554	0.082
Treatment	0.1	Small	Male	- Treatment	4	Small	Male	22.9167	5.19	4.41449	554	0.014
Treatment	24	Large	Female	- Control	-0.1	Large	Male	-2.2500	4.86	-0.46286	543	1.000
Treatment	24	Large	Female	- Control	-0.1	Small	Female	5.3333	4.86	1.09715	543	1.000
Treatment	24	Large	Female	- Control	-0.1	Small	Male	-4.5000	4.86	-0.92572	543	1.000
Treatment	24	Large	Female	- Control	0.1	Large	Male	-3.4167	4.86	-0.70286	543	1.000
Treatment	24	Large	Female	- Control	0.1	Small	Female	2.6667	4.86	0.54858	543	1.000
Treatment	24	Large	Female	- Control	0.1	Small	Male	-11.0833	4.86	-2.28002	543	1.000
Treatment	24	Large	Female	- Control	24	Large	Male	0.3333	4.86	0.06857	543	1.000
Treatment	24	Large	Female	- Control	24	Small	Female	4.5833	4.86	0.94287	543	1.000
Treatment	24	Large	Female	- Control	24	Small	Male	-5.8333	4.86	-1.20001	543	1.000
Treatment	24	Large	Female	- Control	4	Large	Male	0.2500	4.86	0.05143	543	1.000
Treatment	24	Large	Female	- Control	4	Small	Female	4.5000	4.86	0.92572	543	1.000
Treatment	24	Large	Female	- Control	4	Small	Male	-4.3333	4.86	-0.89144	543	1.000
Treatment	24	Large	Female	- Treatment	-0.1	Large	Male	-8.5625	4.50	-1.90458	554	1.000
Treatment	24	Large	Female	- Treatment	-0.1	Small	Female	5.9167	4.86	1.21715	543	1.000
Treatment	24	Large	Female	- Treatment	-0.1	Small	Male	-0.5000	4.86	-0.10286	543	1.000
Treatment	24	Large	Female	- Treatment	0.1	Large	Male	-12.0000	4.50	-2.66919	554	1.000
Treatment	24	Large	Female	- Treatment	0.1	Small	Female	17.6667	4.86	3.63432	543	0.344
Treatment	24	Large	Female	- Treatment	0.1	Small	Male	-34.4167	4.86	-7.08006	543	< .001
Treatment	24	Large	Female	- Treatment	24	Large	Male	-28.0625	4.50	-6.24202	554	< .001
Treatment	24	Large	Female	- Treatment	24	Small	Female	8.7500	4.86	1.80002	543	1.000
Treatment	24	Large	Female	- Treatment	24	Small	Male	-13.6667	4.86	-2.81145	543	1.000
Treatment	24	Large	Female	- Treatment	4	Large	Male	-32.2500	4.50	-7.17346	554	< .001
Treatment	24	Large	Female	- Treatment	4	Small	Female	10.4167	4.86	2.14288	543	1.000

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison												
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni
Treatment	24	Large	Female	- Treatment	4	Small	Male	-11.5000	4.86	-2.36574	543	1.000
Treatment	24	Large	Helpers	- Control	-0.1	Large	Female	-10.6380	4.86	-2.18841	543	1.000
Treatment	24	Large	Helpers	- Control	-0.1	Large	Male	-13.7214	4.86	-2.82270	543	1.000
Treatment	24	Large	Helpers	- Control	-0.1	Small	Female	-6.1380	4.86	-1.26269	543	1.000
Treatment	24	Large	Helpers	- Control	-0.1	Small	Helpers	-2.0686	4.86	-0.42554	543	1.000
Treatment	24	Large	Helpers	- Control	-0.1	Small	Male	-15.9714	4.86	-3.28557	543	1.000
Treatment	24	Large	Helpers	- Control	0.1	Large	Female	-15.6380	4.86	-3.21699	543	1.000
Treatment	24	Large	Helpers	- Control	0.1	Large	Male	-14.8880	4.86	-3.06271	543	1.000
Treatment	24	Large	Helpers	- Control	0.1	Small	Female	-8.8047	4.86	-1.81127	543	1.000
Treatment	24	Large	Helpers	- Control	0.1	Small	Helpers	0.4245	4.86	0.08732	543	1.000
Treatment	24	Large	Helpers	- Control	0.1	Small	Male	-22.5547	4.86	-4.63986	543	0.005
Treatment	24	Large	Helpers	- Control	24	Large	Female	-12.7214	4.86	-2.61699	543	1.000
Treatment	24	Large	Helpers	- Control	24	Large	Male	-11.1380	4.86	-2.29127	543	1.000
Treatment	24	Large	Helpers	- Control	24	Small	Female	-6.8880	4.86	-1.41698	543	1.000
Treatment	24	Large	Helpers	- Control	24	Small	Helpers	-1.5061	4.86	-0.30982	543	1.000
Treatment	24	Large	Helpers	- Control	24	Small	Male	-17.3047	4.86	-3.55985	543	0.455
Treatment	24	Large	Helpers	- Control	4	Large	Female	-11.8880	4.86	-2.44556	543	1.000
Treatment	24	Large	Helpers	- Control	4	Large	Male	-11.2214	4.86	-2.30841	543	1.000
Treatment	24	Large	Helpers	- Control	4	Small	Female	-6.9714	4.86	-1.43412	543	1.000
Treatment	24	Large	Helpers	- Control	4	Small	Helpers	-1.8811	4.86	-0.38697	543	1.000
Treatment	24	Large	Helpers	- Control	4	Small	Male	-15.8047	4.86	-3.25128	543	1.000
Treatment	24	Large	Helpers	- Treatment	-0.1	Large	Female	-14.4714	4.50	-3.21890	554	1.000
Treatment	24	Large	Helpers	- Treatment	-0.1	Large	Male	-20.0339	4.50	-4.45618	554	0.011
Treatment	24	Large	Helpers	- Treatment	-0.1	Small	Female	-5.5547	4.86	-1.14269	543	1.000
Treatment	24	Large	Helpers	- Treatment	-0.1	Small	Helpers	-2.9505	4.86	-0.60697	543	1.000
Treatment	24	Large	Helpers	- Treatment	-0.1	Small	Male	-11.9714	4.86	-2.46270	543	1.000
Treatment	24	Large	Helpers	- Treatment	0.1	Large	Female	-14.2214	4.50	-3.16329	554	1.000
Treatment	24	Large	Helpers	- Treatment	0.1	Large	Male	-23.4714	4.50	-5.22080	554	< .001
Treatment	24	Large	Helpers	- Treatment	0.1	Small	Female	6.1953	4.86	1.27448	543	1.000
Treatment	24	Large	Helpers	- Treatment	0.1	Small	Helpers	3.9036	4.86	0.80304	543	1.000
Treatment	24	Large	Helpers	- Treatment	0.1	Small	Male	-45.8880	4.86	-9.43991	543	< .001
Treatment	24	Large	Helpers	- Treatment	24	Large	Female	-11.4714	4.50	-2.55160	554	1.000
Treatment	24	Large	Helpers	- Treatment	24	Large	Male	-39.5339	4.50	-8.79362	554	< .001
Treatment	24	Large	Helpers	- Treatment	24	Small	Female	-2.7214	4.86	-0.55983	543	1.000
Treatment	24	Large	Helpers	- Treatment	24	Small	Helpers	1.2786	4.86	0.26304	543	1.000
Treatment	24	Large	Helpers	- Treatment	24	Small	Male	-25.1380	4.86	-5.17130	543	< .001
Treatment	24	Large	Helpers	- Treatment	4	Large	Female	1.5911	4.50	0.35392	554	1.000
Treatment	24	Large	Helpers	- Treatment	4	Large	Male	-43.7214	4.50	-9.72506	554	< .001
Treatment	24	Large	Helpers	- Treatment	4	Small	Female	-1.0547	4.86	-0.21697	543	1.000
Treatment	24	Large	Helpers	- Treatment	4	Small	Helpers	-0.4089	4.86	-0.08411	543	1.000
Treatment	24	Large	Helpers	- Treatment	4	Small	Male	-22.9714	4.86	-4.72558	543	0.003
Treatment	24	Large	Male	- Control	-0.1	Small	Male	23.5625	4.86	4.84719	543	0.002
Treatment	24	Large	Male	- Control	0.1	Small	Male	16.9792	4.86	3.49289	543	0.583
Treatment	24	Large	Male	- Control	24	Small	Male	22.2292	4.86	4.57290	543	0.007
Treatment	24	Large	Male	- Control	4	Small	Male	23.7292	4.86	4.88147	543	0.002
Treatment	24	Large	Male	- Treatment	-0.1	Small	Male	27.5625	4.86	5.67005	543	< .001
Treatment	24	Large	Male	- Treatment	0.1	Small	Male	-6.3542	4.86	-1.30715	543	1.000
Treatment	24	Large	Male	- Treatment	24	Small	Male	14.3958	4.86	2.96146	543	1.000
Treatment	24	Large	Male	- Treatment	4	Small	Male	16.5625	4.86	3.40717	543	0.795
Treatment	24	Small	Female	- Control	-0.1	Large	Male	-11.0000	5.20	-2.11673	543	1.000
Treatment	24	Small	Female	- Control	-0.1	Small	Male	-13.2500	5.20	-2.54970	543	1.000
Treatment	24	Small	Female	- Control	0.1	Large	Male	-12.1667	5.20	-2.34123	543	1.000
Treatment	24	Small	Female	- Control	0.1	Small	Male	-19.8333	5.20	-3.81652	543	0.170
Treatment	24	Small	Female	- Control	24	Large	Male	-8.4167	5.20	-1.61962	543	1.000
Treatment	24	Small	Female	- Control	24	Small	Male	-14.5833	5.20	-2.80627	543	1.000
Treatment	24	Small	Female	- Control	4	Large	Male	-8.5000	5.20	-1.63565	543	1.000
Treatment	24	Small	Female	- Control	4	Small	Male	-13.0833	5.20	-2.51762	543	1.000
Treatment	24	Small	Female	- Treatment	-0.1	Large	Male	-17.3125	4.86	-3.56146	543	0.453
Treatment	24	Small	Female	- Treatment	-0.1	Small	Male	-9.2500	5.19	-1.78185	554	1.000
Treatment	24	Small	Female	- Treatment	0.1	Large	Male	-20.7500	4.86	-4.26861	543	0.026

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison												
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni
Treatment	24	Small	Female	- Treatment	0.1	Small	Male	-43.1667	5.19	-8.31530	554	< .001
Treatment	24	Small	Female	- Treatment	24	Large	Male	-36.8125	4.86	-7.57293	543	< .001
Treatment	24	Small	Female	- Treatment	24	Small	Male	-22.4167	5.19	-4.31818	554	0.021
Treatment	24	Small	Female	- Treatment	4	Large	Male	-41.0000	4.86	-8.43436	543	< .001
Treatment	24	Small	Female	- Treatment	4	Small	Male	-20.2500	5.19	-3.90081	554	0.121
Treatment	24	Small	Helpers	- Control	-0.1	Large	Female	-11.9167	5.20	-2.29312	543	1.000
Treatment	24	Small	Helpers	- Control	-0.1	Large	Male	-15.0000	5.20	-2.88645	543	1.000
Treatment	24	Small	Helpers	- Control	-0.1	Small	Female	-7.4167	5.20	-1.42719	543	1.000
Treatment	24	Small	Helpers	- Control	-0.1	Small	Male	-17.2500	5.20	-3.31941	543	1.000
Treatment	24	Small	Helpers	- Control	0.1	Large	Female	-16.9167	5.20	-3.25527	543	1.000
Treatment	24	Small	Helpers	- Control	0.1	Large	Male	-16.1667	5.20	-3.11095	543	1.000
Treatment	24	Small	Helpers	- Control	0.1	Small	Female	-10.0833	5.20	-1.94033	543	1.000
Treatment	24	Small	Helpers	- Control	0.1	Small	Male	-23.8333	5.20	-4.58624	543	0.006
Treatment	24	Small	Helpers	- Control	24	Large	Female	-14.0000	5.20	-2.69402	543	1.000
Treatment	24	Small	Helpers	- Control	24	Large	Male	-12.4167	5.20	-2.38934	543	1.000
Treatment	24	Small	Helpers	- Control	24	Small	Female	-8.1667	5.20	-1.57151	543	1.000
Treatment	24	Small	Helpers	- Control	24	Small	Male	-18.5833	5.20	-3.57599	543	0.429
Treatment	24	Small	Helpers	- Control	4	Large	Female	-13.1667	5.20	-2.53366	543	1.000
Treatment	24	Small	Helpers	- Control	4	Large	Male	-12.5000	5.20	-2.40537	543	1.000
Treatment	24	Small	Helpers	- Control	4	Small	Female	-8.2500	5.20	-1.58755	543	1.000
Treatment	24	Small	Helpers	- Control	4	Small	Male	-17.0833	5.20	-3.28734	543	1.000
Treatment	24	Small	Helpers	- Treatment	-0.1	Large	Female	-15.7500	4.86	-3.24003	543	1.000
Treatment	24	Small	Helpers	- Treatment	-0.1	Large	Male	-21.3125	4.86	-4.38433	543	0.016
Treatment	24	Small	Helpers	- Treatment	-0.1	Small	Female	-6.8333	5.19	-1.31632	554	1.000
Treatment	24	Small	Helpers	- Treatment	-0.1	Small	Male	-13.2500	5.19	-2.55238	554	1.000
Treatment	24	Small	Helpers	- Treatment	0.1	Large	Female	-15.5000	4.86	-3.18860	543	1.000
Treatment	24	Small	Helpers	- Treatment	0.1	Large	Male	-24.7500	4.86	-5.09147	543	< .001
Treatment	24	Small	Helpers	- Treatment	0.1	Small	Female	4.9167	5.19	0.94711	554	1.000
Treatment	24	Small	Helpers	- Treatment	0.1	Small	Male	-47.1667	5.19	-9.08583	554	< .001
Treatment	24	Small	Helpers	- Treatment	24	Large	Female	-12.7500	4.86	-2.62288	543	1.000
Treatment	24	Small	Helpers	- Treatment	24	Large	Male	-40.8125	4.86	-8.39579	543	< .001
Treatment	24	Small	Helpers	- Treatment	24	Small	Female	-4.0000	5.19	-0.77053	554	1.000
Treatment	24	Small	Helpers	- Treatment	24	Small	Male	-26.4167	5.19	-5.08871	554	< .001
Treatment	24	Small	Helpers	- Treatment	4	Large	Female	0.3125	4.86	0.06429	543	1.000
Treatment	24	Small	Helpers	- Treatment	4	Large	Male	-45.0000	4.86	-9.25723	543	< .001
Treatment	24	Small	Helpers	- Treatment	4	Small	Female	-2.3333	5.19	-0.44948	554	1.000
Treatment	24	Small	Helpers	- Treatment	4	Small	Male	-24.2500	5.19	-4.67134	554	0.004
Treatment	4	Large	Female	- Control	-0.1	Large	Male	-15.3125	4.86	-3.15003	543	1.000
Treatment	4	Large	Female	- Control	-0.1	Small	Female	-7.7292	4.86	-1.59001	543	1.000
Treatment	4	Large	Female	- Control	-0.1	Small	Male	-17.5625	4.86	-3.61289	543	0.373
Treatment	4	Large	Female	- Control	0.1	Large	Male	-16.4792	4.86	-3.39003	543	0.846
Treatment	4	Large	Female	- Control	0.1	Small	Female	-10.3958	4.86	-2.13859	543	1.000
Treatment	4	Large	Female	- Control	0.1	Small	Male	-24.1458	4.86	-4.96719	543	0.001
Treatment	4	Large	Female	- Control	24	Large	Female	-14.3125	4.86	-2.94431	543	1.000
Treatment	4	Large	Female	- Control	24	Large	Male	-12.7292	4.86	-2.61859	543	1.000
Treatment	4	Large	Female	- Control	24	Small	Female	-8.4792	4.86	-1.74430	543	1.000
Treatment	4	Large	Female	- Control	24	Small	Male	-18.8958	4.86	-3.88718	543	0.129
Treatment	4	Large	Female	- Control	4	Large	Male	-12.8125	4.86	-2.63574	543	1.000
Treatment	4	Large	Female	- Control	4	Small	Female	-8.5625	4.86	-1.76144	543	1.000
Treatment	4	Large	Female	- Control	4	Small	Male	-17.3958	4.86	-3.57860	543	0.425
Treatment	4	Large	Female	- Treatment	-0.1	Large	Male	-21.6250	4.50	-4.81011	554	0.002
Treatment	4	Large	Female	- Treatment	-0.1	Small	Female	-7.1458	4.86	-1.47001	543	1.000
Treatment	4	Large	Female	- Treatment	-0.1	Small	Male	-13.5625	4.86	-2.79003	543	1.000
Treatment	4	Large	Female	- Treatment	0.1	Large	Male	-25.0625	4.50	-5.57472	554	< .001
Treatment	4	Large	Female	- Treatment	0.1	Small	Female	4.6042	4.86	0.94715	543	1.000
Treatment	4	Large	Female	- Treatment	0.1	Small	Male	-47.4792	4.86	-9.76723	543	< .001
Treatment	4	Large	Female	- Treatment	24	Large	Female	-13.0625	4.50	-2.90553	554	1.000
Treatment	4	Large	Female	- Treatment	24	Large	Male	-41.1250	4.50	-9.14755	554	< .001
Treatment	4	Large	Female	- Treatment	24	Small	Female	-4.3125	4.86	-0.88715	543	1.000
Treatment	4	Large	Female	- Treatment	24	Small	Male	-26.7292	4.86	-5.49862	543	< .001

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison												
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni
Treatment	4	Large	Female	- Treatment	4	Large	Male	-45.3125	4.50	-10.07898	554	< .001
Treatment	4	Large	Female	- Treatment	4	Small	Female	-2.6458	4.86	-0.54429	543	1.000
Treatment	4	Large	Female	- Treatment	4	Small	Male	-24.5625	4.86	-5.05290	543	< .001
Treatment	4	Large	Helpers	- Control	-0.1	Large	Female	-9.5536	4.86	-1.96532	543	1.000
Treatment	4	Large	Helpers	- Control	-0.1	Large	Male	-12.6369	4.86	-2.59962	543	1.000
Treatment	4	Large	Helpers	- Control	-0.1	Small	Female	-5.0536	4.86	-1.03960	543	1.000
Treatment	4	Large	Helpers	- Control	-0.1	Small	Helpers	-0.9841	4.86	-0.20245	543	1.000
Treatment	4	Large	Helpers	- Control	-0.1	Small	Male	-14.8869	4.86	-3.06248	543	1.000
Treatment	4	Large	Helpers	- Control	0.1	Large	Female	-14.5536	4.86	-2.99390	543	1.000
Treatment	4	Large	Helpers	- Control	0.1	Large	Male	-13.8036	4.86	-2.83962	543	1.000
Treatment	4	Large	Helpers	- Control	0.1	Small	Female	-7.7202	4.86	-1.58818	543	1.000
Treatment	4	Large	Helpers	- Control	0.1	Small	Helpers	1.5089	4.86	0.31041	543	1.000
Treatment	4	Large	Helpers	- Control	0.1	Small	Male	-21.4702	4.86	-4.41677	543	0.014
Treatment	4	Large	Helpers	- Control	24	Large	Female	-11.6369	4.86	-2.39390	543	1.000
Treatment	4	Large	Helpers	- Control	24	Large	Helpers	-2.2089	4.86	-0.45441	543	1.000
Treatment	4	Large	Helpers	- Control	24	Large	Male	-10.0536	4.86	-2.06818	543	1.000
Treatment	4	Large	Helpers	- Control	24	Small	Female	-5.8036	4.86	-1.19389	543	1.000
Treatment	4	Large	Helpers	- Control	24	Small	Helpers	-0.4216	4.86	-0.08674	543	1.000
Treatment	4	Large	Helpers	- Control	24	Small	Male	-16.2202	4.86	-3.33676	543	1.000
Treatment	4	Large	Helpers	- Control	4	Large	Female	-10.8036	4.86	-2.22247	543	1.000
Treatment	4	Large	Helpers	- Control	4	Large	Male	-10.1369	4.86	-2.08532	543	1.000
Treatment	4	Large	Helpers	- Control	4	Small	Female	-5.8869	4.86	-1.21103	543	1.000
Treatment	4	Large	Helpers	- Control	4	Small	Helpers	-0.7966	4.86	-0.16388	543	1.000
Treatment	4	Large	Helpers	- Control	4	Small	Male	-14.7202	4.86	-3.02819	543	1.000
Treatment	4	Large	Helpers	- Treatment	-0.1	Large	Female	-13.3869	4.50	-2.97769	554	1.000
Treatment	4	Large	Helpers	- Treatment	-0.1	Large	Male	-18.9494	4.50	-4.21497	554	0.033
Treatment	4	Large	Helpers	- Treatment	-0.1	Small	Female	-4.4702	4.86	-0.91960	543	1.000
Treatment	4	Large	Helpers	- Treatment	-0.1	Small	Helpers	-1.8661	4.86	-0.38388	543	1.000
Treatment	4	Large	Helpers	- Treatment	-0.1	Small	Male	-10.8869	4.86	-2.23961	543	1.000
Treatment	4	Large	Helpers	- Treatment	0.1	Large	Female	-13.1369	4.50	-2.92208	554	1.000
Treatment	4	Large	Helpers	- Treatment	0.1	Large	Male	-22.3869	4.50	-4.97958	554	< .001
Treatment	4	Large	Helpers	- Treatment	0.1	Small	Female	7.2798	4.86	1.49756	543	1.000
Treatment	4	Large	Helpers	- Treatment	0.1	Small	Helpers	4.9881	4.86	1.02613	543	1.000
Treatment	4	Large	Helpers	- Treatment	0.1	Small	Male	-44.8036	4.86	-9.21682	543	< .001
Treatment	4	Large	Helpers	- Treatment	24	Large	Female	-10.3869	4.50	-2.31039	554	1.000
Treatment	4	Large	Helpers	- Treatment	24	Large	Helpers	1.0844	4.50	0.24122	554	1.000
Treatment	4	Large	Helpers	- Treatment	24	Large	Male	-38.4494	4.50	-8.55241	554	< .001
Treatment	4	Large	Helpers	- Treatment	24	Small	Female	-1.6369	4.86	-0.33674	543	1.000
Treatment	4	Large	Helpers	- Treatment	24	Small	Helpers	2.3631	4.86	0.48613	543	1.000
Treatment	4	Large	Helpers	- Treatment	24	Small	Male	-24.0536	4.86	-4.94821	543	0.001
Treatment	4	Large	Helpers	- Treatment	4	Large	Female	2.6756	4.50	0.59514	554	1.000
Treatment	4	Large	Helpers	- Treatment	4	Large	Male	-42.6369	4.50	-9.48384	554	< .001
Treatment	4	Large	Helpers	- Treatment	4	Small	Female	0.0298	4.86	0.00612	543	1.000
Treatment	4	Large	Helpers	- Treatment	4	Small	Helpers	0.6756	4.86	0.13898	543	1.000
Treatment	4	Large	Helpers	- Treatment	4	Small	Male	-21.8869	4.86	-4.50249	543	0.009
Treatment	4	Large	Male	- Control	-0.1	Small	Male	27.7500	4.86	5.70862	543	< .001
Treatment	4	Large	Male	- Control	0.1	Small	Male	21.1667	4.86	4.35432	543	0.018
Treatment	4	Large	Male	- Control	24	Large	Male	32.5833	4.86	6.70292	543	< .001
Treatment	4	Large	Male	- Control	24	Small	Male	26.4167	4.86	5.43433	543	< .001
Treatment	4	Large	Male	- Control	4	Small	Male	27.9167	4.86	5.74291	543	< .001
Treatment	4	Large	Male	- Treatment	-0.1	Small	Male	31.7500	4.86	6.53149	543	< .001
Treatment	4	Large	Male	- Treatment	0.1	Small	Male	-2.1667	4.86	-0.44572	543	1.000
Treatment	4	Large	Male	- Treatment	24	Large	Male	4.1875	4.50	0.93144	554	1.000
Treatment	4	Large	Male	- Treatment	24	Small	Male	18.5833	4.86	3.82289	543	0.166
Treatment	4	Large	Male	- Treatment	4	Small	Male	20.7500	4.86	4.26861	543	0.026
Treatment	4	Small	Female	- Control	-0.1	Large	Male	-12.6667	5.20	-2.43744	543	1.000
Treatment	4	Small	Female	- Control	-0.1	Small	Male	-14.9167	5.20	-2.87041	543	1.000
Treatment	4	Small	Female	- Control	0.1	Large	Male	-13.8333	5.20	-2.66195	543	1.000
Treatment	4	Small	Female	- Control	0.1	Small	Male	-21.5000	5.20	-4.13724	543	0.046
Treatment	4	Small	Female	- Control	24	Large	Male	-10.0833	5.20	-1.94033	543	1.000

Post Hoc Comparisons - Treatment * Hours * Group Size * Subject

Comparison												
Treatment	Hours	Group Size	Subject	Treatment	Hours	Group Size	Subject	Difference	SE	t	df	Pbonferroni
Treatment	4	Small	Female	- Control	24	Small	Female	-5.8333	5.20	-1.12251	543	1.000
Treatment	4	Small	Female	- Control	24	Small	Male	-16.2500	5.20	-3.12698	543	1.000
Treatment	4	Small	Female	- Control	4	Large	Male	-10.1667	5.20	-1.95637	543	1.000
Treatment	4	Small	Female	- Control	4	Small	Male	-14.7500	5.20	-2.83834	543	1.000
Treatment	4	Small	Female	- Treatment	-0.1	Large	Male	-18.9792	4.86	-3.90432	543	0.120
Treatment	4	Small	Female	- Treatment	-0.1	Small	Male	-10.9167	5.19	-2.10290	554	1.000
Treatment	4	Small	Female	- Treatment	0.1	Large	Male	-22.4167	4.86	-4.61147	543	0.006
Treatment	4	Small	Female	- Treatment	0.1	Small	Male	-44.8333	5.19	-8.63635	554	< .001
Treatment	4	Small	Female	- Treatment	24	Large	Male	-38.4792	4.86	-7.91579	543	< .001
Treatment	4	Small	Female	- Treatment	24	Small	Female	-1.6667	5.19	-0.32105	554	1.000
Treatment	4	Small	Female	- Treatment	24	Small	Male	-24.0833	5.19	-4.63923	554	0.005
Treatment	4	Small	Female	- Treatment	4	Large	Male	-42.6667	4.86	-8.77722	543	< .001
Treatment	4	Small	Female	- Treatment	4	Small	Male	-21.9167	5.19	-4.22186	554	0.032
Treatment	4	Small	Helpers	- Control	-0.1	Large	Female	-10.2292	5.20	-1.96840	543	1.000
Treatment	4	Small	Helpers	- Control	-0.1	Large	Male	-13.3125	5.20	-2.56172	543	1.000
Treatment	4	Small	Helpers	- Control	-0.1	Small	Female	-5.7292	5.20	-1.10246	543	1.000
Treatment	4	Small	Helpers	- Control	-0.1	Small	Male	-15.5625	5.20	-2.99469	543	1.000
Treatment	4	Small	Helpers	- Control	0.1	Large	Female	-15.2292	5.20	-2.93055	543	1.000
Treatment	4	Small	Helpers	- Control	0.1	Large	Male	-14.4792	5.20	-2.78622	543	1.000
Treatment	4	Small	Helpers	- Control	0.1	Small	Female	-8.3958	5.20	-1.61561	543	1.000
Treatment	4	Small	Helpers	- Control	0.1	Small	Male	-22.1458	5.20	-4.26152	543	0.027
Treatment	4	Small	Helpers	- Control	24	Large	Female	-12.3125	5.20	-2.36929	543	1.000
Treatment	4	Small	Helpers	- Control	24	Large	Male	-10.7292	5.20	-2.06461	543	1.000
Treatment	4	Small	Helpers	- Control	24	Small	Female	-6.4792	5.20	-1.24678	543	1.000
Treatment	4	Small	Helpers	- Control	24	Small	Helpers	-1.0972	5.20	-0.21114	543	1.000
Treatment	4	Small	Helpers	- Control	24	Small	Male	-16.8958	5.20	-3.25126	543	1.000
Treatment	4	Small	Helpers	- Control	4	Large	Female	-11.4792	5.20	-2.20893	543	1.000
Treatment	4	Small	Helpers	- Control	4	Large	Male	-10.8125	5.20	-2.08065	543	1.000
Treatment	4	Small	Helpers	- Control	4	Small	Female	-6.5625	5.20	-1.26282	543	1.000
Treatment	4	Small	Helpers	- Control	4	Small	Male	-15.3958	5.20	-2.96262	543	1.000
Treatment	4	Small	Helpers	- Treatment	-0.1	Large	Female	-14.0625	4.86	-2.89288	543	1.000
Treatment	4	Small	Helpers	- Treatment	-0.1	Large	Male	-19.6250	4.86	-4.03718	543	0.070
Treatment	4	Small	Helpers	- Treatment	-0.1	Small	Female	-5.1458	5.19	-0.99125	554	1.000
Treatment	4	Small	Helpers	- Treatment	-0.1	Small	Male	-11.5625	5.19	-2.22731	554	1.000
Treatment	4	Small	Helpers	- Treatment	0.1	Large	Female	-13.8125	4.86	-2.84145	543	1.000
Treatment	4	Small	Helpers	- Treatment	0.1	Large	Male	-23.0625	4.86	-4.74433	543	0.003
Treatment	4	Small	Helpers	- Treatment	0.1	Small	Female	6.6042	5.19	1.27218	554	1.000
Treatment	4	Small	Helpers	- Treatment	0.1	Small	Male	-45.4792	5.19	-8.76076	554	< .001
Treatment	4	Small	Helpers	- Treatment	24	Large	Female	-11.0625	4.86	-2.27573	543	1.000
Treatment	4	Small	Helpers	- Treatment	24	Large	Male	-39.1250	4.86	-8.04864	543	< .001
Treatment	4	Small	Helpers	- Treatment	24	Small	Female	-2.3125	5.19	-0.44546	554	1.000
Treatment	4	Small	Helpers	- Treatment	24	Small	Helpers	1.6875	5.19	0.32507	554	1.000
Treatment	4	Small	Helpers	- Treatment	24	Small	Male	-24.7292	5.19	-4.76364	554	0.003
Treatment	4	Small	Helpers	- Treatment	4	Large	Female	2.0000	4.86	0.41143	543	1.000
Treatment	4	Small	Helpers	- Treatment	4	Large	Male	-43.3125	4.86	-8.91008	543	< .001
Treatment	4	Small	Helpers	- Treatment	4	Small	Female	-0.6458	5.19	-0.12441	554	1.000
Treatment	4	Small	Helpers	- Treatment	4	Small	Male	-22.5625	5.19	-4.34627	554	0.019
Treatment	4	Small	Male	- Control	24	Small	Male	5.6667	5.20	1.09044	543	1.000
Treatment	4	Small	Male	- Treatment	24	Small	Male	-2.1667	5.19	-0.41737	554	1.000

Post Hoc Comparisons - Group Size * Treatment * Hours

Comparison											
Group Size	Treatment	Hours	Group Size	Treatment	Hours	Difference	SE	t	df	Pbonferroni	
Large	Control	-0.1	-	Large	Control	0.1	0.17470	0.255	0.68563	580.0	1.000
Large	Control	-0.1	-	Large	Control	24	0.04851	0.255	0.19039	580.0	1.000
Large	Control	-0.1	-	Large	Control	4	-0.01349	0.255	-0.05295	580.0	1.000
Large	Control	-0.1	-	Large	Treatment	0.1	-0.59720	0.288	-2.07492	89.5	1.000
Large	Control	-0.1	-	Large	Treatment	24	-0.70942	0.288	-2.46485	89.5	1.000
Large	Control	-0.1	-	Large	Treatment	4	-0.32488	0.288	-1.12876	89.5	1.000
Large	Control	-0.1	-	Small	Control	0.1	-0.09683	0.308	-0.31469	89.5	1.000
Large	Control	-0.1	-	Small	Control	24	-0.08757	0.308	-0.28459	89.5	1.000
Large	Control	-0.1	-	Small	Control	4	-0.20099	0.308	-0.65323	89.5	1.000
Large	Control	-0.1	-	Small	Treatment	0.1	0.17401	0.308	0.56553	89.5	1.000
Large	Control	-0.1	-	Small	Treatment	24	-0.49266	0.308	-1.60116	89.5	1.000
Large	Control	-0.1	-	Small	Treatment	4	-0.22183	0.308	-0.72094	89.5	1.000
Large	Control	0.1	-	Large	Control	24	-0.12619	0.255	-0.49524	580.0	1.000
Large	Control	0.1	-	Large	Control	4	-0.18819	0.255	-0.73858	580.0	1.000
Large	Control	0.1	-	Large	Treatment	24	-0.88413	0.288	-3.07184	89.5	0.338
Large	Control	0.1	-	Large	Treatment	4	-0.49958	0.288	-1.73575	89.5	1.000
Large	Control	0.1	-	Small	Control	24	-0.26227	0.308	-0.85238	89.5	1.000
Large	Control	0.1	-	Small	Control	4	-0.37569	0.308	-1.22102	89.5	1.000
Large	Control	0.1	-	Small	Treatment	24	-0.66736	0.308	-2.16895	89.5	1.000
Large	Control	0.1	-	Small	Treatment	4	-0.39653	0.308	-1.28873	89.5	1.000
Large	Control	4	-	Large	Control	24	0.06200	0.255	0.24334	580.0	1.000
Large	Control	4	-	Large	Treatment	24	-0.69593	0.288	-2.41797	89.5	1.000
Large	Control	4	-	Small	Control	24	-0.07407	0.308	-0.24074	89.5	1.000
Large	Control	4	-	Small	Treatment	24	-0.47917	0.308	-1.55731	89.5	1.000
Large	Treatment	-0.1	-	Large	Control	-0.1	-0.14549	0.288	-0.50548	89.5	1.000
Large	Treatment	-0.1	-	Large	Control	0.1	0.02922	0.288	0.10151	89.5	1.000
Large	Treatment	-0.1	-	Large	Control	24	-0.09697	0.288	-0.33693	89.5	1.000
Large	Treatment	-0.1	-	Large	Control	4	-0.15898	0.288	-0.55236	89.5	1.000
Large	Treatment	-0.1	-	Large	Treatment	0.1	-0.74268	0.221	-3.36561	580.0	0.098
Large	Treatment	-0.1	-	Large	Treatment	24	-0.85491	0.221	-3.87419	580.0	0.014
Large	Treatment	-0.1	-	Large	Treatment	4	-0.47036	0.221	-2.13153	580.0	1.000
Large	Treatment	-0.1	-	Small	Control	-0.1	-0.16824	0.288	-0.58453	89.5	1.000
Large	Treatment	-0.1	-	Small	Control	0.1	-0.24231	0.288	-0.84190	89.5	1.000
Large	Treatment	-0.1	-	Small	Control	24	-0.23305	0.288	-0.80973	89.5	1.000
Large	Treatment	-0.1	-	Small	Control	4	-0.34648	0.288	-1.20382	89.5	1.000
Large	Treatment	-0.1	-	Small	Treatment	0.1	0.02852	0.288	0.09910	89.5	1.000
Large	Treatment	-0.1	-	Small	Treatment	24	-0.63814	0.288	-2.21719	89.5	1.000
Large	Treatment	-0.1	-	Small	Treatment	4	-0.36731	0.288	-1.27620	89.5	1.000
Large	Treatment	0.1	-	Large	Control	0.1	0.77190	0.288	2.68192	89.5	1.000
Large	Treatment	0.1	-	Large	Control	24	0.64571	0.288	2.24348	89.5	1.000
Large	Treatment	0.1	-	Large	Control	4	0.58371	0.288	2.02805	89.5	1.000
Large	Treatment	0.1	-	Large	Treatment	24	-0.11223	0.221	-0.50858	580.0	1.000
Large	Treatment	0.1	-	Large	Treatment	4	0.27232	0.221	1.23408	580.0	1.000
Large	Treatment	0.1	-	Small	Control	0.1	0.50037	0.288	1.73851	89.5	1.000
Large	Treatment	0.1	-	Small	Control	24	0.50963	0.288	1.77068	89.5	1.000
Large	Treatment	0.1	-	Small	Control	4	0.39621	0.288	1.37659	89.5	1.000
Large	Treatment	0.1	-	Small	Treatment	24	0.10454	0.288	0.36321	89.5	1.000
Large	Treatment	0.1	-	Small	Treatment	4	0.37537	0.288	1.30421	89.5	1.000
Large	Treatment	24	-	Large	Control	24	0.75794	0.288	2.63340	89.5	1.000
Large	Treatment	24	-	Small	Control	24	0.62186	0.288	2.16061	89.5	1.000

Post Hoc Comparisons - Group Size * Treatment * Hours

Comparison											
Group Size	Treatment	Hours		Group Size	Treatment	Hours	Difference	SE	t	df	Pbonferroni
Large	Treatment	4	-	Large	Control	24	0.37339	0.288	1.29731	89.5	1.000
Large	Treatment	4	-	Large	Control	4	0.31138	0.288	1.08188	89.5	1.000
Large	Treatment	4	-	Large	Treatment	24	-0.38455	0.221	-1.74265	580.0	1.000
Large	Treatment	4	-	Small	Control	24	0.23731	0.288	0.82452	89.5	1.000
Large	Treatment	4	-	Small	Control	4	0.12388	0.288	0.43043	89.5	1.000
Large	Treatment	4	-	Small	Treatment	24	-0.16778	0.288	-0.58295	89.5	1.000
Small	Control	-0.1	-	Large	Control	-0.1	0.02275	0.308	0.07394	89.5	1.000
Small	Control	-0.1	-	Large	Control	0.1	0.19745	0.308	0.64173	89.5	1.000
Small	Control	-0.1	-	Large	Control	24	0.07126	0.308	0.23161	89.5	1.000
Small	Control	-0.1	-	Large	Control	4	0.00926	0.308	0.03009	89.5	1.000
Small	Control	-0.1	-	Large	Treatment	0.1	-0.57445	0.288	-1.99588	89.5	1.000
Small	Control	-0.1	-	Large	Treatment	24	-0.68667	0.288	-2.38580	89.5	1.000
Small	Control	-0.1	-	Large	Treatment	4	-0.30212	0.288	-1.04971	89.5	1.000
Small	Control	-0.1	-	Small	Control	0.1	-0.07407	0.255	-0.29071	580.0	1.000
Small	Control	-0.1	-	Small	Control	24	-0.06481	0.255	-0.25437	580.0	1.000
Small	Control	-0.1	-	Small	Control	4	-0.17824	0.255	-0.69952	580.0	1.000
Small	Control	-0.1	-	Small	Treatment	0.1	0.19676	0.308	0.63948	89.5	1.000
Small	Control	-0.1	-	Small	Treatment	24	-0.46991	0.308	-1.52722	89.5	1.000
Small	Control	-0.1	-	Small	Treatment	4	-0.19907	0.308	-0.64700	89.5	1.000
Small	Control	0.1	-	Large	Control	0.1	0.27153	0.308	0.88248	89.5	1.000
Small	Control	0.1	-	Large	Control	24	0.14534	0.308	0.47235	89.5	1.000
Small	Control	0.1	-	Large	Control	4	0.08333	0.308	0.27084	89.5	1.000
Small	Control	0.1	-	Large	Treatment	24	-0.61260	0.288	-2.12844	89.5	1.000
Small	Control	0.1	-	Large	Treatment	4	-0.22805	0.288	-0.79235	89.5	1.000
Small	Control	0.1	-	Small	Control	24	0.00926	0.255	0.03634	580.0	1.000
Small	Control	0.1	-	Small	Control	4	-0.10417	0.255	-0.40881	580.0	1.000
Small	Control	0.1	-	Small	Treatment	24	-0.39583	0.308	-1.28647	89.5	1.000
Small	Control	0.1	-	Small	Treatment	4	-0.12500	0.308	-0.40625	89.5	1.000
Small	Control	24	-	Large	Control	24	0.13608	0.308	0.44226	89.5	1.000
Small	Control	4	-	Large	Control	24	0.24950	0.308	0.81090	89.5	1.000
Small	Control	4	-	Large	Control	4	0.18750	0.308	0.60938	89.5	1.000
Small	Control	4	-	Large	Treatment	24	-0.50843	0.288	-1.76652	89.5	1.000
Small	Control	4	-	Small	Control	24	0.11343	0.255	0.44515	580.0	1.000
Small	Control	4	-	Small	Treatment	24	-0.29167	0.308	-0.94793	89.5	1.000
Small	Treatment	-0.1	-	Large	Control	-0.1	0.24960	0.308	0.81122	89.5	1.000
Small	Treatment	-0.1	-	Large	Control	0.1	0.42431	0.308	1.37901	89.5	1.000
Small	Treatment	-0.1	-	Large	Control	24	0.29812	0.308	0.96889	89.5	1.000
Small	Treatment	-0.1	-	Large	Control	4	0.23611	0.308	0.76737	89.5	1.000
Small	Treatment	-0.1	-	Large	Treatment	-0.1	0.39509	0.288	1.37271	89.5	1.000
Small	Treatment	-0.1	-	Large	Treatment	0.1	-0.34759	0.288	-1.20769	89.5	1.000
Small	Treatment	-0.1	-	Large	Treatment	24	-0.45982	0.288	-1.59762	89.5	1.000
Small	Treatment	-0.1	-	Large	Treatment	4	-0.07527	0.288	-0.26153	89.5	1.000
Small	Treatment	-0.1	-	Small	Control	-0.1	0.22685	0.308	0.73728	89.5	1.000
Small	Treatment	-0.1	-	Small	Control	0.1	0.15278	0.308	0.49653	89.5	1.000
Small	Treatment	-0.1	-	Small	Control	24	0.16204	0.308	0.52663	89.5	1.000
Small	Treatment	-0.1	-	Small	Control	4	0.04861	0.308	0.15799	89.5	1.000
Small	Treatment	-0.1	-	Small	Treatment	0.1	0.42361	0.255	1.66248	580.0	1.000
Small	Treatment	-0.1	-	Small	Treatment	24	-0.24306	0.255	-0.95388	580.0	1.000
Small	Treatment	-0.1	-	Small	Treatment	4	0.02778	0.255	0.10902	580.0	1.000
Small	Treatment	0.1	-	Large	Control	0.1	6.94e-4	0.308	0.00226	89.5	1.000
Small	Treatment	0.1	-	Large	Control	24	-0.12550	0.308	-0.40787	89.5	1.000
Small	Treatment	0.1	-	Large	Control	4	-0.18750	0.308	-0.60938	89.5	1.000

Post Hoc Comparisons - Group Size * Treatment * Hours

Comparison											
Group Size	Treatment	Hours		Group Size	Treatment	Hours	Difference	SE	t	df	Pbonferroni
Small	Treatment	0.1	-	Large	Treatment	0.1	-0.77121	0.288	-2.67950	89.5	1.000
Small	Treatment	0.1	-	Large	Treatment	24	-0.88343	0.288	-3.06943	89.5	0.341
Small	Treatment	0.1	-	Large	Treatment	4	-0.49888	0.288	-1.73334	89.5	1.000
Small	Treatment	0.1	-	Small	Control	0.1	-0.27083	0.308	-0.88022	89.5	1.000
Small	Treatment	0.1	-	Small	Control	24	-0.26157	0.308	-0.85013	89.5	1.000
Small	Treatment	0.1	-	Small	Control	4	-0.37500	0.308	-1.21876	89.5	1.000
Small	Treatment	0.1	-	Small	Treatment	24	-0.66667	0.255	-2.61637	580.0	1.000
Small	Treatment	0.1	-	Small	Treatment	4	-0.39583	0.255	-1.55347	580.0	1.000
Small	Treatment	24	-	Large	Control	24	0.54117	0.308	1.75883	89.5	1.000
Small	Treatment	24	-	Large	Treatment	24	-0.21677	0.288	-0.75314	89.5	1.000
Small	Treatment	24	-	Small	Control	24	0.40509	0.308	1.31657	89.5	1.000
Small	Treatment	4	-	Large	Control	24	0.27034	0.308	0.87861	89.5	1.000
Small	Treatment	4	-	Large	Control	4	0.20833	0.308	0.67709	89.5	1.000
Small	Treatment	4	-	Large	Treatment	24	-0.48760	0.288	-1.69413	89.5	1.000
Small	Treatment	4	-	Large	Treatment	4	-0.10305	0.288	-0.35804	89.5	1.000
Small	Treatment	4	-	Small	Control	24	0.13426	0.308	0.43635	89.5	1.000
Small	Treatment	4	-	Small	Control	4	0.02083	0.308	0.06771	89.5	1.000
Small	Treatment	4	-	Small	Treatment	24	-0.27083	0.255	-1.06290	580.0	1.000

Readme file for “Behavioral and physiological evidence that increasing group size ameliorates the impacts of social disturbance” dataset. Manuscript ID: JEXBIO/2019/217075

Behavioral data was collected in McMaster University’s Animal Behaviour Ecology Laboratory (ABEL) from February 29, 2019 to March 2, 2020. Video recordings were scored from March 13, 2019 to June 6, 2019. Tissue samples were collected March 3, 2019 and assays were conducted from June 11, 2019 to June 20. All the data for this paper was analyzed from June 27, 2019 to September 16, 2019.

The dataset is contained in an Excel worksheet organized by columns. The column labels (variables of interest) and how this data was scored are as follows:

Labels	Factor Values	Meaning
Tank Number_n	1-2, 4-13, 15-16, 18-19, 22, 24-31, 34	Tank ID
Group Size	Small, Large	Binary categorization of group size, with groups either being Small (containing 4 or fewer Helper Fish) or Large (containing 5 or greater Helper Fish).
Treatment	Treatment, Control	Binary categorization of treatment type.
Subject	Breeding Male, Breeding Female, Helpers	Fish class, being Breeding Male (the dominant male of the group), Breeding Female (the dominant female of the group) or Helpers (all of the remaining fish, collectively).
Observation Type	Pre 1, Pre 2, Post 1, Post 2, 4 Hours Post 1, 4 Hours Post 2, 24 Hours Post 1, 24 Hours Post 2	The time step of the observation. The time steps listed are: Pre 1 (recording occurred immediately before the first social perturbation), Pre 2 (recording occurred immediately before the second social perturbation), Post 1 (recording occurred immediately after the first social perturbation), Post 2 (recording occurred immediately after the second social perturbation), 4 Hours Post 1 (recording occurred 4 hours following the first social perturbation), 4 Hours Post 2 (recording occurred 4 hours following the second social perturbation), 24 Hours Post 1 (recording occurred 24 hours following the first social perturbation) and 24 Hours Post 2 (recording occurred 24 hours following the second social perturbation).
Male_ID	A letter/integer combination	A unique combination of a letter and number that identifies each male. The

		number indicates the tank the male started in at the beginning of the experiment.
Helper #_n	Range: 1-8	The number of helpers within the group during experimental treatments.
Trial #_n	1, 2	The observation block, being either 1 (associated with the first social perturbation) or 2 (associated with the second social perturbation).
Hours	-0.1, 0.1, 4, 24	The number of hours before or after the social perturbation the observation occurred, being -0.1 (immediately before the perturbation), 0.1 (immediately after the perturbation), 4 (4 hours after the perturbation) or 24 (24 hours after the perturbation).
Agg_direct	Continuous integer	Aggressive acts by the focal fish toward another subject, including both other fish in the social group and its own reflection. Was not used in the calculation of Dominance Index.
Agg_direct_nomirror	Continuous integer	Aggressive acts by the focal fish toward another fish. Excludes aggressive acts toward reflections. Was used in the calculation of Dominance Index.
Social_direct	Continuous integer	Affiliative acts performed by the focal fish to another fish.
Sub_direct	Continuous integer	Submissive acts by the focal fish toward another subject, including both other fish and reflections.
Agg_rec	Continuous integer	Aggressive acts received by the focal fish from another fish.
Social_rec	Continuous integer	Affiliative acts received by the focal fish from another fish.
Sub_rec	Continuous integer	Submissive acts received by the focal fish from another fish.
Self_Maintenance	Continuous integer	Personal maintenance behaviors performed by the fish, including the initiation of swimming, remaining still, yawning etc. Not used in any of the analysis.
Territorial Maintenance_n	Continuous integer	Behaviors performed by the focal fish in the maintenance of the group's territory.
Still Duration (s)	Continuous	The duration of time (in seconds) that the focal fish was still (no active locomotion). Does not include time when the fish was not visible to the observer. Was not recorded for helpers.

Swim Duration (s)	Continuous	The duration of time (in seconds) that the focal fish was actively swimming. Does not include time when the fish was not visible to the observer. Was not recorded for helpers.
Activity	Continuous	Calculated by dividing the total time the focal fish was observed swimming in an observation over the total time the fish was observed swimming or still: Swim Duration / (Swim Duration + Still Duration) Not relevant for helpers.
Dominance_Index	Continuous Integer	(Sum of aggressive acts given + sum of submissive acts received) – (sum of aggressive acts received + sum of submissive acts given) (Aubin-Horth et al., 2007) Does not include acts toward reflections.
Dominance per capita for helpers	Continuous	Only relevant for helpers. The dominance index divided by the number of helpers in the group.
Co-op per capita for helpers		Only relevant for helpers. The territorial maintenance actions divided by the number of helpers in the group.
Affiliation per capita for helpers		Only relevant for helpers. The affiliation index divided by the number of helpers in the group.