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3 Reciprocal Relationships between Efficacy and Performance in Athlete Dyads: Self, Other,  
4 and Collective Constructs

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1 **Abstract**

2 This study's purpose was to evaluate the unique contributions of self-, other-, and collective  
3 constructs in the efficacy-performance reciprocal relationship for athlete dyads involving  
4 low- and high-dependence roles. Data were obtained from 74 intact cheerleading pairs on  
5 self-, other-, and collective efficacy and subjective performance evaluations for each of five  
6 successive trials. Objective assessments of dyad performances were obtained from digital  
7 recordings. Across path-models involving a single efficacy construct, similar reciprocal  
8 relationships between objective dyad performance and self-, other-, or collective efficacy  
9 were observed. In path-models comprised of multiple efficacy or performance constructs,  
10 unique efficacy contributions were observed in the prediction of objective dyad performance,  
11 and unique subjective performance contributions were observed in the prediction of efficacy  
12 beliefs. Partner effects were observed more often for athletes in the high-dependence role  
13 than for those in the low-dependence role. Findings support how self-, other-, and collective  
14 beliefs are processed by team athletes.

15

16 *Keywords:* self-efficacy, other-efficacy, collective efficacy, dyad, asymmetric dependence,  
17 objective performance

18

## **Reciprocal Relationships between Efficacy and Performance in Athlete Dyads: Self, Other, and Collective Constructs**

In theory, the best performances occur when athletes have strongly positive efficacy beliefs. For athletes performing in a team, however, evaluations of personal capabilities (i.e., self-efficacy; Bandura, 1977) can have weaker relationships to performance because personal success is partially dependent on factors such as how a teammate performs (Bandura, 1997). As such, self-efficacy theory has been extended to include beliefs about a specific teammate's capabilities (i.e., other-efficacy; Lent & Lopez, 2002) and beliefs about a team's conjoint capabilities (i.e., collective efficacy; Bandura, 1997). All three types of efficacy beliefs share commonality in their positive, moderate relationship to sport performance (Moritz, Feltz, Fahrbach, & Mack, 2000; Stajkovic, Lee, & Nyberg, 2009; Stonecypher, Blom, Johnson, Bolin, & Hilliard, 2018). Self-efficacy, other-efficacy, and collective efficacy are each a moderate predictor of performance; and, in turn, self-performance, other-performance, and collective performance are each a moderate predictor of the respective efficacy beliefs. Despite these advances from research focused on testing the efficacy and performance constructs independently, it is emphasized in efficacy theory that self-, other-, and collective constructs operate simultaneously (Bandura, 1997; Lent & Lopez, 2002). Simultaneous evaluations of the efficacy and performance constructs, as argued by Myers (2014), are a better reflection of a team athlete's actual thought processes and performance behaviors. Moreover, efficacy beliefs are subject, in part, to an athlete's level of dependence on others while performing in his or her role and should be examined in respect to the variability of dependence (Bray, Brawley, & Carron, 2002). The purpose of this study was to evaluate the unique contributions of self-, other-, and collective constructs in the efficacy-performance reciprocal relationship for athlete dyads comprised of a low- and high-dependence role.

Self-efficacy, other-efficacy, and collective efficacy have similar definitions that refer

1 to a belief in a capability to produce a given level of performance on a specific task (Bandura,  
2 1977, 1997; Lent & Lopez, 2002). The efficacy constructs differ only by whom the belief is  
3 targeted towards; self-efficacy is about personal capabilities; other-efficacy is about a specific  
4 teammate's capabilities; and collective efficacy is about a team's collective capabilities. The  
5 characterizations of the efficacy beliefs also include parallel cyclical relationships involving  
6 similar antecedents (i.e., prior performance, verbal persuasion, vicarious experience, and  
7 physiological and emotional states) and consequences (i.e., motivation, enjoyment, and  
8 performance). Several studies, perhaps unsurprisingly, show correlations among athletes'  
9 self-, other-, and collective efficacy beliefs that are positive and moderately strong in  
10 magnitude (e.g.,  $r$ 's = .63 - .76; Beauchamp & Whinton, 2005; Magyar, Feltz, & Simpson,  
11 2004). Beyond these associations, Bandura (1997) and Lent and Lopez (2002) theorize that  
12 the efficacy constructs simultaneously influence one another. Athletes may have self-efficacy  
13 beliefs because of other- and collective beliefs; other-efficacy beliefs because of self- and  
14 collective beliefs; and collective efficacy beliefs because of self- and other-beliefs (Damato,  
15 Grove, Eklund, & Cresswell, 2008; Dunlop, Beatty, & Beauchamp, 2011; Jackson,  
16 Beauchamp, & Knapp, 2007; Magyar et al., 2004). As a result of these interactions, it may be  
17 difficult for athletes performing conjointly with a teammate to isolate their self-, other-, and  
18 collective beliefs from one another. The constructs' independently established relationships  
19 with performance may potentially be redundancies of one another when they are examined  
20 simultaneously.

21 Research utilizing samples of dyad athletes have provided some evidence for unique  
22 contributions of self-, other-, and collective constructs in the efficacy-performance reciprocal  
23 relationship. Elite athlete dyad members identify the most common source of self-efficacy to  
24 be past individual achievements, but also acknowledge that other and collective abilities  
25 inform their evaluations of self-efficacy (Jackson, Knapp, & Beauchamp, 2008). Similarly,

1 these athletes report other-efficacy beliefs are mostly evaluated based on their partner's past  
2 performances, but past experiences and performances as a dyad are also considered. When  
3 other-efficacy is examined alongside self-efficacy in the prediction of dyad performance,  
4 personal and collective achievements are uniquely influenced by other-efficacy, above and  
5 beyond the unique contributions of self-efficacy (Beauchamp & Whinton, 2005; Dunlop et  
6 al., 2011). While overlap exists among the three constructs, concordant efficacy and  
7 performance **measures** are expected to have the strongest associations (Moritz et al., 2000).

8         One feature that is defining of an athlete dyad, yet has been mostly overlooked in  
9 previous research, can be found in how the implicated performance roles are related to one  
10 another (Bray, et al., 2002; Gaudreau, Fecteau, & Perreault, 2010). For some pairs, classified  
11 as dyads with *exchangeable roles*, the athletes perform in very similar roles that are equal in  
12 personal dependence on the partner (e.g., doubles tennis; Kenny, Kashy, & Cook, 2006). In  
13 contrast, dyads with *distinguishable roles* (e.g., pair skating) are comprised of two athletes  
14 performing in very distinct performance roles, with each of the roles being associated with a  
15 different level of dependence on the partner. One member of the dyad is more dependent on  
16 their partner (i.e., performs in a *high-dependence role*) than the other member (i.e., performs  
17 in a *low-dependence role*). In the current study we focused on athlete dyads with  
18 distinguishable roles because the asymmetrical dependence in these types of partnerships  
19 implicates differences in each athletes' psychological functioning, including the formation of  
20 efficacy beliefs (Katz-Navon & Erez, 2005; Snyder & Stukas, 1999).

21         Efficacy beliefs, as argued by Snyder and Stukas (1999), emerge in respect to  
22 athletes' performance roles because of the varying attentional foci implicated in the different  
23 performance roles. More specifically, athletes' performance roles are linked to interdependent  
24 functions that effectively regulate their attention during performance, and hence the person-  
25 related information available in the formation of efficacy beliefs (Bray et al., 2002). For

1 example, performing in a low-dependence role requires, relatively speaking, a minimal  
2 degree of reaction to a teammate and, as a consequence, provides an opportunity to focus  
3 attention on personal performance quality. Reacting to and/or coordinating with a teammate  
4 while performing in a high-dependence role, however, requires close attention to that  
5 teammate's behavioral cues during performance (Fiske, 1993). Habeeb, Eklund, and Coffee's  
6 (2017) examination of cheerleaders performing in their low- or high-dependence role in two-  
7 person stunt-tasks has helped clarify these links. They found that bases performing in a low-  
8 dependence role, tended to report self-, other-, and collective efficacy beliefs at a consistent  
9 level regardless of whom their partner was, while flyers, performing in a high-dependence  
10 role, tended to report self-, other-, and collective efficacy beliefs at a certain level based on  
11 their partner's abilities. This was interpreted to indicate that athletes performing in a low-  
12 dependence role (i.e., bases) and a high-dependence role (i.e., flyers) had attentional foci that  
13 were, respectively, more *self-oriented* and *other-oriented*. The self- and other-orientations of  
14 attention, each linked to a performance role, may potentially impact on the extent to which  
15 self, other, and collective constructs uniquely contribute to the efficacy-performance  
16 reciprocal relationship, but this has yet to be examined.

17 Reciprocity in the efficacy-performance relationship has often been tested using  
18 repeated-measures study designs (Heggstad & Kanfer, 2005). Feltz (1982), for example,  
19 conducted a study requiring participants to report their self-efficacy prior to each of four  
20 successive trials of a back-diving task to analyze the unique contribution of self-efficacy in  
21 the prediction of performance, and the unique contribution of performance in the prediction  
22 of self-efficacy. Researchers (Bandura, 1997; Bandura & Locke, 2003; Heggstad & Kanfer,  
23 2005; Vancouver, Thompson, & Williams, 2001), however, have strongly urged cautious  
24 interpretation of reciprocity in the efficacy-performance relationship in these types of studies  
25 because common variance explaining self-efficacy and performance will bias prediction

1 estimates (for review see Feltz, Chow, & Hepler, 2008; Heggstad & Kanfer, 2005). In  
2 response to these assertions, Feltz et al. (2008) reanalyzed data from Feltz' (1982) back-  
3 diving study to compare several statistical approaches that descriptively test for unique  
4 contributions of past performance and efficacy in the prediction of performance. Their results  
5 suggest it is most appropriate to minimize common variance amongst predictors by  
6 residualizing the efficacy and performance predictor variables. This approach, Residualized  
7 Past Performance-Residualized Self-Efficacy Modeling (RPPRSEM; Feltz et al., 2008), was  
8 then later adopted by LaForge-MacKenzie and Sullivan (2014) to examine the efficacy-to-  
9 performance and performance-to-efficacy predictive directions. The aim to minimize  
10 common variance in RPPRSEM provides a framework for examining the extent to which (a)  
11 self-, other-, and collective efficacy uniquely contribute to the prediction of performance and  
12 (b) self-, other-, and collective performance uniquely contribute to the prediction of efficacy.

13 To date, an investigation requiring both athletes in a pair to report their self-, other-,  
14 and collective efficacy beliefs and subjective performance evaluations during repeated trials  
15 of a two-person task (that is also objectively assessed) has not, to the best of our knowledge,  
16 been conducted. Such an investigation would extend previous findings involving measures  
17 from only one member of a dyad (e.g., Beauchamp & Whinton, 2005), and quantitatively  
18 substantiate extant qualitative and case-study evidence (e.g., Jackson et al., 2008;  
19 Stonecypher et al., 2018). When predicting dyad athletes' outcomes, RPPRSEM requires  
20 modification because personal outcomes are mutually influenced by oneself (i.e., *actor*  
21 *effects*) and the other member of the dyad (i.e., *partner effects*; Kenny et al., 2006). A  
22 common statistical approach used to capture actor and partner effects is termed Actor-Partner  
23 Interdependence Modelling (APIM; Kashy & Kenny, 2000; Kenny, 1996). APIM offers  
24 advantages to examining dyads because the actor and partner effects predicting both partners'  
25 outcome variables are simultaneously estimated. When employed with distinguishable dyads,

1 the size of actor and partner effects can be compared across members to determine directions  
2 of influence in the dyad (Kenny & Cook, 1999). The presence of larger partner effects for one  
3 member of the dyad is a numerical indicator of asymmetrical dependence (Kenny et al.,  
4 2006). In coach-athlete dyads, for example, larger partner effects tend to be observed for  
5 athletes' outcomes (e.g., Jackson, Grove, & Beauchamp, 2010; Stebbings, Taylor, & Spray,  
6 2016). APIM would also be useful to investigate the proposed role differences in athlete  
7 dyads with distinguishable roles by examining the magnitude of partner effects across an  
8 efficacy-performance reciprocal chain (Gaudreau et al., 2010). To afford this end, an  
9 approach grounded in Feltz' (1982) original path analysis and Feltz et al.'s (2008) re-analysis  
10 using RPPRSEM was adapted for distinguishable athlete dyads using APIM.

11 In the current study, athletes' reports of efficacy and performance were obtained  
12 across five trials of a two-person cheerleading stunt-task. To examine the reciprocal effects of  
13 the self-, other-, and collective constructs independently and simultaneously, we estimated  
14 two sets of path models. The first set of path models each utilized a single efficacy construct  
15 and objective performance; that is, three separate path models were estimated to evaluate  
16 reciprocal relationships between, respectively, self-efficacy, other-efficacy, and collective  
17 efficacy and performance. In line with previous assertions (Bandura, 1997; Lent & Lopez,  
18 2002), we hypothesized that similarities in direction, and magnitude of the predictive  
19 pathways would be observed across the three separate models (H1). The second set of path  
20 models utilized multiple efficacy (self-, other-, and collective) or performance (objective,  
21 subjective) constructs simultaneously to examine potential unique effects in the efficacy-to-  
22 performance and performance-to-efficacy predictive directions. In the efficacy-to-  
23 performance models we hypothesized that, when controlling for past objective dyad  
24 performance, self-, other-, and collective efficacy would contribute uniquely to the prediction  
25 of objective dyad performance (H2). In the performance-to-efficacy models, we utilized a



1 measure of subjective performance to obtain evaluations from each dyad member's  
2 assessment of his/her performance suitable for examining potential partner effects (n.b.,  
3 objective dyad performance assessment affords only a single value for a pair's performance).  
4 In the performance-to-efficacy models, we expected the subjective assessments of self-,  
5 other-, and collective performance to contribute uniquely to the prediction of, respectively,  
6 self-, other-, and collective efficacy. Beyond these expectations, we hypothesized that, when  
7 controlling for both partners' past efficacy beliefs, subjective assessments of (a) other- and  
8 collective performance, (b) self- and collective performance, and (c) self- and other-  
9 performance would contribute uniquely to the prediction of, respectively, self-efficacy, other-  
10 efficacy, and collective efficacy (H3). Finally, in the models comprised of multiple  
11 performance constructs, we hypothesized that partner effects would contribute uniquely to the  
12 prediction of self-, other-, and collective efficacy beliefs, above and beyond any actor effects,  
13 for athletes performing in the high-dependence role (H4).

## 14 **Method**

### 15 **Participants**

16 Seventy-four male-female pairs from National Collegiate Athletic Association  
17 Division I ( $n = 6$ ) or II ( $n = 1$ ) cheerleading teams participated in the study. Teams were  
18 located within the northeast ( $n = 2$ ), southeast ( $n = 4$ ), and midwest ( $n = 1$ ) regions of the  
19 United States. Participants were from 18 – 27 years of age ( $M_{\text{males}} = 21.0$ ,  $SD = 2.14$ ;  $M_{\text{females}}$   
20  $= 19.3$ ,  $SD = 1.65$ ). In accordance with the American Association of Cheerleading Coaches  
21 and Administrators (AACCA, 2015), two-person stunt-tasks require one *base* (i.e., the partner  
22 in direct contact with the performing surface while supporting the other dyad member's  
23 weight overhead) and one *flyer* (i.e., the partner being supported and/or tossed into the air by  
24 the other dyad member). In this study, males always performed in the base role (i.e., the low-  
25 dependence role) and females always performed in the flyer role (i.e., the high-dependence

1 role). Flyers in this study averaged more general cheerleading experience than bases ( $M_{\text{flyers}} =$   
2 8.8 years,  $SD = 4.13$ ;  $M_{\text{bases}} = 5.2$  years,  $SD = 3.59$ ), but experience in co-ed cheerleading was  
3 comparable across roles ( $M_{\text{flyers}} = 2.9$  years,  $SD = 1.82$ ;  $M_{\text{bases}} = 3.6$  years,  $SD = 2.27$ ).  
4 Participants were starting their first ( $n = 63$ ; 43.8%), second ( $n = 31$ ; 21.5%), third ( $n = 33$ ;  
5 22.6%), fourth ( $n = 14$ ; 9.7%), or fifth ( $n = 3$ ; 2.1%) year with their respective teams. Dyad  
6 members, on average, had been assigned together for two and a half months ( $SD = 2.91$ ) and  
7 trained together for six hours per week ( $SD = 4.53$ ). Flyers trained 4.5 hours ( $SD = 4.77$ ) and  
8 bases trained 2.5 hours ( $SD = 4.64$ ) per week with others.

### 9 **Procedures**

10 After obtaining approval from the Human Subjects Committee at [REDACTED]  
11 [REDACTED], information sheets were emailed to university coaches at addresses gathered from  
12 respective team websites. Ten coaches responded to the invitation, and seven agreed to their  
13 athletes being involved in data acquisition during a regularly scheduled practice at the  
14 beginning of the sport season. After participants completed informed consent, each pair  
15 selected a moderately challenging stunt-task to perform for five trials in front of a video  
16 camera. The participants received a questionnaire packet on: (a) efficacy beliefs to be  
17 completed immediately before each stunt-task performance, and (b) subjective performance  
18 to be completed immediately after each stunt-task performance. Participants were asked to  
19 refrain from any verbal and nonverbal communication except for during communication  
20 periods allocated between each performance trial. Communication periods were necessary for  
21 partners to discuss a safe strategy for the next performance and to avoid unnecessary risk of  
22 injury. Efficacy measures obtained after the communication periods were employed within  
23 analyses.<sup>1</sup> Finally, participants provided their age, experience, and a post-performance  
24 subjective assessment of the stunt-task challenge level. Objective dyad performance, using  
25 video images of a front-view angle of each team of dyads, was assessed post-data collection.

## 1 **Stunt-Task**

2           The two-person cheerleading stunt-tasks employed in this study required one base and  
3 one flyer, and involved the base lifting and supporting the flyer's weight in an overhead  
4 position. The stunt-tasks were standardized in difficulty across each dyads' level of ability at  
5 the time the study was conducted. Variations in difficulty of the overhead position, entrance,  
6 and dismount were self-selected by each dyad to make the stunt-task moderately challenging.  
7 "Moderately challenging" was defined for the participants as being "any skill successfully  
8 performed about 50% of the time, at this moment in time." Successful performance in this  
9 sport is regarded as a faultless execution of the stunt-task and not simply an effortful attempt  
10 (Habeeb & Eklund, 2016). The selected stunt-tasks ranged across four levels of objective  
11 skill difficulty in line with the National Cheerleading Association's (2013) scoring guidelines.  
12 Lower range intermediate stunt-tasks, ( $n = 23$  dyads; 31%) included any non-spinning or non-  
13 flipping skill, and the upper range intermediate stunt-tasks ( $n = 26$  dyads; 35%) included any  
14 skill requiring a 360-degree vertical spin. Advanced stunt-tasks ( $n = 16$  dyads; 22%) included  
15 an inverted position at any point in the skill including 360-degree flips. Elite stunt-tasks ( $n =$   
16  $9$  dyads; 12%), the most difficult category, included either a 720-degree spin or simultaneous  
17 spin-inversion combination. The selected stunt-tasks were rated, on average, as moderately  
18 challenging ( $M_{\text{flyers}} = 5.1$ ,  $SD = 2.85$ ;  $M_{\text{bases}} = 5.2$ ,  $SD = 2.42$ ) after completion of the five  
19 trials on a scale ranging from 0 (*not a challenge at all*) to 10 (*a complete challenge*).

## 20 **Measures**

21           Participants reported their self-, other-, and collective efficacy beliefs and subjective  
22 performance evaluations for each performance trial. Single-item measures were implemented  
23 in line with previous research (e.g., Bruton, Mellalieu, & Shearer, 2016; Habeeb et al., 2017;  
24 LaForge-MacKenzie & Sullivan, 2014). Data derived from single-item efficacy measures  
25 have demonstrated evidence for validity and reliability in measuring athletes' efficacy beliefs

1 (Bruton et al., 2016). The presentation order of the items within each questionnaire was  
2 randomized across participants and performance trials to manage potential order effects in  
3 participant responses.

4 **Efficacy beliefs.** Participants' self-, other-, and collective efficacy beliefs were  
5 assessed using three target-specific, single-item measures. Participants were asked to respond  
6 to the questions, "To what extent are you confident in [YOUR/ your PARTNER's / YOU  
7 AND YOUR PARTNER's collective] ability to perform the skill?" Each item was anchored  
8 at 0 (*not at all confident*), 5 (*moderately confident*), and 10 (*completely confident*).

9 **Subjective performance.** Participants subjectively rated self, other, and collective  
10 performances in a similar format to the efficacy items. Participants were asked to respond to  
11 the questions, "To what extent was [YOUR/ your PARTNER's / YOU AND YOUR  
12 PARTNER's collective] performance of the skill successful?" Each item was anchored at 0  
13 (*not at all successful*), 5 (*moderately successful*), and 10 (*completely successful*).

14 **Objective dyad performance.** Standardized behavioral assessments to obtain  
15 objective assessments of dyad performances were employed as described by Habeeb and  
16 Eklund (2016). The protocol involves assessing a dyad's quality of performance in  
17 accordance to gradations of errors as defined by the National Cheerleading Association  
18 (2013). The five-point Likert-type scale represents performance qualities with *no errors* (0),  
19 *minor errors* (-.5), *major errors* (-1), *complete errors* (-1.5), and *multiple errors* (-2).  
20 Accordingly, the lowest possible score (i.e., -2) indicated poor execution and the highest  
21 possible score (i.e., 0) indicated a faultless execution of the stunt-task. All stunt-task  
22 performances ( $n = 296$ ) were assessed by the first author and these scores were used in  
23 subsequent analyses. A second independent rater, trained on the evaluation protocol, assessed  
24 a sample of 100 stunt-task performances (i.e., 34% of the total number of performances) to  
25 evaluate performance assessment objectivity.<sup>2</sup> A high level of objectivity across raters was

1 observed in the independently rated sample of performance evaluations as indicated by the  
2 absolute agreement intraclass correlation coefficient of .91.

### 3 **Analyses**

4 Mean and standard deviation values were calculated for all variables across Trials 1  
5 through 5. Preliminary analyses were subsequently conducted within SPSS version 21.0 to  
6 determine if the data met statistical criteria indicating a dyadic, or nonindependent, data  
7 structure (Kenny et al., 2006). Dyad modelling approaches were deemed appropriate because  
8 Pearson product-moment correlations between partners' self-, other-, and collective efficacy  
9 beliefs ( $r = .34 - .68, p < .001$ ) and subjective performances ( $r = .32 - .74, p < .001$ )  
10 indicated the existence of nonindependence within the data (Kenny et al., 2006).

11 **Models comprised of a single efficacy construct.** Three models (i.e., self-efficacy,  
12 other-efficacy, and collective efficacy) were estimated to examine the efficacy-performance  
13 reciprocal relationship across the five performance trials. Predictive pathways between each  
14 partners' efficacy beliefs and objective dyad performances were modelled starting with  
15 efficacy on Trial 1 and ending with performance on Trial 5. The five trials rendered four  
16 performance waves (e.g., Performance 1 to Performance 2 is one wave) and four efficacy  
17 waves (e.g., Efficacy 1 to Efficacy 2 is one wave). In line with APIM modelling, the first pair  
18 of variables (i.e., Flyer Efficacy 1 and Base Efficacy 1), and the errors for subsequent pairs of  
19 efficacy variables were allowed to correlate to control for nonindependence in the partners'  
20 scores (Kenny et al., 2006; Ledermann, Macho, & Kenny, 2011). All variables were  
21 standardized using the sample grand mean and standard deviation values so that standardized  
22 pathway coefficients were interpretable across the base and flyer performance roles (Kenny et  
23 al., 2006). Some kurtosis was present in the distributions of the efficacy and performance  
24 values (range -1.25 – 5.94), so these path models were estimated using the robust maximum  
25 likelihood method within Mplus version 7.0. Evaluation of fit of the model to the data was

1 assessed using Chi-square ( $\chi^2$ ), comparative fit index (CFI; a relative measure of fit), and  
2 standardized root mean square residual (SRMR; an absolute measure of fit). A two-  
3 presentation index strategy (Hu & Bentler, 1999) was selected based on previous sport  
4 research utilizing distinguishable dyads (e.g., Stebbings et al., 2016). CFI values between .95  
5 and 1.0 indicate an excellent model fit and values below .90 indicate poor fit, while SRMR  
6 values of .08 or less indicate good model fit (Hu & Bentler, 1999; Kenny et al., 2006).

7 **Models comprised of multiple efficacy or performance constructs.** We adopted a  
8 multi-construct RPPRSEM approach (Feltz et al., 2008) in conjunction with APIM (Kenny et  
9 al., 2006) for distinguishable dyads to examine unique contributions of: (a) self-, other-, and  
10 collective efficacy to the prediction of objective dyad performance and (b) subjective self-,  
11 other-, and collective performance to the prediction of self-efficacy, other-efficacy, and  
12 collective efficacy. The series of steps (within SPSS version 21.0) to attain residual scores  
13 used in these models slightly differed for each direction of prediction being examined. Details  
14 of the calculations are described subsequently. As before, the robust maximum likelihood  
15 estimator within Mplus version 7.0 was employed in estimating these models. These models  
16 were fully saturated so their fits to the data could not be evaluated (Kenny et al., 2006).

17 ***Efficacy-to-performance.*** A series of models were estimated to examine the unique  
18 contribution of self-efficacy (SE), other-efficacy (OE), and collective efficacy (CE) from  
19 both partners to the prediction of objective dyad performance, while controlling for past  
20 objective dyad performance. To attain residual scores employed in these models, first,  
21 Objective Dyad Performance 1 was regressed on the preceding measures of Self-, Other-, and  
22 Collective Efficacy 1 from both partners (i.e., Flyer SE 1, Base SE 1, Flyer OE 1, Base OE 1,  
23 Flyer CE 1, and Base CE 1) and the residual was saved. Second, the saved residual (i.e.,  
24 Residual Objective Dyad Performance 1) was used to calculate residuals associated with the  
25 subsequently measured efficacy beliefs. Each efficacy belief was separately regressed on

1 Residual Performance 1, to remove the effect of Performance 1 from each efficacy in Trial 2.  
2 The residuals (i.e., Residual Flyer SE 2, Residual Base SE 2, Residual Flyer OE 2, Residual  
3 Base OE 2, Residual Flyer CE 2, and Residual Base CE 2) were then saved. To estimate the  
4 model, the seven residual variables were entered as predictors of Performance 2 (a non-  
5 residualized score). This process was repeated for the remaining trials rendering four separate  
6 models representing four performance waves.

7 ***Performance-to-efficacy.*** Three series of models were estimated to examine the  
8 unique contribution of subjective assessments of self-, other-, and collective performance  
9 from both partners on (self-, other-, or collective) efficacy, while controlling for past (self-,  
10 other-, or collective) efficacy. Performance variables in these analyses were subjective so that  
11 each partner's perceptions could be modelled, and partner effects could be examined (i.e.,  
12 objective dyad performance has only a single value for both members and does not allow for  
13 partner effects to be evaluated). To attain residual scores, first, Flyer and Base (Self-, Other-,  
14 or Collective) Efficacy 3 were regressed on Flyer and Base Self-, Other-, and Collective  
15 Performance 2, and the Residual Flyer and Base Efficacy 3 scores were saved. Second, Flyer  
16 and Base Self-, Other-, and Collective Performance 3 scores were regressed on the Residual  
17 Efficacy 3 scores. To estimate the model, the eight residual variables were then entered as  
18 predictors of Efficacy 3 (a non-residualized score). This process was repeated for the  
19 remaining trials rendering nine separate models representing three efficacy waves (i.e.,  
20 Efficacy 2 to 3, Efficacy 3 to 4, and Efficacy 4 to 5) for each of the three efficacy constructs.

## 21 **Results**

22 A trivial percent (.002%) of data was recorded as missing. Descriptive statistics for all  
23 variables are presented in Table 1. Participants provided responses that were across the  
24 possible scale range, with average responses to efficacy ( $M_{\text{flyers}} = 7.15 - 8.23$ ,  $SD_{\text{flyers}} = 1.82$   
25  $- 2.58$ ;  $M_{\text{bases}} = 7.55 - 8.76$ ,  $SD_{\text{bases}} = 1.72 - 2.43$ ) and subjective performance ( $M_{\text{flyers}} = 6.41$

1 – 7.74,  $SD_{\text{flyers}} = 2.47 - 3.42$ ;  $M_{\text{bases}} = 6.53 - 8.20$ ,  $SD_{\text{bases}} = 2.35 - 3.51$ ) being in the upper  
2 end of the scale. The skewness of efficacy and performance scores (range -1.91 – 0.71) was  
3 insufficient to warrant any transformations (Kline, 2011). The stunt-tasks were, on average,  
4 moderately challenging to participants as indicated by the average objective dyad  
5 performance score in each trial remaining consistently near the middle of the possible scale  
6 range. Visual inspection of these performance scores across trials did not indicate an upward  
7 or downward performance trend across the five successive trials.<sup>3</sup>

### 8 **Models Comprised of a Single Efficacy Construct**

9 Three single-efficacy construct (i.e., self-efficacy, other-efficacy, and collective  
10 efficacy) models were estimated to examine efficacy-performance reciprocal effects across  
11 the five performance trials. The observed fit of data to the self-efficacy model was  $\chi^2(62) =$   
12  $96.57$ ,  $p = .003$ ; CFI = .96; SRMR = .08, to the other-efficacy model was  $\chi^2(62) = 166.13$ ,  $p$   
13  $< .001$ ; CFI = .86; SRMR = .08, and to the collective efficacy model was  $\chi^2(62) = 121.25$ ,  $p$   
14  $< .001$ ; CFI = .92; SRMR = .08. The observed pathways of interest are reported in Figure 1.<sup>4</sup>  
15 We note that the CFI for the other-efficacy model did not meet the provided cut-off value  
16 indicating good model fit, so caution is warranted in interpreting those pathway coefficients.

17 As hypothesized (H1), similarities can be observed across the three path models. First,  
18 past efficacy beliefs tended to have a moderate-to-large effect on efficacy beliefs, regardless  
19 of role or efficacy type ( $\beta = .42 - .87$ ,  $p < .001$ ). Second, past objective dyad performance  
20 tended to have a small-to-moderate effect on objective dyad performance ( $\beta = .23 - .45$ ,  $p \leq$   
21  $.001 - .070$ ), except for the effect of Performance 3 on Performance 4 in the other- and  
22 collective efficacy models. Finally, objective dyad performance tended to have a small-to-  
23 moderate effect on efficacy beliefs for flyers ( $\beta = .24 - .46$ ,  $p < .001$ ) and bases ( $\beta = .15 -$   
24  $.34$ ,  $p \leq .001 - .037$ ).

25 The similarities in magnitude and direction of the efficacy-to-performance effects



1 across the three path models differed by athlete role. These effects within the other- and  
2 collective efficacy models were similar for the flyers, whereas these effects within the self-  
3 and collective efficacy models were similar for the bases. It can be observed in the effects of  
4 Efficacy 3 on Performance 3, for example, that the effects of flyers' other-efficacy ( $\beta = .00$ )  
5 and collective efficacy beliefs ( $\beta = .08$ ) were more similar compared to flyers' self-efficacy  
6 beliefs ( $\beta = .26$ ). In contrast, the effects of bases' self-efficacy ( $\beta = -.10$ ) and collective  
7 efficacy beliefs ( $\beta = -.02$ ) were more similar compared to bases' other-efficacy beliefs ( $\beta =$   
8  $.20$ ). The expected theoretical relationships emerged most clearly when past performance was  
9 the poorest predictor of performance, as in the instance of Performance 3 to Performance 4.  
10 In this performance wave, flyers' other-efficacy beliefs ( $\beta = .27$ ) and bases' self-efficacy  
11 beliefs ( $\beta = .29$ ) were positive, small predictors of performance. Both partners' collective  
12 efficacy beliefs ( $\beta_{base} = .21$ ;  $\beta_{flyer} = .15$ ) were positive, small predictors of performance,  
13 although only bases' collective efficacy reached statistical significance.

14       Upon inspection of the path models, it is evident that self-efficacy, other-efficacy, and  
15 collective efficacy explain a similar amount of variance in objective dyad performance across  
16 the models. The variance explained in Performance 2, for example, is 19%, 24%, and 24%  
17 for, respectively, self-, other-, and collective efficacy. Although differences in the magnitude  
18 of the pathway coefficients occur in some places, it is impossible to know in these analyses  
19 whether or not the explained variance in performance is unique to each efficacy belief.

## 20 **Models Comprised of Multiple Efficacy or Performance Constructs**

21       **Efficacy-to-performance.** Across all waves, a significant proportion of variance in  
22 objective dyad performance was accounted for by past objective dyad performance and both  
23 partners' self-, other-, and collective efficacy beliefs ( $R^2 = .20 - .38$ ). Pathway coefficients  
24 are reported in Figure 2. As expected, past objective dyad performance contributed uniquely  
25 to the prediction of objective dyad performance in all four waves ( $\beta = .27 - .58$ ,  $p \leq .001 -$

1 .033). For the hypothesized pathways (H2), a different pattern of unique contribution from  
2 self-, other-, and collective efficacy to the prediction of objective dyad performance resulted  
3 across the four waves. In Wave 1, only flyer self-efficacy ( $\beta = -.31, p = .011$ ) contributed  
4 uniquely to the prediction of objective dyad performance, and it was in the unexpected  
5 direction. In Wave 2, both base other-efficacy ( $\beta = .43, p = .005$ ) and flyer self-efficacy ( $\beta =$   
6  $.26, p = .048$ ) contributed uniquely to the prediction of objective dyad performance. In Wave  
7 3, only base collective efficacy ( $\beta = .39, p = .030$ ) contributed uniquely to the prediction of  
8 objective dyad performance, while in Wave 4, only flyer collective efficacy ( $\beta = .56, p =$   
9  $.020$ ) contributed uniquely to the prediction of objective dyad performance.

10 **Subjective performance-to-self-efficacy.** Across all waves, a significant proportion  
11 of variance in flyers' and bases' self-efficacy was accounted for by both partners' past self-  
12 efficacy and self-, other-, and collective subjective performances ( $R^2 = .63 - .78$ ). Pathway  
13 coefficients are reported in Table 2. Past self-performance contributed uniquely to the  
14 prediction of one's own self-efficacy in two of the three waves for the flyers ( $\beta = .52 - .67, p$   
15  $\leq .001 - .009$ ) and bases ( $\beta = .46 - .78, p < .001$ ). For the hypothesized pathways (H3), a  
16 general trend involved athletes' perceptions of other- and collective performance contributing  
17 uniquely to the prediction of self-efficacy. Hypothesized role differences (H4) were observed  
18 in predicting Efficacy 3 (see upper-left panel of Table 2). Only partner effects contributed  
19 uniquely to the prediction of flyers' self-efficacy beliefs; bases' other-performance ( $\beta = .21, p$   
20  $= .009$ ) and bases' collective performance ( $\beta = -.41, p = .049$ ). In contrast, a mixture of actor  
21 and partner effects contributed uniquely to the prediction of bases' self-efficacy beliefs;  
22 bases' other-performance ( $\beta = .39, p = .004$ ), bases' collective performance ( $\beta = -.76, p <$   
23  $.001$ ), and flyers' other-performance ( $\beta = .66, p = .004$ ).

24 **Subjective performance-to-other-efficacy.** Across all waves, a significant  
25 proportion of variance in flyers' and bases' other-efficacy was accounted for by both

1 partners' past other-efficacy and self-, other-, and collective subjective performances ( $R^2 =$   
2  $.67 - .73$ ). Pathway coefficients are reported in Table 2. Past other-performance contributed  
3 uniquely to the prediction of one's own other-efficacy in two waves for the flyers ( $\beta = .74 -$   
4  $.84, p < .001$ ) and all three waves for the bases ( $\beta = .53 - .63, p < .001$ ). For the hypothesized  
5 pathways (H3), a general trend involved athletes' perceptions of self- and collective  
6 performance contributing uniquely to the prediction of other-efficacy. Hypothesized role  
7 differences (H4) were observed in predicting Efficacy 3 (see upper-middle panel of Table 2).  
8 Only partner effects contributed uniquely to the prediction of flyers' other-efficacy beliefs;  
9 bases' other-efficacy ( $\beta = .15, p = .043$ ), bases' other-performance ( $\beta = .28, p = .006$ ), and  
10 bases' collective performance ( $\beta = -.56, p = .007$ ). In contrast, only an actor effect contributed  
11 uniquely to the prediction of bases' other-efficacy beliefs; bases' collective performance ( $\beta =$   
12  $-.48, p = .025$ ).

13 **Subjective performance-to-collective efficacy.** Across all waves, a significant  
14 proportion of variance in flyers' and bases' collective efficacy was accounted for by both  
15 partners' past collective efficacy and self-, other-, and collective subjective performances ( $R^2$   
16  $= .63 - .76$ ). Pathway coefficients are reported in Table 2. Past collective performance  
17 contributed uniquely to the prediction of one's own collective efficacy in one wave for the  
18 flyers ( $\beta = .36, p = .032$ ) and three waves for the bases ( $\beta = -.53 - 1.14, p = .008 - .034$ ). For  
19 the hypothesized pathways (H3), a general trend involved athletes' perceptions of self- and  
20 other-performance contributing uniquely to the prediction of collective efficacy.  
21 Hypothesized role differences (H4) were observed in predicting Efficacy 3 (see upper-right  
22 panel of Table 2). A mixture of actor and partner effects contributed uniquely to the  
23 prediction of flyers' collective efficacy beliefs; flyers' other-performance ( $\beta = .73, p < .001$ ),  
24 bases' other-performance ( $\beta = .36, p = .001$ ), and bases' collective performance ( $\beta = -.56, p =$   
25  $.013$ ). In contrast, only actor effects contributed uniquely to the prediction of bases' collective

1 efficacy beliefs; bases' self-performance ( $\beta = .72, p = .001$ ) and bases' other-performance ( $\beta$   
2  $= .48, p < .001$ ).

### 3 **Discussion**

4 The purpose of this study was to evaluate the unique contributions of self-, other-, and  
5 collective constructs in the efficacy-performance reciprocal relationship for athlete dyads  
6 involving low- and high-dependence roles. Reciprocal relationships between objective dyad  
7 performance and self-, other-, or collective efficacy were observed in the models comprised  
8 of a single efficacy construct demonstrating some similarities across the three efficacy  
9 constructs. When the efficacy or performance constructs were examined together, the  
10 findings were generally supportive of the hypotheses. First, unique efficacy contributions  
11 were observed in the prediction of objective dyad performance, beyond the common variance  
12 among the efficacy constructs. Second, unique subjective performance contributions were  
13 observed in the prediction of efficacy beliefs. Third, the presence of partner effects differed  
14 by athlete role. Overall, the findings support **the presence of** shared and unique predictive  
15 contributions of self-, other-, and collective constructs in the efficacy-performance reciprocal  
16 relationship.

17 Bandura (1997) and Lent and Lopez (2002) have emphasized in their theorizing that  
18 the many forms of efficacy operate simultaneously. In the current study, a different efficacy  
19 **belief** contributed uniquely to the prediction of objective dyad performance across each of the  
20 four waves in the multi-efficacy construct models. While the results do not support that one  
21 efficacy belief is consistently the strongest predictor of performance, this study demonstrates  
22 paired performance is improved when members have positive beliefs about self, other, and  
23 collective abilities because, at any given point, each belief may play a unique role in  
24 predicting how the pair will perform. In these dyads, for example, a previously poor  
25 performance by the flyer may have implications for beliefs about the flyer (i.e., base other-

1 efficacy) and perhaps strengthen its uniqueness as a predictor of the pair's future performance  
2 together. The findings, in conjunction with previous evidence (Damato et al., 2008; Magyar  
3 et al., 2004), helps support that beliefs about personal and specific teammates' abilities are  
4 important beliefs that uniquely predict group performance.

5         Contrary to Bandura's (1977, 1997) theorizing, negative efficacy-performance and  
6 performance-efficacy relationships have been previously observed in repeated-measures  
7 designs like the one employed in the current study (e.g., Vancouver et al., 2001). Bandura  
8 and Locke (2003) argue that negative or nonsignificant relationships emerge in these studies  
9 because performance stabilizes, vitiating the need for performers to reevaluate their efficacy  
10 beliefs. In the current study, however, performance did not stabilize, nor increase or decrease  
11 linearly across trials either. An alternative explanation, from Vancouver and colleagues  
12 (2001), suggests that negative efficacy-performance relationships arise when personal  
13 performance approaches a desired level of achievement and effort is diminished, even while  
14 performance-efficacy relationships remain, nonetheless, positive. Feelings of complacency  
15 that result in diminished effort, may help explain why negative relationships were observed in  
16 the current study. However, negative relationships were only observed when the self-, other-,  
17 and collective constructs were examined simultaneously. Moreover, in contrast to Bandura's  
18 (1977, 1997) and Vancouver et al.'s (2001) assertions, negative relationships were observed  
19 in both efficacy-to-performance and performance-to-efficacy predictive directions. It seems  
20 plausible that the observed negative relationships may be statistical artifacts resulting from  
21 the similarities amongst the constructs examined in this study. This is corroborated by all the  
22 bivariate correlations being positive. Extant literature focused on unique effects between  
23 either self- and collective-efficacy (e.g., Katz-Navon & Erez, 2005) or self- and other-  
24 efficacy (e.g., Beauchamp & Whinton, 2005) demonstrates efficacy beliefs remain a positive,  
25 unique predictor of performance as argued in theory. Taken together, a stronger examination

1 of the varying explanations (e.g., Vancouver et al., 2001; Bandura & Locke, 2003) of  
2 negative efficacy-performance relationships is clearly warranted in dyadic instances of  
3 performance.

4         The main rationale for this study was the need to evaluate *partner* influences within  
5 efficacy-performance relationships for athlete dyads (Kenny & Cook, 1999). In line with Lent  
6 and Lopez' (2002) dependence hypothesis, the direction of dependence proposed in the  
7 current study's sample of cheerleading dyads was supported by the increased presence of  
8 partner effects for the high-dependence role (i.e., flyer) compared to the low-dependence role  
9 (i.e., base). The observation of partner effects support Jackson et al.'s (2008) qualitative  
10 evidence for factors related to the partner being perceived by athletes as a source of  
11 information to evaluate self- and other-efficacy. This provides evidence, in line with Jackson  
12 et al. (2010) that asymmetric dependence predisposes those in a low-dependence role to be  
13 more self-oriented and those in a high-dependence role to be more other-oriented. The current  
14 study extends Habeeb et al. (2017) by providing evidence that role moderates predictive  
15 relationships between efficacy and performance. Overall, it seems clear that partner effects  
16 are important to investigate, even when only interested in actor effects within group contexts.  
17 The findings have an important implication in the pursuit of a more integrated theory of  
18 efficacy beliefs for team athletes; athlete role, at least in part, is a determinant of the efficacy-  
19 performance relationship.

20         Findings from this study can be applied in sport and performance group contexts in  
21 which self-efficacy is not easily malleable. First, when factors beyond personal control are  
22 partially responsible for successful performance, beliefs about others have important  
23 implications for personal and interpersonal outcomes (Bandura, 1997; Damato et al., 2008).  
24 Therefore, in instances that insufficient time or resources limit the opportunity to foster  
25 personal mastery experiences, a focus on improving beliefs about a specific teammate or the

1 team overall may be useful for practitioners. The findings from previous research and the  
2 current study suggest this approach is likely to be most useful for athletes highly dependent  
3 on others (Habeeb et al., 2017; Jackson et al., 2010). Based on Lent and Lopez' (2002)  
4 tripartite efficacy model, practitioners may also consider the wider network of efficacy  
5 beliefs. More specifically, the members of these cheerleading dyads will likely estimate what  
6 their partner thinks about their own abilities. This estimated belief, also known as relation-  
7 inferred self-efficacy, has been found to support self-efficacy beliefs regardless of what a  
8 partner may actually think about oneself (Jackson et al., 2010). Second, while ignoring  
9 certain teammates' abilities altogether is likely to cause other team-related issues, coach  
10 performance feedback tailored to athletes' orientations of attention may enhance the other  
11 sources of efficacy beliefs including verbal persuasion and third-party feedback (Bandura,  
12 1997; Lent & Lopez, 2002).

13         There are some limitations to the current study. First, the performance roles inherently  
14 implicated athlete gender which was not controlled for in this investigation. Support for a  
15 gender explanation for differences in athletes' cognitive-performance relationships, however,  
16 has not been previously observed in both athlete-athlete and coach-athlete dyads (e.g.,  
17 Jackson, et al., 2010). Further, no differences in confidence were observed by Clifton and  
18 Gill (1994) between females and males in the performance of partner-stunts such as those  
19 employed in this study. Second, the selection of a more novel performance task, as occurred  
20 in Feltz (1982) original path-analytic investigation, might have minimized the extent to which  
21 sources of efficacy information from mastery experiences prior to the study had an impact on  
22 athletes' efficacy beliefs while participating in the current study. Future studies involving less  
23 previous knowledge of the task among participants may provide clearer partitioning of unique  
24 information relative to self, other and collective abilities. Nonetheless, the stunt-tasks were  
25 purposefully selected to avoid floor and ceiling effects while also reducing the likelihood of

1 participant injury. Despite limitations related to experience with the task, this study included  
2 a sample of intact dyads performing several trials of a task requiring dependence on a  
3 teammate, providing both measurement and theoretical extensions of previous dyad studies.

4 Future research focused on a more explicit test of the proposed relationship between  
5 athlete role, orientation of attention, and the formation of efficacy beliefs would be a valuable  
6 contribution to this area of research. Although attention provides a useful framework to  
7 explain why role differences may occur, our knowledge of the extent athlete role contributes  
8 to efficacy theory is limited until we directly monitor attention in these types of studies.  
9 Additionally, the manipulations of the athletes' level of dependence on one another through  
10 use of exchangeable dyads for comparison would provide stronger evidence for the tenability  
11 of the dependence hypothesis to explain functioning in all dyad types (Lent & Lopez, 2002).  
12 Finally, this study's focus on two-person teams provides a basis for examining efficacy  
13 beliefs in larger-sized teams. Future studies focused on the interactive network of efficacy  
14 beliefs and role-related orientations of attention of athletes in larger-sized teams can utilize  
15 analyses such as the group APIM (Kenny & Garcia, 2012) and the Social Relations Model  
16 (Kenny & La Voie, 1984).

17 In conclusion, although there is shared variance among the constructs, self-, other-,  
18 and collective efficacy and subjective performance provide unique contribution in the  
19 efficacy-performance reciprocal relationship. Further, some athletes' beliefs are influenced  
20 by a partner/teammate more than others, indicating the importance of including individual  
21 differences in the integration of self, other, and collective efficacy theory for team athletes.

22



## Endnotes

<sup>1</sup> Extant literature suggests that communication is an antecedent and consequence of the efficacy beliefs (e.g., Jackson et al., 2008). Although, in the current study, we could not control for communication across dyads, participants' self-reported efficacy beliefs were obtained prior to and subsequently after each communication period to allow for descriptive analyses of any potential changes in efficacy related to communication. Reported self-, other-, and collective efficacy during pre- and post-communication were examined using three 2 x 2 x 4 mixed model RM-ANOVAs to examine role (flyer, base) by communication (pre-, post-) by trial (Trials 2-5) interactions. Regardless of one's role, both self- and collective efficacy increased from pre- to post-communication ( $\eta_p^2 = .14 - .20, p < .001$ ), with the absolute levels of efficacy for both roles slightly varying across trials ( $\eta_p^2 = .03 - .05, p \leq .001 - .02$ ). In contrast, bases' other-efficacy was significantly higher than flyers' other-efficacy across all trials as indicated by the moderately-small main effect for role ( $\eta_p^2 = .05, p < .01$ ). Further, a significant two-way interaction effect indicated that other-efficacy increased from pre- to post-communication, but the change in other-efficacy slightly varied across trials ( $\eta_p^2 = .02, p < .05$ ). Given the evidence for efficacy to increase after communication, self-, other-, and collective efficacy measures obtained after the communication periods (i.e., closest in time to the next performance) were used within subsequent analyses.

<sup>2</sup> The second rater's training occurred over two sessions using videos of similar stunt-task performances from an earlier study (i.e., [REDACTED]). The first training session involved performance assessments of 36 dyads with concurrent feedback and discussion with the first author. The second training session involved assessment of 72 dyads for independent practice regarding the evaluation protocol. Based on the ICC from training session 2 (i.e., .90), the second rater assessed the sample of 100 dyads within the current study.

<sup>3</sup> Reported self-, other-, and collective efficacy and performance were examined using six 2 x 4 x 4 mixed model RM-ANOVAs to examine role (base, flyer) by trial (Trials 2-5) by stunt-task difficulty (Levels 1-4) interactions. Results revealed that none of the main or interactive effects involving task-difficulty were significant for the efficacy beliefs ( $p = .175 - .995$ ) or performance ( $p = .069 - .880$ ). A 2 x 4 mixed model RM-ANOVAs conducted to examine trial (Trials 2-5) by task-difficulty (Levels 1-4) interactions was also not significant ( $p = .349 - .737$ ), providing additional support to examine all cases together.

<sup>4</sup> Error covariances between partner's self-efficacy variables were  $r = .06 - .14, p = .027 - .054$ , other-efficacy variables were  $r = -.03 - .09, p = .127 - .359$ , and collective efficacy variables were  $r = .000 - .116, p = .004 - .998$ . The correlation between the Flyer and Base Self-Efficacy 1 was  $r = .07, p = .555$ , Other-Efficacy 1 was  $r = -.03, p = .775$ , and Collective Efficacy 1 was  $r = .27, p = .033$ .

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*Table 1.* Means and Standard Deviations for Efficacy and Performance Data for the Flyer, Base, and Dyads across Performance Trials 1-5.

Variable	Performance 1		Performance 2		Performance 3		Performance 4		Performance 5	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Flyers										
Self-efficacy (pre-com.)	7.45	1.87	7.70	1.98	7.78	1.96	7.69	2.44	8.00	2.20
Other-efficacy (pre-com.)	7.12	2.13	7.23	2.06	7.58	2.15	7.54	2.58	7.80	2.39
Collective Efficacy (pre-com.)	6.76	1.91	7.15	2.04	7.51	2.16	7.47	2.44	7.64	2.48
Self-efficacy (post-com.)	-	-	7.80	2.05	8.01	1.82	7.97	2.10	8.23	1.98
Other-efficacy (post-com.)	-	-	7.61	2.09	7.78	2.20	7.81	2.32	8.01	2.23
Collective Efficacy (post-com.)	-	-	7.39	2.00	7.82	1.97	7.71	2.26	7.93	2.17
Subjective Self-performance	6.50	2.66	7.34	2.47	6.73	3.30	7.74	2.68	7.43	2.66
Subjective Other-performance	6.26	2.82	7.03	2.99	6.63	3.22	7.22	3.12	7.25	2.76
Subjective Collective Performance	5.66	3.15	6.69	3.24	6.41	3.42	7.12	3.11	6.84	3.24
Bases										
Self-efficacy (pre-com.)	7.35	2.11	7.57	2.04	7.97	1.79	7.87	2.08	7.96	2.43
Other-efficacy (pre-com.)	7.71	2.44	8.10	2.07	8.58	1.84	8.39	2.17	8.47	2.17
Collective Efficacy (pre-com.)	7.21	2.02	7.55	2.01	8.10	1.91	8.04	2.10	8.15	2.31
Self-efficacy (post-com.)	-	-	7.78	1.90	8.11	1.83	8.07	2.07	8.07	2.37
Other-efficacy (post-com.)	-	-	8.55	1.73	8.76	1.72	8.68	1.90	8.73	2.10
Collective Efficacy (post-com.)	-	-	8.00	1.89	8.43	1.72	8.26	2.14	8.19	2.36
Subjective Self-performance	5.70	3.11	7.00	2.72	6.58	3.14	7.05	3.10	7.01	3.10
Subjective Other-performance	6.97	3.07	8.20	2.35	7.51	3.11	8.16	2.64	8.05	2.70
Subjective Collective Performance	5.76	3.39	6.97	3.07	6.53	3.51	7.05	3.21	6.77	3.29
Dyads										
Objective Dyad Performance	-0.93	0.55	-0.89	0.58	-0.93	0.57	-0.85	0.54	-0.89	0.55

*Note.* Pre-com = pre-communication between partners. Post-com = post-communication between partners.

Table 2. The Actor and Partner Effects ( $\beta$ ) and Total Explained Variances ( $R^2$ ) within the Performance-to-Self-, Other-, and Collective Efficacy Models.

Outcome	Predictor	Self-efficacy			Other-efficacy			Collective efficacy		
		Actor effects ( $\beta$ )	Partner effects ( $\beta$ )	Total $R^2$	Actor effects ( $\beta$ )	Partner effects ( $\beta$ )	Total $R^2$	Actor effects ( $\beta$ )	Partner effects ( $\beta$ )	Total $R^2$
<i>Flyer Efficacy 3</i>				.78***			.73***			.76***
	Efficacy 2	.54***	.04		.51***	.15*		.51***	.05	
	Self-performance 2	.67***	.27		.16	.32		.16	.30	
	Other-performance 2	.26	.21**		.84***	.28**		.73***	.36***	
	Collective performance 2	-.25	-.41*		-.15	-.56**		-.07	-.56*	
<i>Base Efficacy 3</i>				.66***			.68***			.64***
	Efficacy 2	.65***	-.11		.59***	.01		.47***	.09	
	Self-performance 2	.78***	-.09		.44	-.03		.72***	-.05	
	Other-performance 2	.39**	.66**		.53***	.02		.48***	.12	
	Collective performance 2	-.76***	-.38		-.48*	-.01		-.53*	-.09	
<i>Flyer Efficacy 4</i>				.64***			.73***			.68***
	Efficacy 3	.40***	-.13		.44***	.05		.45***	-.06	
	Self-performance 3	.52**	.26		-.28	.29		.12	.26	
	Other-performance 3	.02	.22		.74***	.06		.53**	.15	
	Collective performance 3	-.10	-.09		.09	.01		-.12	-.09	
<i>Base Efficacy 4</i>				.78***			.70***			.71***
	Efficacy 3	.55***	.01		.40***	.01		.51***	-.03	
	Self-performance 3	.46***	-.08		-.26 <sup>†</sup>	-.16		-.28	-.31*	
	Other-performance 3	-.27 <sup>†</sup>	.40*		.64***	.43		.14	.73**	
	Collective performance 3	.34*	-.18		.21	-.20		.70**	-.27	
<i>Flyer Efficacy 5</i>				.63***			.70***			.63***
	Efficacy 4	.51***	.04		.59***	-.06		.43***	.13	
	Self-performance 4	.29	.02		-.05	.27		-.04	.19	
	Other-performance 4	-.30*	.06		.12	-.05		.09	.04	
	Collective performance 4	.36	.13		.37*	.06		.36*	.05	
<i>Base Efficacy 5</i>				.74***			.67***			.68***
	Efficacy 4	.64***	.10		.28*	-.02		.34**	.13	
	Self-performance 4	.44	.34*		-.67*	.07		-.42	.09	
	Other-performance 4	-.29 <sup>†</sup>	.04		.63***	-.44		.13	-.28	
	Collective performance 4	.17	-.04		.83*	.22		1.14**	.09	

Note. Predictor variables are residualized scores in line with Feltz et al. (2008). <sup>†</sup> $p = .05$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .



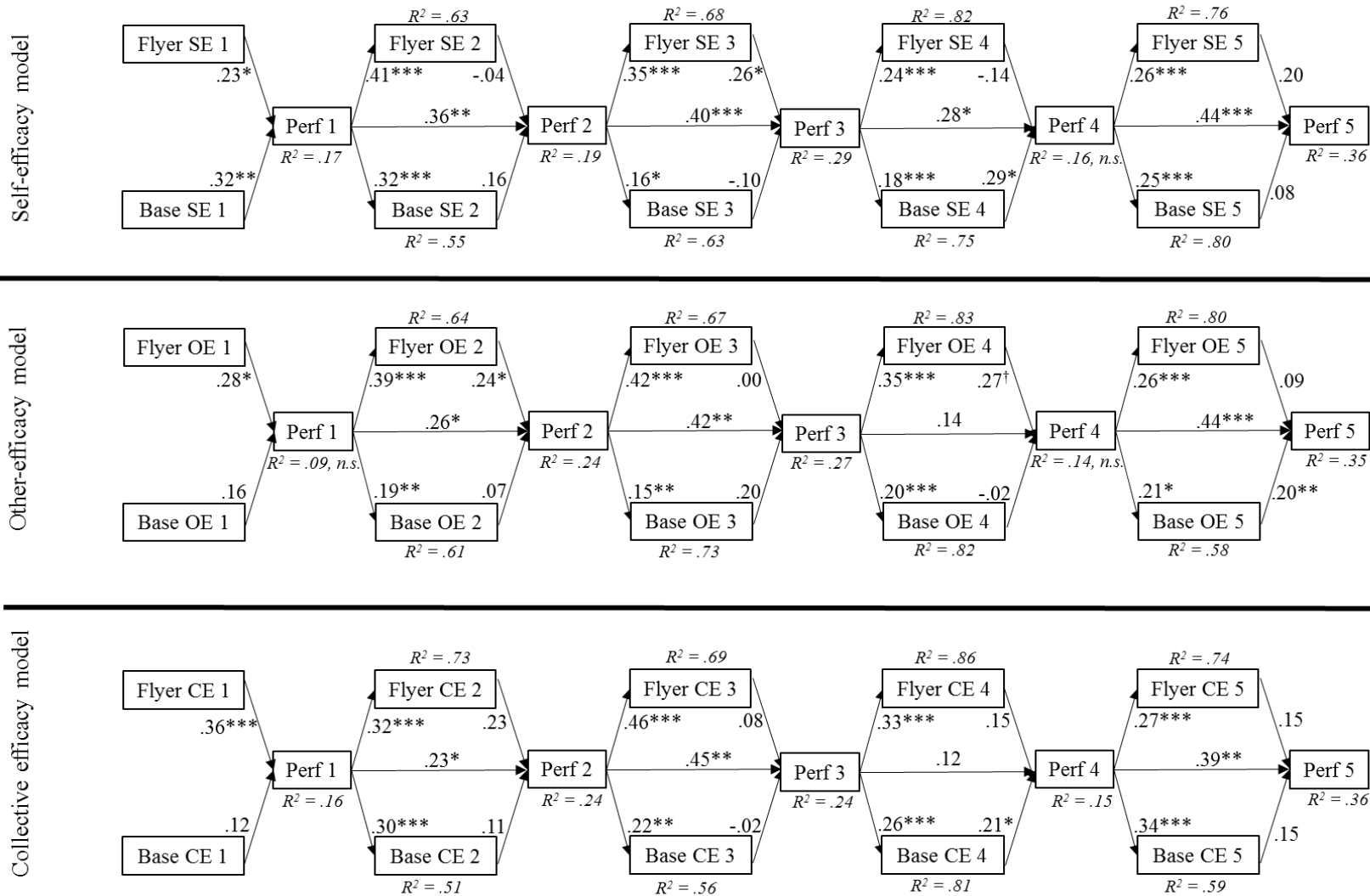


Figure 1. Efficacy and Performance Reciprocal Effects. This figure illustrates the self-efficacy (SE) model, other-efficacy (OE) model, and collective efficacy (CE) model, each comprised of a single efficacy construct and objective dyad performance, estimated to examine similarities in direction, and magnitude of the predictive pathways across the three separate models. Not drawn are the pathways representing within and between person effects of past efficacy on subsequent efficacy, and covariances between pairs of efficacy variables across the flyer and base partners (e.g., Flyer Efficacy 4 and Base Efficacy 4). †*p* = .05. \**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

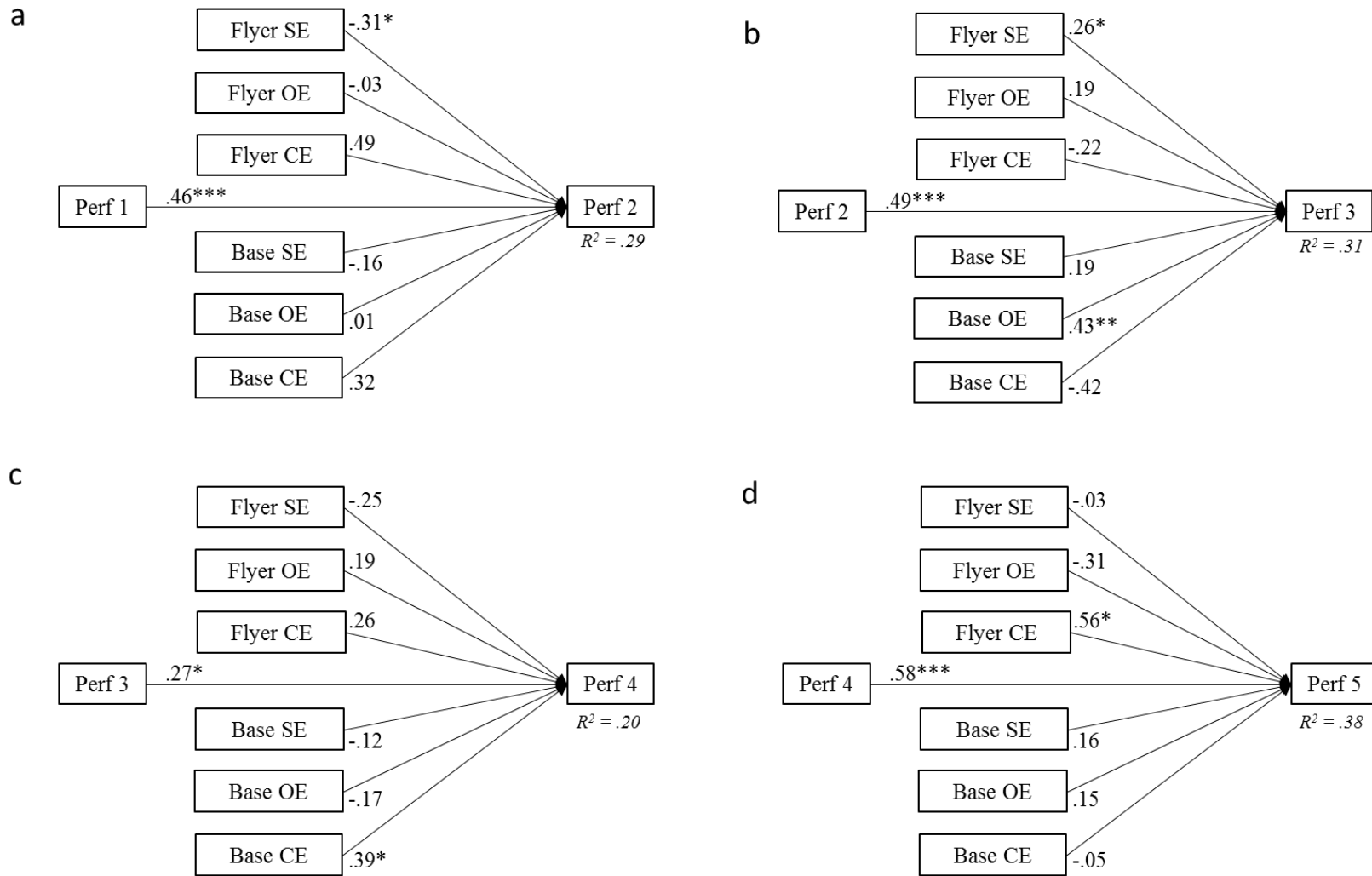


Figure 2. Efficacy-to-Performance Models. This figure illustrates four separate models, each comprised of multiple efficacy constructs, estimated to examine unique contribution of flyers' and bases' self- (SE), other- (OE), and collective efficacy (CE) beliefs in the prediction of Objective Dyad Performance 2, 3, 4, and 5. Predictor variables are residualized scores in line with Feltz et al. (2008). \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .