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## The Effects of Autonomy-Supportive vs Controlling Feedback on the Performance of Novice Jugglers

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**The Effects of Autonomy-Supportive vs Controlling Feedback on the Performance of  
Novice Jugglers**

By

Dominique Mullicane

Accepted in Partial Completion  
of the Requirements for the Degree  
Master of Science

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## **Master's Thesis**

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Dominique Mullicane

July 27, 2022

**The Effects of Autonomy-Supportive vs Controlling Feedback on the Performance of  
Novice Jugglers**

A Thesis  
Presented to  
The faculty of  
Western Washington University

In Partial Fulfillment  
Of the Requirements for the Degree  
Master of Science

By  
Dominique Mullicane  
July 2022

## Abstract

Coaches tend to take on many roles with their athletes (Conroy et al., 2006). In the majority of previous studies that use the self-determination theory (Deci & Ryan, 2000) as a theoretical framework applied to sport, athletes have preferred the autonomy-supportive coaching style over the controlling-coaching style (Amorose & Anderson-Butcher, 2015) and autonomy-support is correlated with key variables including autonomous forms of motivation, well-being, and enjoyment (e.g., Amorose & Anderson-Butcher, 2015; Felton & Jowett, 2013). Of course, many athletes want coaches who help increase their sport performance. Yet, the extremely limited research on the effects of autonomy-supportive coaching on participants' motor task performance have been largely inconclusive (Mladenovic, 2015), with only some researchers finding positive effects on performance (Manninen et al., 2020). Thus, there is a need for continued research on this topic. This proposed experimental study measured the effects of autonomy-supportive feedback compared to controlling feedback on the performance of novice jugglers. The current study was conducted in person and included 18 college students with an average age of 20.33 (SD =1.19) of all genders over the age of 18. The participants watched an instructional video on how to juggle and were then allowed to practice; participants were split into two groups: 1) controlling group, who was provided with no choice, no rationale, and given feedback during the practice session such as "Practice it like you saw in the training video;" 2) autonomy-supportive group, who was provided with choice, rationale, and given feedback during practice that included, "You can practice however you like." The novice jugglers were tested on the number of consecutive catches made and how quickly they reached five balls both before watching a juggling instruction video (pre-test) and after a 10-minute practice period (posttest). The primary researcher provided the feedback. The Learning Climate Questionnaire (LCQ) was

given to participants to measure the coaching climate. Two mixed ANOVAs compared the results of the groups' performance to determine if the type of feedback affected juggling performance. Results of the first mixed ANOVA revealed that there was no statistically significant interaction between groups and time on the number of consecutive catches. Results of the second mixed ANOVA revealed that there was no statistically significant interaction between groups and time on the variable of time needed to catch five balls; however, there was a medium effect size as indicated by partial eta squared = 0.07. Results on the independent samples t-test to compare the groups' responses on the LCQ indicated differences in scores between the autonomy supportive and controlling group that were statistically significant, with a large effect size. Overall, it was found that different coaching styles lead to differences in perceptions of the learning environment, but there were no statistically significant effects on performance. Therefore, coaches need to be aware of their coaching style and how it may affect their athletes' experience while learning a new skill.

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## **Literature Review**

Mentor, instructor, and role model are often duties that coaches take on with their athletes (Conroy et al., 2006). Coaches typically have goals to develop and influence their athletes' well-being and physical growth (Felton & Jowett, 2013). Players can also learn from their coaches to participate in prosocial behaviors, to follow rules, and gain knowledge from authority figures in sport (Delrue et al., 2017). Lastly, a main component coaches focus on is human potential in their athletes; Spence and Deci (2013) refer to human potential as utilizing one's contribution of strengths and latent abilities, developing, and unlocking human capabilities, and maximizing people's engagement. A coach effectiveness training (CET) program can be used to enhance coaches' abilities and improve their effectiveness (Barnett et al, 1992). One model used to develop CET programs is self-determination theory. Self-determination theory (SDT) is a broad theoretical framework of human motivation, which can be applied to explain how coaching behaviors affect athletes (Deci & Ryan, 2000). According to SDT, athletes have three basic psychological needs that must be satisfied by coaches or the sport environment in order to achieve self-determined motivation (Deci & Ryan, 2000). This literature review includes an overview of CET and how CET has affected athletes as well as an explanation of SDT along with a review of research on how satisfaction of the three basic psychological needs affects athletes' perceptions and behaviors. This review also continues to describe CET interventions rooted in SDT and ends with the effects of SDT related coach interventions on athletes' performance in their sport.

## **Introduction to Coaching**

Around 30 to 40 years ago researchers began to find out more about athletes' experiences with their coaches and teammates along with their perceptions of their coaches. For example, Smith and Smoll (1990) examined relationships between athletes (542 male little league baseball players with an average age of 11.12 years) perceptions of their coach along with their level of self-esteem. The researchers also examined different styles of coaching such as being more supportive or more willing to help develop their baseball competencies and how that had an effect on the first two items, and they did this by using surveys. Smith and Smoll (1990) recruited 51 male coaches to take an assessment measuring their coaching behaviors including things like reinforcement, mistake contingent instruction, punitive instruction, or general technical instruction and more. The researchers found that supportiveness and instructiveness (i.e., the way coaches give instruction, such as punitive or hostile compared to general technical instruction), had significant main effects. Specifically, children with low self-esteem were significantly more likely to be attracted to the coaches with supportive and instructive characteristics. Similarly, Smith et al. (1983) examined 182 male athletes' (9-12 years old) responses on how often their coaches used certain coaching behaviors and compared the results from previous studies using surveys. The researchers also enlisted 31 male coaches with an age range of 22-46 years old to answer questions in order to measure their coaching behaviors. According to Smith et al. (1983), there was a significant positive correlation between perceived solidarity or feeling of unity in their sport with teammates and coaches and self-esteem for the athletes. The athletes also rated their coaches in a positive manner and their attitude toward their sport was extremely positive. Also, if a coach was considered mistake-contingent technical, which means the coach typically instructs their athletes on how to fix their mistakes, then there was a strong positive relationship between the coaches' evaluation relating and the coach's

response towards mistakes. There was a negative correlation between use of punishment and coach evaluation, meaning that the coaches who used punishments often were given a lower evaluation by their athletes. Finally, the results indicated that the athletes' self-esteem and team solidarity had a significant negative relationship with general technical instruction. One takeaway from this study is that children's enjoyment of their participation in sport is highly correlated coaches' behaviors. These early studies demonstrated that coaches could contribute to players' attitudes in their sport. That is why researchers want coaches to be trained have positive effects on their athletes in many ways. One technique to improve coaches' interactions with players is called coach effectiveness training.

### **Coach Effectiveness Training (CET)**

Coach effectiveness training (CET) was developed for youth sport coaches because researchers wanted to help coaches create an experience for youth athletes that is more positive (Holtzclaw et al., 2019). By using CET to train coaches, researchers were hoping to decrease some behaviors such as giving instruction in a punitive or hostile way or giving a lot of punishments and increase other behaviors including reinforcement or using mistake contingent feedback (providing the athletes with what they did wrong and how they can fix it) (Holtzclaw et al., 2019). According to Barnett et al. (2016), researchers who design CET programs define "winning" or success as the athlete using their maximum effort. When coaches use CET, they tend to relate to athletes more effectively along with using less aversive or negative responses, but more positive behaviors.

Although sport psychology is relatively new field, there is quite a history of CET research. The studies reviewed below examined the effectiveness of coach interventions. Specifically, David and Cobeanu (2016) examined the effects of a cognitive behavioral CET

program on the emotion-regulation abilities of 88 future coaches (81.4 percent female and 18.6 percent male) with an age range of 25 to 59 years old. The researchers used a training program in cognitive behavioral coaching (CBC) that had four parts, the first part was 60 minutes of training on cognitive behavioral theory (CBT), the second part was 90 minutes of information on CBC, the third part was 90 minutes on issues encountered with CBC, and the fourth part was 120 minutes applying the (ABC) model (A= activating event; B= belief; C= consequences) to scenarios in coaching youth sport. According to David and Cobeanu (2016), at the end of the course there was a significantly higher self-reported work performance and a decrease in coaches' depressed mood. From pretest to posttest there were significant modifications made in the coach's emotion-regulation abilities, attributable to the CBC training (David & Cobeanu, 2016). Not only did we review studies that examined the effectiveness of coach interventions, but we also examined athletes' perceptions of their coaches. Comparatively, Holtzclaw et al. (2019) explored the sport environment, coaches' perceptions of their own behavior, and athlete's perception of their coaches' behavior after a 2-hour coach workshop about positive coaching. Their participants included four coaches (29 to 45 years old) with about 11 to 30 years of teaching experience, as well as 16 athletes (10 to 17 years old). After the intervention, the researchers administered an open-ended questionnaire to both groups. According to Holtzclaw et al. (2019) there were eight themes from the coaches and athletes, which included positive experience, an increase of coach awareness of behavior, planning for the future, coaches focus on effort, working to improve the athlete coach relationship, coaches use of positive reinforcement, athletes' openness with the coach, and coaches focus on the athlete. The coaches reported that they increased their focus on athletes' effort and therefore the athletes also believed their coach wanted them to put forth their best effort and have fun. Lastly, the coaches used more

positive reinforcement with their athletes to encourage more positive attitudes with teammates. One limitation of the study was that one of the coaches was already using the coaching style taught, so that could have limited new learning from the coach workshop (Holtzclaw et al., 2019). Similarly, Barnett et al. (2016) trained youth coaches on desirable and undesirable coaching behaviors that affect attrition in two phases to determine if the training would enhance the athlete-coach relationship. The participants included 18 male coaches with an age average of 40 years old and 202 male little league baseball players with an average age of 11.39 years old. The researchers had the youth athletes answer questions on surveys about perceptions and attitudes. The researchers delivered a two- and half-hour CET workshop/intervention that aimed to help the coaches increase the use of technical instruction, reinforcement, mistake-contingent encouragement, corrective instruction and decrease the use of behaviors that maintain control, such as non-reinforcement, punishment, and punitive instruction (Barnett et al., 2016). The researchers found that the coaches who were CET trained were liked more by their players and were rated as better coaches than those who were not trained. The researchers also found that athletes who perceived that their coach liked them were more likely to be in the intervention group, and those same athletes had a greater interpersonal relationship with their teammates and more fun than the athletes who were not in the intervention group.

Additionally, Harwood et al. (2015) examined the psychosocial behavior of five youth male soccer players (average 12.58 years old) and how it was affected by a 5C's coach education program, which included a focus on commitment, communication, concentration, control, and confidence. The first session of the program included information about the benefits of sport psychology and then the researchers introduced the 5C's. Every three weeks the researchers had another session and went over each of the 5C's individually with the coach. All five players had

in increase in adaptive interpersonal behaviors after the coach went through the commitment phase of the 5C's. Researchers also found increases in confidence, commitment, and control for three of the five players. One main takeaway communicated by Harwood et al. (2015) was that an optimal social learning environment can be created by peer contact and coach-player interactions and therefore coaches can become significant figures in a youth athlete's life.

Overall, these studies showed that athletes preferred coaches who gave more general technical instruction. The researchers also found that after CET programs, athletes had a more positive experience and, in one instance, one athlete had an increased mood (David & Cobeanu, 2016). Coaches who were CET trained also had more fun and greater interpersonal relationships (Barnett et al., 2016). One limitation of the previous studies include that the researchers only examined outcomes on youth athletes. Lastly, an additional limitation is that researchers did not measure the transfer of CET training into games or other sport settings, which means that what the researchers teach during a workshop may not always be put to use in a game or sport setting by the coaches.

### **Self-Determination Theory**

There are many models that can be used for CET training. SDT is one of the most thoroughly researched and supported theories of motivation, which explains why it is commonly used for CET. According to Deci and Ryan's (2002) self-determination theory, for human beings to have psychological well-being, effective behaving, vital engagement, and healthy development, there are essential, fundamental, and universal psychological needs that need to be satisfied. According to Deci and Ryan (2000) the three basic psychological needs are relatedness, competence, and autonomy. Relatedness refers to the need to be cared for and loved, which is the desire to feel connected, so also caring for and loving others. Competence is feeling a sense of

self-efficacy and having confident feelings about one's ability level, and lastly, autonomy refers to volition, or being able to use one's own will to make decisions (Deci & Ryan, 2000).

Researchers want to predict and understand different qualities that athletes experience and their behaviors including things like motivation, persistence and effort that are central to SDT and the researchers do that by comparing two different types of motivation: autonomous and controlled motivation (Deci & Ryan, 2000). Autonomous motivation refers to acting with volition, feeling in control of one's own choice, and performing a behavior willingly (Spence & Deci, 2013). Deci and Ryan (2000) defined one main type of autonomous motivation, intrinsic motivation, which refers to when one finds an activity enjoyable and interesting and that is their only reason one participates in the chosen activity. An example of intrinsic motivation would be children playing on a playground at the park, because when children go out and play it is for pure enjoyment not for any external factor. In contrast, extrinsic motivation refers to getting some separate rewards or consequences as the reason for participating in a chosen activity (Deci & Ryan, 2000). According to SDT, extrinsic motivation has four different subtypes, two of which are autonomous and two that are controlled. The most autonomous and self-determined type of extrinsic motivation is called *integrated regulation* and this type of motivation refers to activities that you enjoy, but that also align with your values (Spence & Deci, 2013). An example of integrated regulation is when one goes to practice one may not go only out of pure enjoyment, one may also attend because it aligns with one's values. The second autonomous type of extrinsic motivation in SDT is called *identified regulation* and this type refers to when an athlete participates in the sport or activity because the athlete wants to, therefore the athlete may choose to participate to achieve a particular goal inherent to the sport (Spence & Deci, 2013). An example of identified regulation is when one has to study for an exam; one may not enjoy

studying but may still study in order to get a good grade on the exam, because the individual has a goal to earn high enough grades to be able to continue to participate in sports.

Controlled motivation often involves coercion (threat of punishment) or seduction (offering a reward) that makes one feel pressured to act in a certain way (Spence & Deci, 2013). Two of the subtypes of extrinsic motivation are considered controlled motivation. Spence and Deci (2013) explain that one controlled type of extrinsic motivation is *introjected regulation*, and this type refers to participating in an activity because if one does not, one will feel guilty or ashamed. An example of introjected regulation is when an athlete participates in their sport because they will feel guilty for disappointing their coach or teammates if they do not come to practice. The last controlled type of extrinsic motivation, which is the least self-determined, is called *external regulation* and this type refers to participating in an activity to receive an award or because someone else wants you to participate as well as participating because if one does not one could be punished (Spence & Deci, 2013). An example of external regulation would be a student who is only participating in sport because they are on athletic scholarship, and they would not be playing if they did not have a scholarship. The types of motivation previously mentioned are the main types outlined in SDT; when a person, or athlete, lacks motivation or has no reason to participate in sport and that is called *amotivation* (Deci & Ryan, 2000).

Using the SDT framework, researchers can assess athletes' forms of motivation (i.e., regulations). It can be especially important to know what type of motivation the athlete currently has, in order for the coach to motivate the athlete. Knowing these types of motivation may help a coach to truly motivate their athletes. Coaches can predict and understand different qualities of behavior and experience when they differentiate between types of motivation. Autonomous motivation (i.e., intrinsic motivation, integrated regulation, and identified regulation) is preferred

because in this case the athlete is participating willingly and is motivated purely by joy whereas an athlete with controlled motivation (i.e., introjected regulation and external regulation) is acting due to coercion and pressure and may not want to participate in sport. If a coach is struggling getting their athletes to work harder or put enough effort in then differentiating the athletes' types of motivation may guide the way the coach interacts with the athlete. In other words, coaches can use research on SDT to better understand how they can motivate athletes.

To continue, there are multiple sub theories of SDT; this review will only be elaborating on one of them that is known as the Basic Psychological Needs Theory (BPNT). The sub theory of BPNT helps researchers explain why athletes may have a decreased motivation or diminished effort. BPNT states that when one's three basic psychological needs are satisfied, one is more likely to work toward life goals and have long-term motivation (Spence & Deci, 2013). On the contrary, BPNT also states that if anyone is having diminished performance outcomes or wellness, one possible cause is that their three basic psychological needs are being thwarted (i.e., blocked) and that can have significant cost (Spence & Deci, 2013). Overall, satisfaction of the three basic needs, will result in the best outcomes in aspects of sport and personal life.

Researchers use self-determination theory to shape programs that enhance well-being, human personality, and behavioral self-regulation through types of coaching. When researchers design SDT-based programs, they also consider sociocultural factors, growth tendencies, and innate psychological needs. SDT or any of SDT's sub theories can be used to help explain how a coach or athlete's needs are being thwarted or satisfied. In order to do this, researchers use SDT to support and guide coaches in the beginning stages of coaching through theory-guided explanation with a purpose (Spence & Deci, 2013). Lastly, SDT can be used by researchers to explore different coaching styles such as *controlling coaching* versus *autonomy supportive*

*coaching* (Amorose & Anderson-Butcher, 2015), which are described below. Coaches are a major influential factor in determining social milieu, and they can influence their athletes' needs satisfaction in a positive or negative way. The two coaching styles mentioned below have been studied as a way to measure the influence, positive and negative, that coaches can have on the sport climate.

**Autonomy-supportive coaching styles.** According to Amorose and Anderson-Butcher (2015) an autonomy-supportive coach behaves in ways that minimize use of pressure or demands to control others, acknowledges athletes' feelings and thoughts, and encourages self-regulation of behavior, choice, and self-initiation. Autonomy-supportive coaches typically have similar behaviors that include providing choice within reason, providing athletes with a rationale for doing a particular activity, providing feedback on performance that is noncontrolling, acknowledging and asking about athletes' feelings and thoughts, and providing opportunity for athletes to take initiative (Amorose & Anderson-Butcher, 2015). Autonomy-supportive coaches also minimize ego involvement behaviors and avoid controlling statements, overt control, and guilt induced criticism. Coaches who assume that their athletes are self-motivated and tend to acknowledge the athletes' natural tendency to develop and grow are autonomy-supportive coaches (Haerens et al., 2018).

Researchers use interventions to try to increase autonomy-supportive coaching styles. For example, Mahoney et al. (2016) examined the effectiveness of an SDT intervention on mental toughness in sport. The researchers included 113 adolescent athletes (35 male and 78 female) with an average age of 15.05 years old and 18 coaches (17 male and 1 female) with an average age of 50.84 years old. The athletes took assessments for autonomy support, controlling coaching, need satisfaction, needs thwarting, and mental toughness. The researchers also

observed and interviewed the coaches. The researchers then had the coaches participate in two, two-hour workshops. The first workshop explained SDT, how coaches can use SDT when coaching, and ways to avoid controlling coaching styles. The second workshop was used for coaches to talk about how the last week went, as the coaches implemented a new more autonomy supportive coaching style. The researchers found after the interviews that the coaches found five benefits of the intervention and those included practical skill use, being able to share ideas in a group, application outside of sport, enhanced insight, and beliefs in one's own coaching practices (Mahoney et al., 2016). The coaches also believed the autonomy supportive coaching style had four barriers and those included misinterpretation of what they learned in the workshop, the coaches felt like the workshop was overly broad and the coaches could have used examples more related to rowing, going back to old coaching style instead of continuing use of new ideas and time restrictions (Mahoney et al., 2016,). One takeaway is that an autonomy supportive style may be hard to implement, but autonomy supportive style could have benefits for the coaches and athletes.

**Controlling coaching styles.** According to Amorose and Anderson-Butcher (2015) a controlling coach wants their athletes to behave, act, or feel in ways that are consistent to the coaches wants and needs. A controlling coach has typical behaviors that include: not paying attention to athletes who are not doing well, but complimenting them when the athletes do perform well, manipulating athletes' behaviors using rewards, evaluating athletes' by using social comparison, motivating athletes to perform better by using overly critical feedback, forcing athletes' to comply with power assertive techniques, and attempting to influence the athletes' lives outside of sport (Amorose & Anderson-Butcher, 2015). The coaches who neglect

or bypass their athletes' motivation and pressure their athletes to behave, think, or feel in a certain way are the controlling coaches (Haerens et al., 2015).

Researchers have also explored controlling coaching styles and how that style can affect athletes. Gucciardi et al. (2017) explored the association between thriving and controlling coaching behavior and measured the buffering effect of mental toughness. The total amount of participants recruited were 232 netballers who were females from Australia with an age range of 11-17 years of age, and the athletes had between 1 to 15 years of netball experience, with about anywhere from one hour to 10 hours of coach supervised netball practices. The researchers wanted to measure controlling coaching, mental toughness, and thriving which included two subscales of learning and vitality (energy, feeling alive). The researchers found the inverse effect of controlling coaching on an athlete's perceptions of learning were stronger when the athletes had low levels of mental toughness, but not when they had high levels of mental toughness. The researchers measured thriving through the component of vitality. When the researchers measured vitality, the effects of coach controlling interpersonal style and mental toughness were significant, but the interaction between the two was not. The inverse association between coach controlling personal style and mental toughness was statistically non-significant and small. In conclusion, having more mental toughness as well as be higher in vitality will be more beneficial when learning is involved no matter the coaching style (Gucciardi et al., 2017). Both coaching styles are quite different, and the coaching styles can affect the athlete's basic needs from SDT.

### **Correlational Studies on Coaching Styles, Basic Psychological Needs, and Motivation**

**Correlational studies examining changes of athlete's behavior related to need satisfaction.** Researchers want to know more about how coaching styles affects athletes' motivation, performance, achievements. Amorose and Anderson-Butcher (2015) tested whether

the interactive or combined effects of controlling, and autonomy-supportive coaching behaviors predicted athletes' burnout, motivational regulations, and basic psychological need satisfaction beyond the effects of these behaviors alone. The researchers had 301(111 males, 190 females) high school athletes from a variety of team and individual sports answer multiple questionnaires about perceived autonomy support, perceived controlling coaching, intrinsic motivation, perceived relatedness, and burnout. One of the measures was the Behavioral Regulation in Sport Questionnaire (BRSQ; Lonsdale et al., 2008). The researchers found that autonomy-supportive coaching was a significant positive predictor of adaptive motivational behaviors measured by the BRSQ, including integrated regulation and intrinsic motivation. Also, autonomy-supportive coaching was a significant negative predictor of maladaptive behaviors measured by the BRSQ including amotivation, external regulation, introjected regulation as well as burnout. On the contrary, perceived controlling coach behavior was a negative predictor of feelings of relatedness, intrinsic regulation, and perceived autonomy. Amorose and Anderson-Butcher (2015) also reported that when athletes perceived a low level of controlling behaviors and a high level of autonomy supportive behaviors from coaches, the athletes had their most positive motivational outcomes. In conclusion, coaches with more autonomy-supportive coaching behavior will more likely result in athletes having a higher intrinsic motivation who also experience more satisfaction of their need for relatedness. In addition, Reinboth et al. (2004) explored relationships of male adolescent athletes' autonomy need satisfaction and psychological well-being with their reported levels of social support, autonomy support, and mastery focus. The researchers enlisted 265 British adolescent male soccer and cricket players to take three surveys to measure coach autonomy support, need satisfaction, and subjective vitality. The researchers found that well-being and the three basic needs were significant and positively

related to autonomy supportive coaching behavior. There was a positive and moderate intercorrelation between the three basic needs. The researchers explored a well-being variable and need satisfaction variables and found significant positive relationships. They reported negative physical symptoms had a negative correlation with the three basic needs (Reinboth et al., 2004). Overall, Reinboth et al. (2004) suggested that an autonomy-supportive environment is socially supportive, emphasizes effort and improvement, and maximizes need satisfaction in athletes which in turn can result in a greater well-being among athletes participating in sports. Therefore, coaches should try to foster an autonomy-supportive environment to better satisfy all their athlete's needs.

In another study that focused on well-being, Felton and Jowett (2013) investigated the relationship between the athlete experience of the three basic needs in relation to their coach and coach behaviors that may lead to need satisfaction along with well-being and ill-being. The researchers also specifically examined coaching types and behaviors and how they affect athletes' needs satisfaction and coach and athletes' ill-being and well-being. The researchers surveyed 300 team and individual athletes (109 males, 191 females; 15-30 years old) that competed at a variety of levels, using seven measures about coach behaviors and athletes' psychological variables. The researchers found there was a small but significant positive association between ill-being, well-being, and the need for autonomy. Autonomy need satisfaction was positively correlated with each of the following variables, negative affect, skill self-concept, performance self-concept, and vitality, which then indicated the athletes' needs were more likely to be satisfied when the athletes had a more autonomy supportive coach. Controlling coach behavior was negatively correlated to the following variables, negative affect, skill self-concept, performance self-concept, and vitality, which leads to a lower satisfaction of

autonomy. The controlling coach behavior was negatively correlated to satisfaction of the competence need. Lastly, there was a significant association between ill-being, well-being, and competence, meaning if the competence need was met, one had greater well-being and decreased ill-being. Lastly, Haerens et al. (2018) investigated which athlete motivational styles naturally emerge from control and autonomy supportive coaching environments. The researchers recruited about 202 athletes (51% boys; average age 15.73 years old) who participated in multiple team or individual sports and trained about 18.11 hours a week. The athletes took questionnaires that measured perceived autonomy support, need satisfaction, motivation, well-being, and ill-being. The researchers identified two groups who had opposite motivating styles. Those who perceived their coach as low on controlling and high on autonomy support, were deemed the high autonomy support group; the high-control group had the opposite pattern. The researcher then identified two more groups where the coaches were rated on both dimensions such as relatively low (low autonomy support-low control group) or high (high autonomy support-high control) group. When compared to the other groups, the high autonomy support group showed the highest levels of autonomous motivation and need satisfaction, while the high control group and low-low group had the lowest levels of autonomous motivation and need satisfaction. The high-high group and the high autonomy support group had the highest levels of well-being and the lowest level of well-being was found in the high control group. The low-low and the high control group had the highest levels of ill-being and the lowest levels of ill-being was found in the high autonomy support group. The researchers also found that ill-being and perceived control correlated positively with numbers of training hours per week, but also had a negative correlation with coach rated performances, perceived autonomy support, and need satisfaction. One limitation of this study was that there was no descriptive information on the coaches (Haerens et

al., 2018), but the findings suggest that when control is absent and autonomy support is present the most optimal outcomes will be present.

Overall, these studies indicate that athletes' psychological needs can be fulfilled by high quality athlete-coach relationship along with athlete perceptions of coaching behaviors that are autonomy supportive. One limitation of the above studies was that the researchers all used youth and adolescent athletes, with the exception of the study by Felton and Jowett (2013) which included athletes with a larger age range but did include some adolescents. Another limitation was that all the athletes were at the same competitive level with the exception of the study by Felton and Jowett (2013). Amorose and Anderson- Butcher (2015) suggest that for future application, researchers should explain that coaches use a more autonomous supportive behavior when coaching because their athletes will tend to have higher motivation as well as autonomy, competence, relatedness and have less burnout.

To continue with SDT related correlational studies, many studies in the literature focus primarily on Basic psychological needs theory (BPNT). For example, Stebbings et al. (2011) examined the potential antecedents of perceived coach interpersonal behaviors, specifically by measuring BPNT concepts. Stebbings et al. (2011) recruited 443 coaches (18-75 years old) from many different levels and had them take multiple questionnaires that measured satisfaction of autonomy, competence, and relatedness, well-being, vitality, autonomy supportive coaching behaviors, controlling coaching behaviors and social desirability. The researchers found that there was a positive and moderate correlation between the three psychological needs and autonomy supportive coaching behaviors, positive affect, and subjective vitality; there was a negative correlation between these same variables with controlling behaviors. There was a positive and moderate correlation between subjective vitality and positive affect as well as

autonomy support; vitality and positive affect had a weak and negative correlation with controlling behaviors. The researchers found that the coaches perceived autonomy supportive behaviors as a strong positive predictor of their own psychological well-being while perceived controlling behavior was a moderate negative predictor. The four meditation pathways were significant, and those pathways include perceived controlling behaviors and autonomy need satisfaction, perceived autonomy supportive behavior and competence need satisfaction, perceived controlling behavior and competence need satisfaction, and perceived autonomy supportive behavior and autonomy need satisfaction (Stebbing et al., 2011). A key implication from the study was that coaches who create an adaptive interpersonal coaching climate have athletes and coaches who thrive in that environment. Overall, the findings suggest that coaches need to take time for themselves to make sure that their own needs of autonomy, competence, and relatedness have been satisfied in order to have a more positive coaching style and greater psychological well-being. Stebbings et al. (2011) also recommend a more democratic coaching style, which is more supportive, and this style lets the athletes have more of a choice, which will give the athletes a higher perceived autonomy and also leads to the athletes having a higher perceived competence and relatedness. Furthermore, Hollembeak and Amorose (2005) wanted to determine athletes' motivation in relation to specific negative or positive coaching behaviors. The researchers also examined the relationship of athletes' intrinsic motivation for their sport and the way the athletes perceive their coach's behaviors and how perceived autonomy, feelings of relatedness, and perceived competence mediate the relationship. The researchers included 280 (149 male and 134 female) student athletes from a Midwest university and had them take multiple questionnaires about leadership, sport motivation, and relatedness as well as a scale developed by Amorose (2003), and a scale developed by Amorose and Hollembeak (2005). If the

coaches were high on autocratic behavior it means the coaches demand obedience and a rigid decision-making style. If the coaches were high on democratic behavior it means the coaches encourage athletes' tactics, decisions, and goals. If the coaches were high on social support it means the coaches had good interpersonal relationships with their athletes.' If the coaches were high on positive feedback it means the coaches reinforce and praise their athletes' performances. Lastly, if the coaches were high on instruction and training it means the coaches put emphasis on teaching their athletes. The athletes' intrinsic motivation was significantly affected in a positive way by feelings of relatedness, perceived autonomy, and competence (Hollembek & Amorose, 2005). Perceived democratic behavior from coaches positively predicted the athletes' autonomy need satisfaction while autocratic behavior negatively predicted the athlete's autonomy need satisfaction (Hollembek & Amorose, 2005). Hollembek and Amorose (2005) found that athletes' feelings of relatedness were positively affected by positive feedback from coaches. There was a negative relationship between the athletes' perceived competence and positive feedback. The researchers also found a negative relationship between autonomy and coaches' instructional tendencies (the way that coaches instruct their athletes). The researchers also found significant negative effect from autocratic behavior on feelings of relatedness, whereas there was non-significant effect from social support on relatedness (Hollembek & Amorose, 2005). Overall coaches who implement and listen to their athletes' suggestions and choices may have athletes who are more intrinsically motivated.

Additional research supports the recommendation for coaches to listen to their athletes' choices and suggestions. For example, Conroy and Coatsworth (2007) explored coaches' approaches that support athletes' autonomy, by surveying 165 youth swimmers on measures of autonomy supportive coaching, coaching behaviors, coaches' interpersonal behaviors, need

satisfaction in general, and need satisfaction in relationships. The researchers found a positive association between scores for supportive instruction and how athletes perceived their coach's affiliative behavior (their ability to connect with the athletes). The researchers then found a negative correlation between athletes' perceptions that their coaches blame and control with their perceptions of coaches' affiliative behavior. The contrast models on complete relatedness, complete autonomy, and complete competence needs were statistically significant meaning that the athlete's needs were satisfied in general as well as with the athlete's relationship with their coach (Conroy & Coatsworth, 2007). Overall, the findings indicated that coaches in youth sport have a leadership role that puts them in a unique position to support young athletes' autonomy. In another study on youth athletes, Coatsworth and Conroy (2009) examined needs in a coaching relationship and how the needs are perceived by 119 youth recreational swimmers, who took multiple questionnaires that measured autonomy support, need satisfaction in relationships, as well as other measures. The researchers found that there was a significant correlation between the three needs of relatedness, autonomy, and competence. The way the athletes perceived their competence satisfaction at the beginning of the season significantly predicted the way the athletes perceived their competence satisfaction at the end of season, but competence satisfaction did not affect relatedness or autonomy need satisfaction (Coatsworth & Conroy, 2009). One takeaway from is that coaches should develop a wide range of coaching strategies that can be used at any time to support autonomy in youth athletics. Some limitations to the study were that that sample size was small and only included one sport (Coatsworth & Conroy, 2009). In addition, Moreover, Conroy et al. (2006) examined situational motivation (the reason an athlete is participating in the here and now) and how situational motivation affected four motivation types including amotivation, intrinsic motivation, along with identified regulation, and external

regulation. The researchers recruited 66 male and 99 female youth swimmers (average 11.2 years old), who had been swimming for about three years. The athletes took three surveys to measure self-determination to participate in sport, achievement goals, and achievement goals used by coaches to evaluate competence. There was a significant interindividual variability in the participants' level of intrinsic motivation at the start of the season, with no change throughout the season (Conroy, et al., 2006) as well as significant interindividual variability in the participants' level of identified regulation with no change throughout season. Although, for extrinsic regulation, there was a significant interindividual variability in the participants when the participants started out, but during the season the researchers saw an increase in extrinsic regulation in the participants. According to Conroy et al. (2006), amotivation also had a significant interindividual variability in the participants when the participants started out, but during the season there was a significant, slight increase of amotivation. Changes in forms of less self-determined situational motivation can affect the more avoidance types of motivation, which include amotivation. The findings show that athletes' amotivation and external regulation increase throughout the season and therefore coaches should try to find new ways to increase their athlete's intrinsic motivation during season. Overall, these studies have shown that if youth coaches can develop coaching strategies that use an autonomy supportive style, then they can have a more positive impact on the athlete's experiences and development in sport.

**Antisocial and prosocial behaviors related to variables described in SDT.** While the previous studies determined athletes' internal experiences and linked them coaching styles, this section includes a review of studies on the way in which coaching styles affect the athlete's behaviors towards others. Hodge and Lonsdale (2011) investigated whether the relationships between personal and contextual factors that are outlined as the main framework of self-

determination theory relate to antisocial and prosocial behaviors towards opponents and teammates in sport. The researchers determined a potential mediator for this relationship, which was moral disengagement. Hodge and Lonsdale (2011) examined the integrated components (i.e., intrinsic motivation, integrated regulation, identified regulation, introjected regulation, external regulation, and amotivation) of SDT with a measure of moral disengagement and assessed SDT autonomy-supportive coaching style as well as controlling style. The researchers studied 292 (114 males, 175 females) competitive individual and team athletes from a university in New Zealand, who took questionnaires that measured autonomy supportive and controlling coaching styles, motivational regulations, moral disengagement, and antisocial and prosocial behaviors. The researchers found that, autonomous motivation was moderately and positively predicted by autonomy support. Controlled motivation was weak to moderately and negatively predicted by autonomy support (Hodge & Lonsdale, 2011). Hodge and Lonsdale (2011) found that autonomous motivation did not predict prosocial behavior towards opponents, but autonomous motivation was a moderate positive predictor of prosocial behavior towards teammates. The researchers also noted that controlled motivation was a moderate positive predictor of moral disengagement. The researchers also mentioned, antisocial behavior towards teammates and opponents was positively predicted by moral disengagement (Hodge & Lonsdale, 2011). The researchers found that if the coach had a more autonomous supportive style, athletes had more prosocial behaviors towards their teammates, but not necessarily their opponents. One takeaway is that if one wants to get athletes to internalize and accept moral values then the quality of the coach athlete relationship is critical. Similarly, Delrue et al. (2017, p.3) examined “game to game dynamics of coaching” and antisocial and prosocial outcomes and how the coach’s independent contribution predicted those outcomes towards their teammates, opponents,

and referees. The researchers included 197 male soccer players (average 26.57 years old) who had been playing soccer for 19 years and been on the same team for five years. The researchers had them take some questionnaires on perceived need support before and after game, objectification, and antisocial and prosocial behaviors. Delrue et al. (2017) found that there was a positive relationship between game-to-game objectification of the opponents and game to game perceived pre-game need thwarting coaching behavior, which related positively to antisocial behavior towards teammates and opponents and game to game resentment of the referee, which related negatively to prosocial behavior towards the opponents. The players exhibited less antisocial and more prosocial behavior towards their teammates when the athletes perceived their coach to be more need supportive during the game, while the researchers found that need thwarting coaches had an opposite result. Game to game resentment of the referee was positively related to need perceived thwarting coaching game to game. Some limitations of this study were the researchers included only male soccer players and they focused on autonomy but did not focus on competence or relatedness. One takeaway is that coaches who thwart athletes' needs appear to have athletes with more antisocial behavior towards referees, opponents, and their own teammates (Delrue et al., 2017).

#### **Correlational Studies that relate SDT constructs with a sport performance variable.**

Thus far, this review has focused on how athletes perceive their coach's behaviors as well as how coaching relates to athletes' internal experiences and social interactions; however, exploring performance variables could be greatly beneficial for future coaches so that they understand how their behavior is related to athletes' sport performance. The following studies measured variables related to coaching style, but also included a measure of sport performance. Pope and Wilson (2015) examined the coach-athlete relationship by recruiting 221 female rugby players (16 to 33

years old) who had played rugby from 1 to 15 years to participate in their research. The athletes took multiple assessments measuring coaching interpersonal style, satisfaction of three basic psychological needs, self-determined motivation using the BRSQ, and sport performance using the game performance assessment instrument (GPAI: Oslin et al., 1998). Pope and Wilson (2015) found that the three basic psychological needs were strongly and positively correlated with involvement and autonomy support from their coaches. The correlations between identified, intrinsic, and integrated regulation and the three basic psychological needs were positive and moderate in strength. Of the three basic psychological needs, autonomy had the strongest correlation with self-determined motivation. There was a positive, but weak correlation between performance and self-determined motivation (Pope & Wilson, 2015). One possible lesson from this study is that coaches might influence higher performance levels and psychological factors by getting involved, providing structure, and increasing autonomy support. However, the direction of the relationship is not known because this is a correlational study; therefore, it may be that having a good performance may make people enjoy it more or have more autonomous motivation. One limitation of this study was that the researchers used only female athletes as well as only rugby players, so future researchers should recruit all genders as well as other sports. In another study, Rocchi et al. (2019) predicted performance trajectories by examining coaches' motivation and interpersonal behaviors reported by their athletes. The researchers included 413 competitive swimmers (192 females, 221 males) with an average age of 14.63 years old and about 6.34 years of experience in competitive swimming. The athletes took multiple assessments to need satisfaction; the performance variable was based on swimmers' points from the International Swimming Federation. Rocchi et al. (2019) found that the trajectories were based on the points from the International Swimming Federation (top recorded

scores each year across all events) with high scores for top performances and low scores or no score for worst or no performance at all, which resulted in five groups including, early dropout (those who dropped out as the study began), delayed dropout (showed slight improvement, but then dropped out), stable (continued to swim throughout study, but showed no signs of improvement), improvement (steady signs of improvement), and high performance (large signs of improvement). The two dropout trajectory groups had no differences in motivation or coach behavior. The improvement and high-performance groups also reported no differences. There was higher autonomy support reported by the athletes in the high performance and improvement trajectory groups than in the stable, early dropout and delayed dropout groups. Athletes in the high performance, improvement and stable groups reported more relatedness support than the delayed dropout and early dropout groups. Lastly, the athletes in the delayed dropout and early dropout group reported more non self-determined motivation than the athletes in the high performance, stable, and improvement groups (Rocchi et al., 2019). One main takeaway from this study is that coaches can help promote long term participation for their athletes by using relatedness and autonomy supportive interpersonal behaviors. Non self-determined motivation can be a predictor of dropout and that is why we should encourage and help athletes to foster more intrinsic motivation.

Gillet et al. (2010) investigated determinants of athletes' performance by measuring athletes' perceptions of sport performance, motivation, and coach behavior. The researchers recruited 101 French judokas (69 males and 32 females) with an age range of 14 to 43 years old. The researchers had the judokas take multiple assessments to measure perceived autonomy support, situational motivation, and contextual motivation; researchers measured their performance score using the athletes' official ranking in competition. Gillet et al. (2010) found

that self-determined motivation was positively related to perceptions of coach autonomy support. The researchers also found that situational self-determined motivation and contextual self-determined motivation were positively correlated and statistically significant. Athletes' performance was positively related to situational self-determined motivation. Additionally, there was an indirect effect between situational motivation to coach autonomy support that was statistically significant via contextual motivation. There was also a statistically significant indirect effect between sport performance and contextual motivation. One key finding from the results is that sport performance and self-determined motivation are influenced by coach's autonomy-support. One limitation of this study was that the researchers only focused on judokas, so future research should use athletes from different sports as well. Another limitation was that the researchers did not control for athletes' ability and past performance, so future research should control these variables. In another study that examined performance outcomes, Halperin et al. (2016) analyzed the outcome of boxing bouts to find if there were any possible differences in performance based on the frequency and type of coaches' feedback. The researchers recorded and transcribed the feedback given by twelve coaches (1 female, 11 males; average age of 42) to their athletes, then assigned the feedback to one of three categories: autonomy-supportive, controlling, or neutral. The researchers found that autonomy-supportive feedback was given 5.8% of the time, controlling feedback was given 52.5% of the time and the rest of the of the feedback (41.6%) was neutral. The researchers also found that the coaches provided 10% more controlling feedback in losing bouts, although there was no statistical difference in controlling feedback between the losing and winning bouts. The coaches used 6.7% autonomy-supportive feedback, 48.8% controlling feedback, and 44.4% neutral feedback in winning bouts. In conclusion although controlling feedback was used more during all bouts, there was less

controlling feedback in the winning bouts, though the difference was not statistically significant, which may be due to the small sample size in the study. Overall, it is worth noting that coaches tended to use more autonomy-supportive or positive feedback in winning bouts (i.e., better performance). Although this research provides a reference point for differentiating feedback in a live performance more research is still needed; perhaps a larger sample size could result in a statistically significant relationship between type of feedback and performance.

**Summary: Correlational studies on coaching styles and SDT variables.** Overall, researchers have determined that athletes prefer the autonomy supportive coaching style. Researchers have found that autonomy-supportive coaching is correlated with adaptive motivational behaviors measured by the BRSQ including integrated regulation and intrinsic motivation (Amorose & Anderson-Butcher, 2015), well-being (Reinboth et al., 2004), satisfaction of needs (Felton & Jowett, 2013), subjective vitality and positive affect (Stebbins et al., 2014), prosocial behavior towards teammates (Hodge & Lonsdale, 2011), and self-determined motivation (Pope & Wilson, 2015). However, there are limitations to past research. For example, one suggestion for future studies from Amorose and Anderson-Butcher (2015) was to use different age groups and level of sport such as adding in youth and collegiate level athletes and making motivational responses the outcome of the study. Stebbins et al. (2011) suggested that future researchers also examine full-time versus part-time coaches as well as coaches at a higher competitive level such as coaches of professional teams versus a lower-level coach such as youth league coaches. Future researchers should determine other strategies to enhance autonomy and identify if one strategy or approach works more effectively (Conroy & Coatsworth, 2007). Furthermore, Coatsworth and Conroy (2009) suggest for future research using two different models for autonomy support and comparing one against the other. Felton

and Jowett (2013) suggest that future directions should continue to examine autonomy supportive and controlling coach behaviors in a more longitudinal study and how those effects need satisfaction. Moreover, Reinboth et al. (2004) suggest that future researchers should measure all three basic psychological needs and see how each need is satisfied by various coaching styles more specifically. The research that was just reviewed shows that autonomy supportive style is related to other positive athlete outcomes, like performance. However, only experimental studies on training coaches to use an autonomy supportive style can determine if coaching style affects performance.

### **Self-Determination Theory based Coach Effectiveness Training Interventions**

**Physical education studies that test SDT.** The three basic needs identified in SDT can be satisfied or thwarted by autonomy supportive and controlling coaching. The studies below measured the relationships between coaching styles and need satisfaction in physical education settings. PE teachers and coaches are remarkably similar; the main difference between coaches and PE teachers is that the PE teachers do not gear their lessons towards a competition or a game. However, like coaches, PE teachers need to motivate their students and the students need to perform physical activity assessments. Thus, understanding research outcomes in physical education settings can be of use to sport psychology practitioners and sport coaches; specifically, it is useful to study autonomy supportive versus controlling coaching teaching styles to identify which style is the better in P.E. settings. Aelterman et al. (2014) examined if PE teachers would be willing and able to implement need supportive teaching behaviors if they had successful changes in teaching effectiveness after attending a one-day professional development training on need supportive teaching. The second goal was to have the students and teachers themselves rate their actual in class autonomy support to measure the impact of the training. The last aim was to

examine how the teachers implemented what was learned in class and if that correlated with more ease and effectiveness in teaching. Aelterman et al. (2014) recruited 39 experienced PE teachers and 669 students to take a few assessments that measured teachers' beliefs, as well as teachers' reported need support, observed need support, and student's' reported observed need support. The PE teachers were split into an experimental (n =15) and control (n = 24) group. The PE teachers in the experimental group participated in a need supportive teaching training that contained three parts; part one was theoretical background, part two was autonomy support and structure using motivating strategies, and part three was application to exercise. Aelterman et al. (2014) found that afterward, the teachers in the experimental group had a statistically significant higher perceived effectiveness when it came to autonomy support. After receiving training, there was also an increase in teachers use of structuring strategies and ease of implementation of autonomy support in the intervention group. Students in the teachers' classes from the intervention groups reported a statistically significant increase in autonomy support. Change in teacher reported behavior was correlated with PE teachers' change in feasibility beliefs in the intervention group, meaning that the teachers' believed teaching was easier (Aelterman et al., 2014). One takeaway is that autonomy support was noticed by teachers and students, so researchers should further invest in this training style (Aelterman et al., 2014). In addition, Barkoukis et al. (2020) tested the effects of an autonomy-supportive teacher intervention on high school students' physical activity behavior, autonomous motivation, and intentions in and out of physical education classes and leisure time activities. The researchers included 256 (129 females, 120 males) junior high, students with an average age of 13.46 years; these participants completed multiple assessments about students' perceived autonomy support, motivational regulations in PE, motivational regulations in leisure time activity, attitude, subjective norms, perceived

behavioral control, leisure time activities, and history of physical activity. The students were then split into an intervention group (61 females, 63 males) and a control group (68 females, 57 males). One PE teacher (43-year-old male) attended the autonomy-supportive intervention, which lasted two weeks and included three 90-minute seminars; he was then asked to apply the things he learned to his teaching while the other teacher just continued his normal teaching style. The researchers found that the direct effect from the changes of perceived autonomy support on autonomous motivation in PE and leisure time were statistically significant. The researchers also found that autonomy support had no direct effect on intentions to participate in physical activity. Overall, it seems that autonomy support does not change students' intent to exercise, but it does make the students more likely to have autonomous motivation when they engage in physical activity.

**Studies on the effects of coaches' implementations of SDT-related coaching styles with competitive athletes.** Although sport psychology researchers can apply some helpful information on teaching styles based off studies of PE teachers, there are multiple aspects that are different between PE teachers and coaches. Athletes' participating on sports teams have more motivation to perform and achieve a certain result such as a win, loss, or a certain time while students in a PE class are not necessarily trying to achieve a certain result. Reynders et al. (2019) investigated both short term and long-term effects of youth sport coaches using a structured and autonomy supportive style to see if these styles can be successfully trained. They recruited 43 coaches and 346 athletes, who took assessments that measured need satisfaction and need thwarting, athlete motivation, and athletes' self-reported engagement. Then, the coaches and athletes were separated in a control (20 coaches, 169 athletes) and an intervention (23 coaches, 1777 athletes) group; the control group continued their regular practices, while the coaches in the

intervention group participated in an intervention called “M-Factor,” which included four sessions. The initial session was about SDT and was followed by three workshops. The first workshop focused on “How to adopt a motivating style during training,” the second workshop focused on “How to adopt a motivating style during competition” and the third workshop focused on “How to introduce and monitor rules in a motivating way.” At baseline, Reynders et al. (2019) found that the coaches more likely to use a controlling coaching style were older as well as male coaches. After the intervention, there was a significant decrease in the intervention groups’ use of controlling coaches’ behaviors, but not in the control group. Reynders et al. (2019) found that there was a significant increase in autonomy support and a significant decrease in controlling coaching in the intervention group reported by the coaches, but not in the control group from pre-test to post test. The findings suggest that coaches should invest in autonomy-supportive training because this type of training will lead to athletes being motivated and engaged in their sport participation. One limitation of the study was that the researchers began the intervention mid-season, not giving the coaches a full season to implement what the coaches learned in the workshop. While the previous study started mid-season, Langdon et al. (2015) evaluated autonomy supportive coaching behaviors, while also investigating motivation, perceived autonomy-support, and basic need satisfaction among youth athletes across an entire sport season. The researchers recruited seven youth soccer coaches (2 females, 5 males) with an age range of 20-48 years old, along with 46 youth soccer players (28.3% female, 71.7% males) with an average age of 8.22 years old. The youth soccer players completed assessments that measured perceptions of basic need satisfaction, autonomy support from coaches and the athletes’ motivation. The coaches participated in a one-hour intervention session on autonomy-support and then online modules followed the initial overview that continued throughout the

season. From pre to post testing, there were no statistically significant changes in coaches' autonomy supportive behaviors, nor were there any significant changes in controlling behavior, thwarting of the relatedness need, or support of the relatedness need from the coach. Importantly, following the intervention, there were no significant changes to athletes' motivation or need satisfaction variables. However, their survey scores indicated that the athletes' relatedness, autonomy, and competence need satisfaction scores were above average and therefore they were already satisfied before the intervention. In addition, the athletes had lower extrinsic motivation and higher intrinsic motivation before the intervention. Overall, the findings suggest that youth coaches can satisfy the basic needs of their youth athletes by praising their athletes for their choices made, attitude displayed, and effort given, but future research mentions that coaches should try to work on providing athletes with choices and asking for their opinion. One limitation of this study was that the athletes were young and therefore the assessments may have been harder for them to understand, and future research can work on developing assessments that are more comprehensive to the youth population.

In addition, Pulido et al. (2020) analyzed the effects of an intervention on coach effectiveness, player outcomes and coaching competency. The researchers recruited eight male coaches and 117 youth male soccer players. The soccer players then took a few pre-test assessments that measured intention to persist, coaching competency, enjoyment, and satisfaction with their coach. The players were then broken into two groups: a control and an experimental group. The coaches of players in the experimental group then went through a training program that included four sessions on motivational theories, leadership, and coaching, giving feedback and reinforcements, group dynamics, and team building activities. At the end of the soccer season (6 weeks later), the researchers found that there were no differences in the

experimental and control between satisfaction with the head coach and intentions to persist. However, the experimental group's enjoyment differed significantly than in the control group. The athletes in the experimental group had increased character building, technique, and motivation, while those variables all decreased in the control group, which indicates that: the intervention was effective in increasing athletes' intention to persist in participating in sport, perception of their coaches' competency, and their own enjoyment. Some limitations of this study were that it was only male athletes, and they were youth athletes. Finally, Pulido et al. (2017) documented the effects of an intervention program that promoted motivational and methodological strategies based off self determination theory (SDT) for coaches. Pulido et al. (2017) included 8 coaches (four in the control group, four in the experimental group) and 109 male soccer players (control = 56, experimental = 53) who took multiple questionnaires that measured coaches' interpersonal style, need satisfaction, need thwarting, motivation, and sport commitment. The experimental groups' coach training program had two parts that equaled a total of 12 hours, while the control groups' coaches just went about their normal coaching days. The first part was focused on the theoretical framework of SDT, and the second part was focused on optimizing athletes' three basic needs using motivational and methodological strategies. After the intervention, Pulido et al. (2017) found that relatedness thwarting and competence thwarting were significantly different between the control group who was higher in need thwarting than the experimental group. Athletes' relatedness and competence need satisfaction were significantly different between the control group and the experimental group, who was higher in athletes' need satisfaction (Pulido et al., 2017). This study demonstrates that coaches who learn methodological and motivating strategies based on SDT are more likely to satisfy their athlete's needs. One limitation was that the participants were all males, so future researchers should use

female coaches and athletes (Pulido et al., 2017). Overall, these studies show that CET intervention programs based on SDT, which train leaders to use an autonomy supportive style, lead to increased satisfaction of athletes' and students' needs. Reynders et al. (2019) suggest that future research should add a training component on relatedness and see if a combination of needs being met increases the effectiveness of the intervention or if just satisfying one need is enough to increase the athlete's motivation to perform.

Research has shown that the athletes prefer an autonomy supportive coaching style and that training that style tends to satisfy athletes' needs, but researchers want to know if an autonomy supportive style produces the best performance from their athletes. Coaches and athletes alike would be extremely interested to learn if coaching styles affect actual athletic performance variables, because of that the field needs more studies that include a performance component.

**The effects of SDT-based CET interventions on performance.** Performance is a major aspect of sport; many athletes want coaches who help them increase performance. Including a performance dependent variable can let coaches and researchers know if altering or training coaching style affects sport or motor skill performance. If CET training affects performance, coaches may be more willing to invest time in being trained and/or would be more likely to follow the guidance on training. These following studies measured how certain coaching styles or SDT-based interventions affected students' or athletes' performance. Lemos et al. (2017) examined whether autonomy support training affected motor learning. The researchers trained 24 girls (mean age of 10.58 years; novices to ballet) on five of the classical ballet positions. Participants also took surveys on self-efficacy, rated their positive affect, and answered questions on their thoughts during the study. The girls were broken into two groups; choice (they got to

choose if they wanted to watch demonstration videos after being taught the five positions) and control (they did not get any choice to watch videos but were allowed to watch the videos occasionally shown by the experimenter). The girls each completed 50 practice trials and then completed a 10-trial retention test on the positions one day later. The researchers found that the choice group outperformed the control group on all practice trial blocks except the first block. The control group was clearly outperformed by the choice group based on the retention test and the main effect of the group was significant. Self-efficacy was the same in both groups at the start of the intervention, but after the retention test, self-efficacy was greater in the choice group. The choice group also had a greater positive affect at post-test. Overall, providing athletes with choice appears to increase their positive affect and self-efficacy, and it can align the performers goals with their movement actions. One limitation of this study was that there were only female participants, and they were all young girls.

While the previous study (Lemos et al., 2017) recruited young girls, the following study recruited both female and males above the age of 18. Manninen et al. (2020) recruited 69 (75% females, 25% male) undergraduate students and measured their perceived need-support, juggling skill performance, instructor adherence (the teachers' adherence to the need supportive or need thwarting strategies), self-determined motivation, trait anxiety, enjoyment, causality orientations, state anxiety, situational interest, in-class free-choice practice time, and out-of-class practice time. The students were broken into two groups by class level: need supportive (i.e., paired with a teacher who nurtured students' needs) and need-thwarting. Each group was given five 45-minute lessons on juggling and results were tracked by comparing pre and posttest assessments. The researchers measured the students' juggling performance by averaging the total number of successful catches (that did not include the first catch) for two rounds using three different

juggling techniques. The researchers found that there was a difference at post-test between groups that was statistically significant for enjoyment, intrinsic motivation, and skill performance (scores were moderately greater than those in the need thwarting group); all were greater in the need-supportive group. The researchers found no differences in state anxiety or other motivational regulations in between the groups. Lastly, the researchers found that the intervention positively impacted amotivation, intrinsic motivation, and integrated regulation for the need- supportive group. In conclusion, the results suggest that when in comparison to need-thwarting instruction, need-supportive instruction improves participants' enjoyment, skill performance, and intrinsic motivation. Some limitations of this study included lack of random assignment and lack of true control group. In addition, Jahromi and Yaali (2018) investigated how teachers' instructional language affects students' performance accuracy, self-efficacy, and intrinsic motivation. The researchers included 48 female undergraduate students, who took one questionnaire on intrinsic motivation and then watched a video clip. The students were split into three instructional groups: neutral instruction, autonomy-supportive instruction, and controlling instruction. After watching the video, the students performed 21 dart throws and then watched another clip tailored to the group they were in. The students then performed 51 dart throws and then returned a day later for 21 more dart throws as a retention test. The researchers found that self-efficacy and intrinsic motivation were statistically significantly affected by facilitating learning in the autonomy-supportive instructional group. The researchers also found that compared to the other two groups, there was significantly higher accuracy in dart throwing on the retention test in the autonomy-supportive group. In conclusion, providing positive feedback and autonomy, as well as changing instructional feedback to autonomy supportive appears to improve intrinsic motivation, self-efficacy, and performance. One limitation of the study was

that the participants were all females. In another study that focused on instructional language, Hooyma et al. (2014) explored how the wording of task instructions influenced the learning of 48 (37 males, 21 females) undergraduate students. The students were assigned randomly to three groups: autonomy-support language, neutral language, and controlling language. The students watched an instructional video on a cricket bowling action that is modified and done with a tennis ball and target with no sound and then would do 10 trials for a pre-test. The students then did 50 more trials in blocks of 10 each. Lastly, the students took two surveys that measured self-efficacy along with negative and positive affect. The researchers found that the autonomy-supportive group had the least number of errors when performing the cricket bowling action and the main effect of both group and block was significant. The neutral and autonomy supportive group had a higher self-efficacy. Higher levels of positive affect were found in the autonomy supportive group and the main effect of the group was significant. Lastly, negative affect did not differ among groups and was quite low. Overall using an autonomy-supportive coaching or teaching style can endow athletes with a greater self-efficacy, along with positive affect. Ultimately, greater self-efficacy and positive affect can decrease the students' attempts at controlling their movements that hinder automaticity

The previous studies included students along with novice athletes. Researchers have also measured performance variables in competitive athletes. For example, Mertens et al. (2018) examined the effects of coaches and athlete leaders' competence-support on the rest of the athletes on the team. The participants included 126 male competitive basketball players (average age of 16 years old) with an average of seven years of experience. The researchers gave the athletes questionnaires on competence, intrinsic motivation, and performance. The researchers also measured performance objectively by counting how many free-throws and lay-ups the

participants made in the first test session and measured the time the performance took the athlete to complete their task during the second session. The researchers then took the overall score and added a five second penalty for every shot missed. The researchers broke the participants up into three groups, the coach group (n = 42 players) where the coach provided the competence supportive feedback and the athlete leader group (n = 42 players) where the athlete leader provided the competence need supportive feedback and lastly the control group (n = 42 players) who got no feedback. The feedback included individual comments such as “that was a great shot” or “good job,” as well as comments towards the entire team including things like “keep going” “we are the fastest team if we keep this up.” The researchers found that, at post-test athletes’ in the coach condition had significantly higher perceived competence support than the athlete leader and control group when the coaches increased the rate of frequency of positive feedback. The researchers also found that in the athlete leader condition, the athletes’ perceived competence support was significantly higher than the coach condition and control condition when the athlete leader increased the rate of frequency of positive feedback. The increase of the feedback from the athlete leader increased competence supports the most. The researchers also found that no matter who delivered the competence support, the athletes executed their tasks faster when competence support was received. Although, when measuring shooting accuracy, the athletes performed better only when the support was from the coach. Overall, providing competence need support alone does have motivational benefits. One limitation of this study was that the focus was only on competence and only one aspect of competence and that was providing feedback (Mertens et al., 2018). Another limitation was that it was only male participants and it was also only basketball players. In another study on basketball players, Fransen et al. (2018) examined whether athletes’ performance (120 male basketball players;

average age 14.9 years old), competence satisfaction, and intrinsic motivation was impacted by competence support from athlete leaders and coaches. The participants' performance was measured by how many free throws and lay ups they made along with how long it took them to complete the task. The athletes were divided into four groups the athlete leader experimental group, the coach experimental group, the combined group (both coach and athlete leader) and the control group. In the coach experimental group and leader experimental group, the coach and leader gave feedback by saying things like: "great shot," "You will make it the next time," "No worries, your execution was good," and "you can do this. Keep the speed high." In the control group, the coach gave no motivational feedback and acted neutrally. The researchers found that the coach was more competent supportive than the athlete leaders. Intrinsic motivation and competence satisfaction were greater in the experimental groups than in the control group with no difference between the single or combined experimental groups. Athletes' performance improved significantly in speed in all three experimental groups compared to the control group, but accuracy was no different between the four groups. Overall athlete leaders have the ability to develop a motivating role that can impact the athletes just as strong as the coaches are able to and with that the coaches and athlete leaders can increase intrinsic motivation, boost athlete's performance, and satisfy the athletes competence. One limitation of this study was that the coach was a confederate student in research not the actual coach. Another limitation was that they did not take into consideration the quality of the feedback that was given to the athletes. In a final study on competitive athletes, Mladenovic et al. (2015) measured the motivational climate of controlled and autonomy supportive coaching styles and their influences on improvement of sport skills in water polo. The researchers recruited 20 male water polo players from Serbia, who ranged from five to 12 years old. Each athlete's performance was measured before the

experiment and after for swim speed (the time swimmers took to swim 5-meter sprints, 12 times) and technical elements (rating of one to five on waving the ball in one spot and waving the ball while moving in the water). The coaches were trained in SDT, SDT application and using different coaching styles. Then the athletes were split into two groups and underwent a three-month training period. Group one had an autonomy-supportive coach, who provided as much choice as possible, took the athletes' perspective, and gave a reason for each activity. Group two had a controlling coach, who ignored the athletes' questions, assigned tasks without feedback from the athletes, and showed little interest in how the athletes see things. Mladenovic et al. (2015) found that after the three months, swim speed increased for both controlled and autonomy supportive coach groups, but there were no statistical differences between the groups. Although there were no statistical differences between the groups at post-test, the controlling coach group had a larger decrease in their mean swimming time from pre to post-test than the autonomy support group; it is possible that with a larger sample size, these results may have led to statistically significant differences in the two groups in favor of the controlling coaching group. When measuring technical elements, both groups had statistically significant improvement, but there was no statistical difference between the groups. Although exceedingly small, there was a slightly greater improvement of technical elements in the autonomy support group even when the result was non-significant. Overall, when athletes are working on the development and learning of a complex skill, it appears that physical training and practice resulted in improved swimming times. Although the athletes did improve their speed and technique, because the results between group were not significant, the researchers are still unsure if the coaching style is what caused the increase (Mladenovic et al., 2015). Some limitations of this study are that these athletes were young, and the athletes may have just improved their skills based on the fact that the athletes

were learning new skills and as you practice new skills you start to improve and develop those skills.

From the previous studies, certain coaching styles like satisfying athletes' competence need, could affect certain aspects of performance; however, results are not yet consistent to determine if coaching styles affect objective measures of performance. There is extremely limited and somewhat inconsistent research on the effects of SDT focused coach trainings on performance; more research is needed that uses a performance variable, particularly on samples of competitive athletes of various ages. Mladenovic et al. (2015) mentions that future research should examine improvements in performance and sport practices by exploring circumstances and conditions under a controlled versus autonomy supportive coaching styles that cause these improvements in performance. Other limitations of these studies on competitive athletes are the previous studies only focused on two sports as well as only two age groups. Future research should include a variety of sports as well as include different age groups.

## **Conclusion**

The correlational studies reviewed above determined that athletes prefer coaches with an autonomy supportive coaching style. Also, there is strong and consistent evidence that an autonomy supportive coaching style is more likely to meet the athletes' three basic psychological needs and therefore lead to more self-determined motivation. Although coaches should of course want athletes to have a more self-determined motivation, it remains somewhat unknown to what degree autonomy supportive coaching affects motor skills or physical performance. If coaches know that a certain coaching style will improve performance, then coaches may be more likely to get involved in training as well as follow training guidelines.

The few studies that measured the effects of coaching interventions reviewed above that also included a measure of physical performance had results that were inconclusive; therefore, researchers are not yet able to determine if a particular coaching style has an effect on performance, as only a few studies have been conducted. In addition, because some studies collected data after several weeks of coach intervention, the performance variable may have been affected by practice effects or additional activities of the participants that were not related to the coaching style, such as additional training outside of scheduled practice time (Rocchi et al., 2019).

Researchers have measured participants' performance on a few novel activities to see if autonomy supportive versus controlling coach behavior increase performances of a new task. However, two of those studies included only female participants (Lemos et al., 2017; Jahromi & Yaali, 2018). In addition, nearly all of the studies included only undergraduate students except for one study who included young girls (Lemos et al., 2017). As such, there is a need for additional studies that expand on the age range tested in past experiments as well as studies that include all genders in order to increase generalizability. Moreover, there is a need for students with a more controlled dependent variable that is measured shortly after the coaching intervention, to minimize possible practice effects or outside influences; in other words, more experimental laboratory setting studies are needed before moving to field-based studies.

The current laboratory type study was designed to determine if autonomy supportive coaching can improve the performance of novice jugglers. This study recruited adults of all genders who were over the age of 18. The current study aimed to determine the effects of an autonomy supportive coaching style compared to a controlling coaching style on performance in a group of novice jugglers. In the majority of previous studies, athletes have preferred the

autonomy supportive coaching style over the controlling coaching style. Although, when researchers examined effects of coaching styles on performance, the results were inconclusive and not one coaching style was more effective than the other. Therefore, the hypothesis of the current study was that there will be no difference in performance between the autonomy supportive group and the controlling group.

## **Introduction**

Coaches take on many roles with their athletes (Conroy et al., 2006). Players tend to benefit from their coaches in a multitude of ways such as sport knowledge, well-being, understanding of rules, physical growth, and prosocial behaviors (Delrue et al., 2017; Felton & Jowett, 2013). Coaches' abilities and effectiveness can be improved and enhanced through training, also known as coach effectiveness training (CET) programs (Barnett et al., 1992).

Coach effectiveness training (CET) is designed to create a more positive experience for youth athletes by training youth coaches (Holtzclaw et al., 2019). There have been many studies that examined the effectiveness of various types of CET. In one particular study on 88 future coaches, researchers found that the coaches no longer had a depressed mood, and had increased productivity after going through coach behavioral training (David & Cobeanu, 2016). Another study on four coaches and 16 athletes demonstrated that following CET, coaches used more positive reinforcement, focused more on the athletes' efforts, and had an increase in planning for the future (Holtzclaw et al., 2019). In another study on 202 youth little league athletes along with 18 male coaches, researchers found athletes liked the coaches who were CET trained more than those without CET training and felt as if the coaches liked them more (Barnett et al., 2016). These athletes also developed greater interpersonal relationships with coaches and teammates. Overall, past studies indicate that CET trained coaches provide athletes with a more positive environment and develop stronger interpersonal relationships.

CET training can be designed using many different models and theories; a popular and heavily researched approach is to evaluate CET programs based on the self-determination theory (SDT; Deci & Ryan, 2000). Self-determination theory is a broad theoretical framework of human motivation, which can be applied to explain how coaching behaviors affect athletes or correlate

to athlete outcomes (Deci & Ryan, 2000). According to SDT, humans have three basic psychological needs that must be satisfied in order to achieve self-determined motivation (Ryan & Deci, 2000). According to Deci and Ryan (2000), the three basic psychological needs are relatedness, competence, and autonomy. Relatedness refers to the need to be cared for and loved a desire to feel connected, and it also includes caring for and loving others. Competence is feeling a sense of self-efficacy and having confidence about one's ability level or improvement. Lastly, autonomy refers to self-governance, or being able to use one's own will to make decisions (Deci & Ryan, 2000). According to SDT, when one's psychological needs are satisfied in a particular activity, the person will have intrinsic motivation for that activity (Deci & Ryan, 2000). By contrast, when a need is thwarted that means that a person's satisfaction of that need is blocked, which reduces intrinsic motivation (Deci & Ryan, 2000). For example, an athlete's need for relatedness would be thwarted if an athlete has many conflicts with their teammates or plays for a coach who conveys a lack of care about the athlete's well-being.

When one performs a behavior willingly, acts with volition, and feels in control of their own choices, it is considered autonomous motivation within the framework of SDT (Spence & Deci, 2013). One type of autonomous motivation is intrinsic motivation, which is when one participates in an activity for the sole purpose of enjoyment (Deci & Ryan, 2000). An example of intrinsic motivation would be children playing on a playground at the park, for pure enjoyment not for any external factor. In contrast, when one participates in an activity for motives other than inherent pleasure or satisfaction that is referred to as extrinsic motivation (Deci & Ryan, 2000). Extrinsic motivation has four subtypes according to SDT, and two of those subtypes are classified as autonomous motivation. The most autonomous and self-determined type of extrinsic motivation is called integrated regulation, and this type of motivation refers to activities that one

enjoys because they align with one's values or identity (Spence & Deci, 2013). Another autonomous type of extrinsic motivation in SDT is called identified regulation, and this type refers to when an athlete participates in the sport to achieve a particular goal inherent to the activity (Spence & Deci, 2013). An example of identified regulation related to attending practice would be an athlete who does not always enjoy going to practice but still attends to improve their ability to perform at a higher level, because the individual has a goal to become a better at their sport.

While two of the subtypes of extrinsic motivation are described as autonomous in SDT, there are two subtypes that are considered controlled motivation. When one feels pressured or coerced to act in a certain way that is referred to as controlled motivation in SDT (Spence & Deci, 2013). Spence and Deci (2013) explained that one controlled type of extrinsic motivation is introjected regulation, which refers to participating in an activity because if one does not, one will feel guilty or ashamed. An example of introjected regulation is when an athlete participates in their sport because they will feel guilty for disappointing their coach or teammates if they do not come to practice. The last controlled type of extrinsic motivation, which is the least self-determined, is called external regulation. This type refers to participating in an activity to receive a reward or avoid negative consequences (Spence & Deci, 2013). An example of external regulation would be a student who is only participating in sport because they are on athletic scholarship, and they would not be playing if they did not have a scholarship. The final construct defined in SDT is amotivation which refers to having no reason or lack of motivation to compete or participate in sport.

SDT-based interventions can be used to enhance behavioral self-regulation, well-being, and personality as well as determine if, following CET training, the coaches' or athletes' needs

are more likely to be satisfied or thwarted (Haerens et al., 2018; Reinboth et al., 2004; Stebbings et al., 2011 ). Within sport psychology literature, researchers have compared two different motivational coaching styles, autonomy-supportive and controlling coaching, on various outcomes. These styles can help researchers to understand and predict athlete's effort, motivation, and persistence.

Researchers use the term *autonomy-supportive coaching* to describe coaches who behave in ways that encourage self-regulation of self-initiation, give choice, acknowledge athletes' thoughts and feelings, minimize use of demands or pressure to control others, provide non-controlling feedback on performance, and provide a rationale behind each activity (Amorose & Anderson-Butcher, 2015). Autonomy supportive coaches also avoid guilt induced criticism and overt control (Amorose & Anderson-Butcher, 2015). Autonomy supportive coaches tend to acknowledge the athlete's natural tendency to grow and develop and assume that their athletes are self-motivated (Haerens et al., 2018). In a study with 18 coaches and 113 adolescent athletes the researchers found that the SDT intervention had five benefits for the coaches, including: increased belief in one's own coaching styles, use of skills taught in the SDT intervention, enhanced insight, being able to share ideas in a group, and application outside of sport (Mahoney et al., 2016).

By contrast, researchers use the term *controlling coaching* to describe coaches who want their athletes to act, feel, or behave in ways that are consistent with the coaches' needs and wants (Amorose & Anderson-Butcher, 2015). A controlling coach has typical behaviors that include attempting to dictate athletes' lives outside of sport, complementing athletes when they do well, but ignoring them when they do not, forcing athletes to comply with power assertive techniques, using rewards to manipulate athletes' behaviors, using overly critical feedback to motivate, and

using social comparison (Amorose & Anderson-Butcher, 2015). Controlling coaches tend to bypass or neglect their athletes' motivation (Haerens et al., 2018).

Over the past decade, many survey studies have been conducted to determine if these two coaching styles are related to athletes' experiences, well-being, or motivation. For example, in a study on 301 high school athletes, autonomy-supportive coaching was a significant positive predictor of athletes' intrinsic motivation and integrated regulation (Amorose & Anderson-Butcher, 2015). In addition, a study was done on 265 British adolescent male soccer players, where the researchers found that autonomy supportive coaching behavior was positively related to satisfaction of the three basic needs as well as positive well-being (Reinboth et al., 2004). In another study on 202 junior athletes from many different sports, need satisfaction and autonomous motivation were the highest in the high autonomy support coach group, while the high controlling coach group had the lowest autonomous motivation and need satisfaction (Haerens et al., 2018). In a similar study on 443 coaches, the researchers found a moderate and positive correlation between subject vitality, satisfaction of the three basic psychological needs, positive affect and autonomy supportive coaching styles; while a controlling coaching style negatively correlated with subject vitality, satisfaction of the three basic psychological needs and positive affect (Stebbins et al., 2011). In another study on 101 French judokas, researchers found that when the athletes perceived autonomy support from their coaches they were more likely to have self-determined motivation (Gillet et al., 2010).

While correlational survey studies are helpful, experimental research examining the effects of CET interventions may give researchers more insight on how the use of autonomy supportive and controlling coaching behaviors affects athletes. For example, in a study on 256 junior high students, researchers discovered that while autonomy support increased students'

autonomous motivation it did not increase their intent to exercise (Barkoukis et al., 2020). Barkouskis et al.'s (2020) finding followed an intervention when one PE teacher attended an autonomy-supportive intervention that took approximately two weeks and included three, 90-minute seminars. In another study on 117 male youth soccer players, researchers split participants into an intervention group and a control group (Pulido et al., 2020). The intervention group had a coach who attended a training program that included four sessions on giving feedback and reinforcements, motivational theories, group dynamics and team building activities, as well as leadership and coaching. The researchers found that the athletes in the intervention group (autonomy-supportive coaching group) had significantly greater enjoyment than the athletes in the control group at the end of the study (Pulido et al., 2020). These studies helped determine that coaching intervention affects athletes' perceptions and motivations; however, the researchers did not include a measure of athletes' performance.

Performance is a critical aspect of sport; many athletes want coaches who help them increase performance. Including a performance dependent variable within experimental studies can determine if altering or training coaching style affects sport or motor skill performance. If CET training affects performance, coaches may be more willing to invest time in being trained and/or would be more likely to follow the guidance they receive in training.

There are only a few CET studies that have used a dependent variable of performance. For example, in a study on 69 male and female undergraduate students, the researchers split the participants into a need supportive group (taught by instructor who used need satisfying instructions) and a controlling group (taught by instructor who used need thwarting instructions; Manninen et al., 2020). In this study, the instructors focused on satisfying or thwarting all three needs. The researchers compared the groups on juggling skill performance, enjoyment, and

intrinsic motivation after instruction. Researchers found that in the need supportive group, the students had greater skill performance (consecutive catches), intrinsic motivation, and enjoyment (Manninen et al., 2020). However, a limitation of this study was that researchers did not use random assignment. In a similar study on 48 female undergraduate students, the researchers split the participants into a neutral instruction group, autonomy-supportive instruction group, and controlling instruction group. Manninen et al. (2020) compared the results of dart throwing accuracy, self-efficacy, and intrinsic motivation. The researchers discovered that in the need supportive feedback group, students had greater accuracy, intrinsic motivation, and self-efficacy (Jahromi & Yaali, 2018). In a comparable study on 24 youth novice ballet dancers, researchers split the participants into two groups: a choice group in which the participants got to ask for video demonstrations and a control group in which the participants were told they may occasionally see a video demonstration. The researchers compared the results of the participants performance and self-efficacy (Lemos et al., 2017). The researchers found that self-efficacy was higher in the choice group along and that choice group participants outperformed all of the control group (Lemos et al., 2017).

While the previous studies using a CET performance variable targeted undergraduate student, the following study included competitive athletes. In a study on 20 male youth water polo players, the researchers split the participants into two groups: an autonomy supportive group and a controlling group (Mladenovic et al., 2015). In the autonomy supportive group, the coach provided the athletes with choice, gave a reason for each activity, and took the athletes' perspective, while in the controlling group the coach assigned tasks without feedback from the athletes, showed little interest in how athletes see things, and ignored athletes' questions. The researchers than compared the athletes' performance on a speed test and a skill test. The

researchers found that both the autonomy supportive and controlling groups had improvements in swim speed and technical elements, with no statistically significant differences between groups in performance (Mladenovic et al., 2015). Although the athletes improved their speed and technique, the results between groups were not different, therefore the researchers are still unsure what caused the increase, and the results are than inconclusive.

Researchers have measured participants' performance on a few novel activities to see if autonomy supportive versus controlling coach behavior increased physical performances of a new motor skill task (Jahromi & Yaali, 2018; Manninen et al., 2020). Given that the results of past studies, where researchers tested the effects of a coaching style on motor skill performance, were inconclusive, there is a need for continued research on the topic. Moreover, two of those studies included only female participants (Lemos et al., 2017; Jahromi & Yaali, 2018). In addition, nearly all of the studies described above compared the two coaching styles but did not include a measure of whether or not the coach was truly autonomy-supportive or controlling. Therefore, there is need for additional studies that both use random assignment to groups and include a measure of the learning climate to ensure that the coach is indeed using the intended coaching style. Moreover, there is a need for studies with a more controlled dependent performance variable that is measured shortly after the coaching intervention to minimize possible practice effects or outside influences that could have accounted for the lack of statistically different findings between groups in Mladenovic et al.'s (2015) study. In other words, more controlled, experimental laboratory setting studies are needed before moving to field-based studies.

The current lab-based experimental study was designed to determine if autonomy-supportive coaching can improve the performance of novice jugglers. In the current study,

researchers recruited adults of all genders who were over the age of 18. The researchers also used random assignment and added a measure of the learning climate in the current study. The purpose of the current study was to determine the effects of an autonomy supportive coaching style compared to a controlling coaching style on performance in a group of novice jugglers. In the majority of previous studies, athletes have preferred the autonomy supportive coaching style over the controlling coaching style. Although, when researchers examined effects of coaching styles on performance, the results were inconclusive. Therefore, the hypothesis of the current study was that there will be no difference in performance between the autonomy supportive group and the controlling group, as that has been the case in past studies (e.g., Mladenovic et al., 2015).

## **Methods**

### **Participants**

Participants were 18 college-student adults who were novice jugglers (13 women, 3 men, 1 gender non-binary, and 1 queer woman), with an average age of 20.33 years ( $SD = 1.19$ ). The race/ethnicity breakdown of the sample was: 44.4% White, 11.1% Hispanic, 33.3% Asian, as well as other participants who identified with more than one race (5.6% Asian/White/Hawaiian, and 5.6% Asian/White). The participants had some background in competitive sports including: volleyball ( $n = 5$ ), swimming ( $n = 3$ ), soccer ( $n = 4$ ), wrestling ( $n = 1$ ), track and field ( $n = 4$ ), cross country ( $n = 4$ ), basketball ( $n = 4$ ), softball ( $n = 1$ ), dance ( $n = 1$ ), weightlifting ( $n = 1$ ), baseball ( $n = 2$ ), lacrosse ( $n = 1$ ), and tennis. The participants were broken in to two groups: autonomy supportive group ( $n = 9$ , males = 0, females = 8, nonbinary = 1; mean age = 20.22 years). and controlling group ( $n = 9$ , males = 3, females = 6; mean age = 20.44 years).

## **Measures**

### ***Consecutive Catches.***

All of the students were tested on their juggling performance before and after the experiment using two tests. The first performance test measured the number of consecutive successful catches each participant made while juggling three balls. Each participant had three attempts at this test. The first catch was not included in the count, but each catch after the first catch counted as one point. This procedure was used in past research on juggling performance (Manninen et al., 2020). Once the participant dropped the ball, that trial was than over.

Consecutive catches were averaged over three trials.

### ***Speed Test.***

The second performance test measured the time it took the participants to achieve five consecutive catches, within a five-minute limit. Each time they dropped the ball the time continued, but the count started from zero. The reason behind using a speed test is that it is a more ecologically valid measure of performance; in many sports, the faster one successfully completes a skill, the more points one will earn over the course of a competition. Thus, shorter time to successful completion was a target variable in this study. This variable was measured in seconds.

### ***Perceived Autonomy Supportive Behaviors.***

Participants evaluated the coach's autonomy supportive behaviors using the Learning Climate Questionnaire (LCQ; Williams & Deci, 1996; Appendix K), which assesses participants' perceptions of a leader. The LCQ is a 6-item questionnaire, with response options that range from strongly disagree to strongly agree on a seven-point Likert scale, with higher scores indicating a more autonomy supportive coaching behaviors. To score the LCQ, the average of

the individual items is computed. The LCQ has a reported Cronbach's alpha of 0.96 (William & Deci, 1996). In the present student, the Cronbach's alpha on the LCQ was 0.88, indicating strong internal consistency.

## **Procedure**

Prior to collecting data and recruiting participants, the study was approved by the Institutional Review Board. Participants were recruited using convenience sampling; seventeen of the participants were students in one undergraduate sport psychology course who earned class credit for participating. Flyers were also posted around campus and one participant was recruited through the flyers posted. Each participant took a Qualtrics survey to determine they qualified for the study. The inclusion criteria (see Appendix E) for the study were 1) over the age of 18, and 2) have no prior successful juggling experience (defined as follows: the participant could have attempted juggling before but was not successful in catching three or more balls in a row). If they met inclusion criteria, they arranged a one-hour, one-on-one meeting at a standard sized gymnasium. The participants were randomly assigned to an autonomy supportive coaching group or controlling coaching group prior to arriving for data collection.

## ***Experimental Protocol***

At the start of the experimental session, participants signed an informed consent form (see Appendix F). Next, the researcher read standardized introductory scripts to all participants, which explained that the purpose of the study was to teach participants how to juggle. Then, each participant performed the two juggling pre-tests. The participants performed all study procedures in an open gym in front of the primary researcher, therefore the researcher could count the number of catches. There was a second-rater present for seven of the data collection sessions, while the primary researcher was present for all data collection sessions. The primary researcher

and second-rater agreed that a catch was successful if it left one hand and was caught in the opposite hand. If the second-rater and primary researcher had different numbers, the primary researcher averaged the two numbers to include in the final data collection sheet. Next, each participant watched an eight-minute instructional video on juggling, which included video but no sound; while participants watched the video, the researcher provided juggling instructions (see Appendix I) that corresponded to a visual demonstration in the video. After each participant watched the video, the participants then had 10 minutes to practice juggling while the researcher provided feedback that was specific to their group assignment.

If a participant was in the autonomy-supportive group, they were instructed in an autonomy supportive way to practice juggling for 10 minutes, which included choices, an overview of the session, and a rationale for the practice period. They received these instructions:

“You now have the opportunity to practice juggling. You will have 10 minutes to practice and then we will take a two-minute break before we test your juggling again using the same two tests. Please select three balls from this basket of tennis balls. All participants in this study need to use standard sized tennis balls to be sure that there are no effects of different equipment on the results. You are welcome to practice however you think would be best and you may stand wherever you feel most comfortable, you can face me or face another direction of your choice. Feel free to either follow the video instructions and cues or try your own technique or cues. I will be checking in and providing feedback throughout the 10 minutes. The purpose of this practice period is to improve your juggling skills. Do you understand the task? Do you have any questions before you begin?”

During the practice session, all participants in this group were provided standardized autonomy supportive feedback (see Appendix J).

If the participant was in the controlling group, they were instructed in a controlling way to practice juggling for 10 minutes, with no rationale provided, with these instructions:

“Your job today is a relatively easy task, which is to learn how to juggle. These three tennis balls are the balls that you need to use. You have some time to practice now, and I will tell you when to stop when your time is over. Please practice in accordance with the instructions from the video and use the cues that were provided. In other words, try to mimic them precisely. You also need to stand directly in front of me and continue to practice until I tell you to stop. Your time begins now.

During their 10-minute practice period, this group received controlling feedback from the primary researcher (see Appendix J).

Following the practice period, all participants had a five-minute break and then completed the same 2 juggling tests again as a post test.

### ***Manipulation Check and Debriefing***

Lastly, the participants took the LCQ in person at the end of their data collection period as a manipulation check. The participants took this questionnaire to measure if the researcher was perceived as autonomy supportive or controlling. Participants were then debriefed (see Appendix L) and informed of the true purpose of the study. The entire experimental procedure lasted between 30-45 minutes. At the end of the study, participants received class credit if applicable (n = 17).

### **Analysis**

Two separate, 2 (group) x 2 (time) mixed between-within subjects' ANOVAs were used to test the effects of the intervention and to determine if there was an interaction between the factors of experimental group (autonomy support vs. controlling) and the within subjects' factor of time (pre to posttest) on both dependent variables related to juggling performance. The *p* value used in this study was 0.5 and the researcher calculated effect sizes. Effect sizes for the ANOVAs were calculated using partial eta squared, interpreted using these guidelines: less than or equal to 0.01 is a small effect, .06 is medium effect, and .14 is a large effect (Cohen, 1988).

Possible group differences on responses to the LCQ were assessed using an independent samples t-test. To evaluate the effect size on the t-tests, Cohen's *d* was used which was interpreted using these guidelines: less than or equal to 0.2 is a small effect, 0.5 is a medium effect, and 0.8 is a large effect (Cohen, 1988). If a significant interaction was found, the researchers ran a post-hoc t-test and these were all calculated using SPSS.

### Results

During the three pre-test trials, the autonomy supportive group had an average of 1.63 (*SD* = 1.24) consecutive catches. In addition, they took on average 149.22 (*SD* = 129.33) seconds to catch five balls. During the pre-test, the controlling group had an average of 1.70 (*SD* = 1.02) consecutive catches over three trials. In the second pre-test measurement, the controlling group took on average 112.90 (*SD* = 117.66) seconds to catch five balls. During the post-test, the autonomy supportive group had an average of 3.63 (*SD* = 3.57) consecutive catches and took on average 154.78 (*SD* = 125.52) seconds to catch five balls. While the controlling group had an average of 5.77 (*SD* = 7.16) consecutive catches and took on average 53.44 (*SD* = 75.27) seconds to catch five balls. See Table 1 for all descriptive statistics.

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Dependent Variable	Mean	Standard Deviation
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Autonomy Support Group

# of catches (Pre)	1.63	1.24
# of catches (Post)	3.63	3.57
Time in seconds (Pre)	149.22	129.33
Time in seconds (Post)	154.78	125.52
Average LCQ	5.94	0.95

Controlling Group

# of catches (Pre)	1.70	1.02
# of catches (Post)	5.77	7.16
Time in seconds (Pre)	112.89	117.67
Time in seconds (Post)	53.44	75.27
Average LCQ	4.52	1.20

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The consecutive catches ANOVA revealed that there was no interaction effect between groups and time on the number of consecutive catches, Wilks' Lambda = 0.96,  $F(1,16) = 0.68$ ,  $p = 0.42$ , and a medium small partial eta squared = 0.04. There was a statistically significant main effect of time, Wilks' Lambda = 0.7,  $F(1,16) = 5.81$ ,  $p = 0.03$ ; the effect size was large (partial eta squared = 0.27). Thus, both groups demonstrated large improvement in performance at post-test compared to pre-test. When assessing main effects of group (autonomy support vs controlling), there were no significant effects,  $F(1,16) = 0.58$ ,  $p = 0.46$ , partial eta squared = 0.04, which is a small effect size, in favor of the controlling group.

Results of the second mixed ANOVA revealed that there was no interaction between groups and time on the variable of time needed to catch five balls, Wilks' Lambda = 0.93,  $F$

(1,16) = 1.25,  $p = 0.28$ ; however, there was a medium effect size as indicated by a partial eta squared of 0.07. There was not interaction effect when it came to time, Wilks Lambda = 0.95,  $F(1,16) = 0.86$ ,  $p = 0.37$ , with a small effect size (partial eta squared = 0.05). Lastly the main effect of group (autonomy support vs controlling) had no interaction effect,  $F(1,16) = 2.32$ ,  $p = 0.15$ ; however, partial eta squared was 0.13, which is at the top end of the medium effect size range (i.e., nearly large effect), in favor of the controlling group.

Results on the independent samples t-test to compare the groups' responses on the LCQ indicated differences in scores between the autonomy supportive ( $M = 5.94$ ,  $SD = 0.95$ ) and controlling group ( $M = 4.52$ ,  $SD = 1.20$ ) that were statistically significant,  $t(16) = 2.79$ ,  $p = 0.01$ , two-tailed. The effect size was 1.08, which is very large.

### **Discussion**

This study was designed to determine if being instructed by an autonomy supportive coach improved the juggling performance of novice jugglers more so than those instructed by a controlling coach. The hypothesis stated there would be no difference in juggling performance between groups and the results supported that hypothesis in that there were no statistically significantly interaction effects detected in the two mixed ANOVAs. However, the medium sized interaction effects found on the dependent variable of time to catch five balls, indicated that the controlling coach group appeared to improve at post-test more so than the autonomy supported group by looking at the improvements from pre-test to post-test. However, the lack of statistically significant interaction effects as measured by  $p$  values, of an autonomy supportive vs controlling coaching style on performance is consistent with a study conducted by Mladenovic et al. (2015) in which no statistically significant interaction effect, measured by  $p$  values, was found in water polo performance between an autonomy supportive and controlling coaching groups.

However, the current study's findings differ from other previous studies that found statistically significant improvements in performance on a task after autonomy supportive coaching (Hooyman et al., 2014, Jahromi & Yaali, 2018, Manninen et al., 2020), which could be because past studies had more participants. In Jahromi and Yaali's (2018) study, there was an improvement in performance in dart throwing, which may be due to a higher number of participants. The current study, with only 18 participants, may have been affected by participants who were outliers. For example, at post-test some participants in the autonomy-supportive group posted very high time scores, as reflected in the large standard deviation, which may have skewed the group's average. By contrast, the controlling group's standard deviation on the time test was smaller at post-test, possibly indicating more uniform performance across the group.

Although there was no statistically significant interaction effect on time it took participants to catch five balls in a row, there was a medium effect in the direction of the controlling group. This finding provides indication of a meaningful decrease in the time it took controlling group participants to catch five balls in a row, which was not expected. This finding is comparable to the results found in Mladenovic et al. (2015) in which trends in the data indicated that the controlling coach group had a larger decrease in their swim time from pre to post-test than the autonomy support group, although the results were not statistically significant and thus no meaningful group differences were evident. Perhaps with a bigger sample size, or in a longitudinal study, the results would have been statistically significant as measured by  $p$  values. Although, Mladenovic et al. (2015) recruited youth athletes compared to the current study done on students ages 18 and older, therefore, to determine whether autonomy supportive coaching or controlling coaching has a greater impact on performance, more research is needed on the same aged populations for comparison. Another difference is that in the present study,

each participant performed the juggling tasks individually with the primary researcher and in some sessions a second rater, whereas Mladenovic et al.'s (2015) participants performed their tasks in a group. In the current study, the researchers kept data collection with one individual at a time to avoid any added pressure by having another person in the room while they practiced or did the tests. However, when athletes work in a group it allows the participants or athletes to support each other when the coach may be using a more controlling coaching style, thus having a teammate to lean on could be beneficial. The reason the autonomy-supportive group did not perform well on the timed posttest in the current study could be that they felt no pressure to try and achieve a higher score. Overall, although the controlling group performed better on both the consecutive catches and the timed test and reasons for that maybe because the feedback given by the controlling coach pushed them to perform at a higher level. In the controlling group the feedback and the instructions about the practice period were very straightforward and to the point and did not allow questions. These instructions and the feedback could have made the participant really focused and eliminated any confusion about what needed to be done. In addition, novices may also prefer less choice because they may not feel competent to perform the skill or may prefer to have fewer pieces of information to use their attentional resources on.

Specifically, when comparing the current study to a past study on juggling, Manninen et al., (2020) found significant improvement in juggling performance measured by consecutive catches with three attempts with each juggling style after need-supportive instruction was given. One reason their participants may have improved is the fact that they had 45 minutes of instruction instead of 10 minutes. Manninen et al. (2020) also had higher number of participants, with 69 total, while the current study had 18 participants; therefore Manninen et al. (2020) may have had more statistical power to assess group differences due to higher participant numbers.

Another difference in Manninen et al.'s (2020) study compared to the current study is that their participants tried three different juggling types (basic, reverse, and mills mess cascade, all using three balls) compared to just one and, therefore, one juggling type may have been easier for the participants to learn and develop their skills. Lastly, the two groups that participants were split into were need supportive and need-thwarting group in which the teacher nurtured the students' needs, or blocked satisfaction of their needs. When comparing the two studies, Manninen et al. (2020) focused on all three needs while in the current study the researcher focused on only autonomy support. Although, the current researcher's autonomy-supportive feedback along with the warmth from the feedback could have also satisfied participants' competence and relatedness needs.

It should be noted that there was a statistically significant main effect of time, with a large effect size, on the dependent variable of total consecutive catches. This means that all participants got statistically significantly better from pretest to posttest on the consecutive catches test. This finding implies that the physical practice of the skill itself helps participants to improve their skills. When the participants first completed the consecutive catches test (pre-test), many had never juggled before, but after watching an instructional video and practicing, the participants were then able to catch more balls. Furthermore, this shows practical implications for coaches and students, that when novices are given instruction from coaches along with time to practice using the instructions, they will be able to learn those skills and improve, regardless of what kind of feedback is given (autonomy vs controlling), even in a short amount of time.

In a similar study, Mladenovic et al. (2015) found that overall, the athletes improved their technique and speed, but the results between groups was not different. Therefore, the researchers were not able to determine if the improvements were due to the coaching styles. Similar to the

present study, there was improvement from start to finish in consecutive catches, but it was not different between groups; therefore, we are not able to determine if improvements on catches was due to anything related to the coaching style. However, in the current study it can be determined that the coaching style did cause a difference in perception of the coaching climate between the groups. Although Mladenovic et al. (2015) observed how the participants reacted to each coaching style, there were no measures taken to see if the coaching climate had a significant impact on the participants.

### **Learning Environment Findings**

There was evidence in the current study of an effect of an autonomy supportive compared to a controlling coaching style on the participants' experiences of the learning environment. Based on the LCQ scores, the participants in the autonomy supportive coaching style group perceived the leader as more autonomy supportive than those in the controlling coaching style group. This finding matches with what the primary researcher in the study anecdotally observed when leading the data collection session. For example, one participant mentioned that if the researcher did not debrief them after the session the participant would have walked away thinking this was a truly horrible experience having been in the controlling group. Once the two groups were brought to this participant's awareness, the participant was then more understanding of the coaching style. The primary researcher noticed that during the controlling coaching sessions it could have been helpful to have another teammate there to support the participants because the controlling coaching style created a negative environment. Although another person could have been beneficial, having one participant at a time, especially when the participant was performing a task they have never done before, did appear to take the pressure off the participant. Overall, coaches can use this information about learning climate when reviewing their own

coaching style and can be aware that their feedback does lead to measurable differences on their athletes' perceptions of the learning environment

Overall, the differences on the groups' LCQ scores indicate that the lead researcher did indeed create different learning experiences for the two groups. The primary researcher had very little time with each participant in order to evoke the differences in coaching style; yet there was a measurable effect of the two different styles in that brief period of time. In terms of what explains these differences, it is likely that the options of choice and rationale in the autonomy-support group, in addition to the different feedback, made a difference. For example, in the autonomy-supportive group participants were given a choice of the balls they wanted to use along with the rationale for use of standard size tennis balls. The autonomy supportive group was also provided with choice on how and where to practice, along with count downs of how much time was left during the practice period. While in the controlling group no choice or rationale was given. The controlling group also had to practice in one particular spot and was not given count down of the time remaining in the practice period.

It is noteworthy that during the time the study, mandatory masking policies were still in place on the University campus for the first week of the study, but not required for the second and last week of the study. Although masks were not required for the duration of the study, the primary researcher wore a mask during the whole time period, along with almost every participant. As such, the study's finding on learning climate shows that even though one is wearing a mask, a coach can still be perceived as autonomy-supportive.

### **Limitations and Future Research**

This study has a few primary limitations. The first limitation of this study was that the sample size was small. If a larger sample size is used in the future, more researchers may be able

to find statistical significance as measured with larger effect sizes. The second limitation of this study was that it was done in a brief period of time; each participant met with the primary researcher once for about 30-45 minutes each. Future researchers can meet with the participants for a longer period of time and meet with the participants continuously for a span of a few months or years so that the experiment more closely mirrors a real sport setting in which coaches and athletes have more regular contact. A third limitation of this study was that the different styles of coaching was implemented only in the feedback given to the participants during their practice session. Future researchers can implement the different styles of coaching, while giving technical instructions and throughout the whole-time span of working with the participants as that would again mirror a real coaching environment more closely. A fourth limitation of this study was that the study was done on novice jugglers in which the primary researcher met with the participant for one initial data collection session. Normally coaches get to work with their athletes for more than just one initial lesson to their sport. The final limitation of this study was that all participants, but one, were students from a sport psychology class; given that they were learning about sport psychology, the students may have been keyed into the possibility of the researcher manipulating the experimental setting. Future researchers can use students in a different major or those with no knowledge of sport psychology. A final limitation was that the researchers did not know the athletes' sport history, such as what types of coaches (autonomy supportive or controlling) they may have had in the past as well as what coaching styles they prefer. Future research could include measures such as the general causality orientations scale (GCOS; Deci & Ryan, 1985) to assess for these relevant variables.

### **Conclusion and Application**

Overall, it was found that coaching style leads to significant differences in perceptions of the learning environment, but there were no statistically significant differences in performances. However, when examining effect sizes, the controlling group appeared to improve more on the timed test at post-test, and it might have been due to the instructions and the feedback given in that group. Therefore, more research needs to be done in order to determine if an autonomy-supportive coaching style has an effect on performance. Coaches can take from this study that the climate and the style they use to give feedback does affect athletes; coaches should take into consideration the type of coaching style they want to use and how it will impact their athletes and the team. Based on the results of this study, using a controlling coaching style may cause improvements in performance in the moment, but past research indicates that, in the long run, a controlling coaching style is related to lower intrinsic motivation in athletes (Amorose & Anderson-Butcher, 2015; Hollembek & Amorose, 2005). One takeaway from this study is that athletes may benefit when coaches use a more straightforward and to the point way of giving instructions when teaching novices, a new skill. Again, however, overall athletes tend to prefer the autonomy-supportive coaching style (Conroy & Coatsworth, 2007). Although improving athletes' performance is of course important to coaches, they should be aware that their feedback and the climate they provide can affect athletes' experiences of the learning environment, even in the short-term.

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## Appendix A

### Journal of Applied Sport Psychology Submission Guidelines

All parts of the manuscript should be typewritten, double-spaced, with margins of at least one inch on all sides. Articles will be no more than 30 double-spaced pages in length for quantitative submissions and 35 for qualitative submission (including tables, figures, and references). They should also include a title page, a 250-word abstract, 50-word lay summary, up to three implications for practice and complete references. Lay summaries should be included after the abstract and key words. Insert a line space after the abstract, and then include a heading (Implications for Practice:) and then finally the text in bullet point format. The title of the manuscript should reappear on the first page of the text. Authors should also supply a shortened version of the title suitable for the running head, not exceeding 50-character spaces. The discussion section of the manuscript should provide suitable attention to the applied implications arising from the findings of the work. Research notes with novel or interesting descriptive quantitative or qualitative data (15-pages including references, tables, figures, 100-word abstract) are welcomed submissions.

Manuscripts, including tables, figures and references, should be prepared in accordance with the Publication Manual of the American Psychology Association (Seventh Edition, 2020). Manuscripts which do not adhere to these guidelines will be returned to the authors on submission.

Authors are to avoid the use of sexist, racist, and otherwise offensive language. Where relevant the cultural characteristics of any sample population should be described in the participation section of the method. Manuscript copies should be clear and legible and all figures must be camera ready.

General guidance for the preparation and successful submission of academic work in sport and exercise psychology can be found here.

Guidelines can be found using the following link:

<https://www.tandfonline.com/action/authorSubmission?journalCode=uasp20&page=instructions>

## **Appendix B**

### **Western Washington University Internal Review Board Notification**

WWU Research Compliance To: Dominique Mullicane; Jessyca Arthur-Cameselle Subject: Mullicane Application #4603EP22 Approved Hi Dominique, It was determined that application #4603EP22 “The effects of an autonomy supportive vs an controlling coach on performance in novice jugglers” meets the requirements outlined in §45 CFR 46 and WWU Institutional Policy to receive approval under the following expedited category: Expedited Category 4 You may begin recruitment and data collection. This approval is given under the following conditions:

1. The research will be conducted only according to the approved protocol.
2. The research will be conducted in accordance with the ethical principles of Justice, Beneficence, and Respect for Persons, as described in the Belmont Report, as well as with federal and University policy.
3. Any individual interacting or intervening with human subjects or their identifiable data will be appropriately trained in human research subject protections (CITI Basic Social/Behavioral Researcher course), research methods, and responsible conduct of research.
4. The Principal Investigator will retain documentation of all past and present personnel, including documentation of their training.
5. The Principal Investigator will ensure that trainings remain up to date.
6. IRB approval will be obtained prior to making any modifications from the approved protocol or materials. The only exception is that a modification is not required for adding or removing research personnel other than the Principal Investigator (PI), PI Proxy, or Faculty Advisor (if applicable).

7. All research records (the application approval or determination packet, correspondence with the IRB, any other IRB-related approvals, signed consent forms, and documentation of research personnel trainings in human research subject protections) will be maintained in accordance with WWU's guidelines for document retention.

8. The IRB will be promptly informed of any issues that arise during the conduct of the research, such as adverse events, unanticipated problems, protocol deviations, or any issue that may increase the risk to research participants.

9. When all interaction and intervention with human subjects or their identifiable data is complete, the Principal Investigator will submit a final status report to close the application.

Thank you for your attention to these details. If you have questions at any point, please review our website ([www.wwu.edu/compliance](http://www.wwu.edu/compliance)) or contact a Research Compliance Officer.

Sincerely, Stephanie Richey  
Pronouns she/her/hers  
Research Compliance Officer  
Research & Sponsored Programs  
Western Washington University

[www.wwu.edu/compliance](http://www.wwu.edu/compliance)

[compliance@wwu.edu](mailto:compliance@wwu.edu)

360.650.2146

Hours: (Working Remotely) M 8 - 1:00 pm, Tu 8 – 5:00 pm, F 8 - 3:00 pm

## **Appendix C**

### **Script to Read for KIN 320 Classes**

Hello Class,

My name is Dominique Mullicane and I am a graduate student in the Sport and Exercise Psychology Master's program at Western Washington University. I am conducting a study for my Master's thesis project on how novices, which means beginners, learn how to juggle. I am looking for participants to join my study. If you have never tried juggling or have not been able to juggle more than a few balls before and are interested in learning how, please sign up!

Participation in this study is completely voluntary. The study will take place in Carver Gym D and will take 30-45 minutes. In the study, you will watch instructional videos on juggling, and practice your juggling before and after doing a juggling skills test. If you participate, you can earn extra credit in this course, based on the policy about extra credit in your professor's syllabus. If you participate, I will give you a certificate to show your TA and professor to confirm that you attended. If you are interested, scan the QR code on the flier and reserve your spot today!

Thank you

Dominique Mullicane

# Want to learn how to Juggle?

My name is Dominique Mullicane and I am a graduate student at WWU conducting a study for my Master's thesis on how beginners learn to juggle. I am looking for participants to join my study. Participation will last ~60 minutes in Carver Gym D.



**Scan QR code to see if you are eligible and to schedule a time**

## **Participant Requirements**



- Must be at least 18 years old.
- Must be WWU student/staff/faculty
- Must be beginner level juggler or have no juggling experience

## Appendix E

### Screening Questionnaire

1. Are you over the age of 18?
  - a. Yes
  - b. No
2. Have you ever juggled before?
  - a. Yes
  - b. No
3. If yes were you successful in catching 3 or more balls in a row?
  - a. Yes
  - b. No

## Appendix F

### Informed Consent Novice Juggling Study Western Washington University (WWU)

**Primary Researcher:** Dominique Mullicane, Masters Student in Sport & Exercise Psychology at WWU

**Research Supervisor:** Jessyca Arthur-Cameselle, Professor of Sport & Exercise Psychology at WWU

We are asking you to be in a research study. Participation is voluntary. The purpose of this form is to give you the information you will need to help you decide whether to participate. Please read the form carefully. You may ask questions about anything that is not clear. When we have answered all of your questions, you can decide if you want to be in the study or not. This process is called “informed consent.”

**Purpose and Benefit:** The purpose of this research study is to better understand the process by which beginners learn how to juggle. There are no direct personal benefits from completing this study; however, my participation can further knowledge of how to best instruct beginning jugglers to successfully learn how to juggle.

**Summary of your Participation:** If you choose to participate in this study, you will come to a Carver Gym D at WWU for approximately 60 minutes. During the study, you will watch a video on juggling, practice juggling, as well as complete juggling performance tests, and complete a demographic questionnaire (e.g., your age and gender) and a feedback questionnaire that asks about your experiences during the study.

**Risks:** There are no known or expected lasting risks to participating; however, it is possible that you might experience some stress about having your juggling skills evaluated or you may experience some mild fatigue after juggling. Injury is not expected, but if you injure yourself while juggling, you will be referred for treatment, which will be billed like any normal doctor’s visit.

**Data Privacy and Protections:** All information about you will be stored securely and will be kept confidential, meaning that only researchers and research assistants will have access to your identifiable responses. You will be given a code number, which will be used to label your data; the link between this code and your name and other identifying information will be stored separately from your data (i.e., your juggling performance data and survey responses). We will ask for your email address to facilitate communication with your professor and TA to inform them of your participation in order for you to receive class credit (see below); however, your contact information will not be stored in the same location with your data. Your contact information will be destroyed at the end of the study. We take every precaution to protect your information, though no guarantee of security can be absolute. We believe the chances of you being identified are low due to the protections in place for your privacy. Your data, with

identifiers removed, may be used or distributed for future research without your additional informed consent.

**Withdrawal:** Your participation is voluntary. You can leave the study at any time with no penalty. You can request to have your data and contact information destroyed up until the end of data collection for all participants, at which point we will no longer know which responses are yours.

**Incentive:** If you participate in this study you will receive extra credit in your sport psychology class (KIN 320), per your professor’s syllabus policy. Researchers will provide you with a certificate of completion and will send it to your TA and/or your professor. However, participation in this study is not required for your course; your professor has indicated in the syllabus that any student who does not want to participate in the study can complete an alternative extra credit assignment of the same duration (~1 hour of time), worth the exact same amount of extra credit. This alternative assignment is to watch a course-relevant video and type answers to some brief, summary type questions. The total time to complete this alternative assignment will be no more than participating in this study (1 hour or less) to ensure fair treatment to all students.

This research is being conducted by Dominique Mullicane, a master’s student at Western Washington University, under the supervision of Dr. Jessyca Arthur-Cameselle. Any questions that you have about this study, or your participation may be directed to Dominique at [mullicd@wwu.edu](mailto:mullicd@wwu.edu).

The Institutional Review Board (IRB) at Western Washington University has approved this study. If you have any questions about your rights as a research participant, you can contact the Western Washington University Office of Research and Sponsored Programs (RSP) at [compliance@wwu.edu](mailto:compliance@wwu.edu) (360) 650- 2146. Any questions that you have about this study, or your participation, may be directed to Dominique Mullicane @ [mullicd@wwu.edu](mailto:mullicd@wwu.edu).

If during or after participation in this study you suffer from any adverse effects as a result of participation, please notify Dominique Mullicane.

\*\*\*\*\*

**Participant’s Consent:** By signing below, you are indicating that you are over 18 years old, you have read this form, you have had your questions answered, you understand the tasks involved, and you wish to volunteer to take part in this research study. You are also indicating that you agree to let the researcher contact your professor to let them know of your participation in order to receive credit in your class (if applicable). After signing below, you will be given a hard copy of this consent form to take with you.

**Full Name:** \_\_\_\_\_

**Signature:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Email address:** \_\_\_\_\_

## Appendix G

### Demographic Questionnaire

1. What is your current age in years (e.g., 21 years old)? \_\_\_\_\_

2. What is your gender identity? (Check all that apply)

\_\_\_\_\_ Man

\_\_\_\_\_ Women

\_\_\_\_\_ Transman

\_\_\_\_\_ Transwoman

\_\_\_\_\_ Agender

\_\_\_\_\_ Non-binary

\_\_\_\_\_ Two-Spirit

\_\_\_\_\_ Gender Fluid/Queer

\_\_\_\_\_ Prefer not to answer

Other (Please Explain) \_\_\_\_\_

3. What race/ethnicity(s) do you identify with? (Check all that apply)

\_\_\_\_\_ American Indian or Alaska Native

\_\_\_\_\_ Asian or Asian American (including Indian subcontinent and Philippines)

\_\_\_\_\_ Black or African American (including Africa and Caribbean)

\_\_\_\_\_ Hispanic or Latino/Latina/Latinx (including Spain)

\_\_\_\_\_ Native Hawaiian and Other Pacific Islander

\_\_\_\_\_ White or European American

\_\_\_\_\_ Arab/Middle Eastern

\_\_\_\_\_ Other (please explain) \_\_\_\_\_

\_\_\_\_\_ Prefer not to respond

4. Did you participate in competitive sports when you were in middle school or high school?

a. If yes, complete the following table:

Sport Type	Total years...	Highest competitive level	Currently Competing	What level?

## **Appendix H**

### **Introduction Script**

Hello, thank you for taking time to be a part of my study. My name is Dominique Mullicane and I am a graduate student in the sport and exercise psychology program at Western Washington University. Before getting started I need you to read and sign an informed consent form. Any questions about the form before we begin? Would you like a hard copy of the consent form?

I have very specific instructions and in order to make sure all participants receive the same information, I may look at my notes from time to time, so please forgive me I do not want to forget any steps.

The purpose of this study is to better understand how beginners learn how to juggle. Before I give you any instruction, I am going to have you perform two juggling tests. Please take these 3 tennis balls and then stand in a comfortable position and face me. If you have any questions let me know.

The first test we will do is the consecutive catches test. I will be counting how many successful catches you can make in a row. You will get to try this three times. Any questions? Can you repeat those instructions back to me? Begin when you are ready.

Now we will do a second test. For this one, I will time how long it takes you to make 5 catches in a row. If you get to 5, we will stop the timer. You will have up to 5-minutes to see if you can get to five catches. Any questions? When you are ready give me a thumbs up and I will start your time.

Now that your pretests are completed. I am going to show you an instructional juggling video. You will then have time after the video to practice what you learned in the video. Do you have any questions before we begin with the video?

## **Appendix I: Juggling Video Script**

### **Juggling Video Script**

I am now going to show you an instructional juggling video, that will teach you the basics of juggling and then you will have 15 minutes after to practice what you have learned in the video.

The video will be muted and I will be explaining the skills you will learn in the video. I will pause the video in certain spots to allow you time to see the visual that I am explaining so if you can watch the video but listen to what I am saying.

Before we begin: I want to start by saying, you will drop the balls, so just think of juggling as throwing the ball up and dropping them.

As we begin you are learning to juggle with three balls, and I want you to take those three balls and drop two of them. Then just go ahead and toss the one ball back and forth in your hands and just get comfortable throwing and catching and feel what the ball feels like in your hand. (Pause video have them throw the ball back and forth in their hands sitting in their chair)

As you begin to get more comfortable with throwing and catching, we want to begin to aim our throws. In order to find your aiming points, you will put your arms straight above your head and you will make a rectangle above your head. The two corners of that rectangle will be your aiming points as shown in the video.

In order to practice your aiming, you will throw the ball with your right hand and aim to the left point and when you throw the ball with your left hand you will aim to the right point. When you catch the ball you want to catch them a little outside the shoulder and then scoop it in when you throw. When throwing the ball try to aim high so that way when you have more balls it will be more beneficial. (Pause and have them stand up and practice throwing a few times on each side.)

Now it's time to add another ball. When it comes to two balls, you want to continue using the same technique and aim for those points. You will want to start with your dominant hand and throw the ball up to the point and then when it starts to come down that's when you will want to throw the ball in your nondominant hand.

Some tips for juggling with two balls, are as follows: If you struggle to get the second ball out of your hand try starting with your nondominant hand. If the second ball goes away from you and you have to reach far to catch, try focusing on your second throw and throw with intention towards that point. Lastly, try to wait till the first ball is coming down before throwing the second because if you throw too quickly you may drop the balls more often. (pause and have them stand up and practice throwing with two balls about three times, and I will pick up the ball if it falls)

Now it is time to add the third and final ball. You will start with 1 ball in your nondominant hand and two balls in your dominant hand.

You will continue to use the same technique and aim for those points. You will throw the balls in a three-step pattern that sounds like right, left, right or left, right, left. You want to throw the balls up and not out.

That is the end of our instructional video.

## **Appendix J**

### **Autonomy-Supportive Feedback**

“I recognize that this may be hard, but you can do it.” “You can do this”

“You will get it next time”

“Remember that you can try facing a new direction if you want.”

“You will keep getting better from here”

“Feel free to try a new technique”

“You’re doing great”

“You have 5 minutes left”

“Take your time”

“You have 1 minute left”

### **Controlling Feedback**

“This is a relatively easy task.”

“Remember to do it the way they showed you in the video”

“Keep going. There is no resting during this practice period”

“You can do better. Keep going.”

“You should be able to do this”

“Keep practicing” “You should be getting better”

“Be sure to use the cues from the video.”

Silence used twice

## Appendix K

### Learning Climate Questionnaire (LCQ)

Put an X in the box that best describes your experience with your juggling instruction.

**1. I feel that my instructor provides me choices and options.**

1 strongly disagree	2	3	4 Neutral	5	6	7 Strongly Agree
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**2. I feel understood by my instructor.**

1 strongly disagree	2	3	4 Neutral	5	6	7 Strongly Agree
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**3. My instructor conveyed confidence in my ability to do well in the practice.**

1 strongly disagree	2	3	4 Neutral	5	6	7 Strongly Agree
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**4. My instructor encouraged me to ask questions.**

1 strongly disagree	2	3	4 Neutral	5	6	7 Strongly Agree
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**5. My instructor listens to how I would like to do things.**

1 strongly disagree	2	3	4 Neutral	5	6	7 Strongly Agree
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**6. My instructor tries to understand how I see things before suggesting a new way to do things.**

1 strongly disagree	2	3	4 Neutral	5	6	7 Strongly Agree
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## **Appendix L**

### **Debrief Script**

Thank you for your participation in this study. Now that we have completed our juggling tests, I would like to take a moment and explain exactly what we were studying. The purpose of this study was to determine the effects of different coaching styles on juggling performance, specifically, an autonomy-supportive coaching style compared to a controlling coaching style. In order to do this study, we divided all participants into two groups. For one group, I used what sport psychologists call an “autonomy-supportive coaching style”, which is defined as coaches that provide choice within reason, providing athletes with a rationale for doing a particular activity, providing feedback on performance that is noncontrolling, acknowledging and asking about athletes’ feelings and thoughts, and providing opportunity for athletes to take initiative (Amorose & Anderson-Butcher, 2015).

For the other group, I used what sport psychologists call a controlling coaching style, which includes not paying attention to athletes who are not doing well, but complimenting them when the athletes do perform well, manipulating athletes’ behaviors using rewards, evaluating athletes’ by using social comparison, motivating athletes to perform better by using overly critical feedback, forcing athletes’ to comply with power assertive techniques, and attempting to influence the athletes’ lives outside of sport (Amorose & Anderson-Butcher, 2015).

You were in the \_\_\_\_\_ Group.

Past studies have shown that participants tend to favor the autonomy supportive coaching style overall, but very few studies have been conducted to measure if performance on the actual physical task is better when someone has an autonomy-supportive coach compared to a

controlling coach. Therefore, we designed this study to measure the effects of the two coaching styles on the juggling performance outcomes of the two groups.

Now that we have gone over the purpose of this study, do you have any questions?

If you think of a question later on about this research study, you may email me at

[mullicd@wwu.edu](mailto:mullicd@wwu.edu). Please do not discuss the details of this study with anyone else who may participate in this study until after April 17, 2022, when all data has been collected. If other participants find out about the purpose of this study before they participate in the juggling study then their data will not be usable.