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## **Spectators' Perceptions of Momentum and Personal Control: Testing the Antecedents-Consequences Model**

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### **ABSTRACT**

For the past 25 years, researchers have found momentum to be a difficult variable to quantify scientifically. While various definitions of momentum have been utilized and the numerous methods undertaken to investigate its significance, there is a need for more focused, empirical study of certain aspects of this potentially vast factor. Although mostly ignored by researchers, the Antecedents-Consequences Model (ACM; Vallerand, Colavecchio, & Pelletier, 1988) provided a specific framework in which to understand this potentially broad concept. The ACM, which suggested momentum may be experienced by both spectators and athletes, stated personal control (PC) is a fundamental variable establishing whether psychological momentum is perceived. The present study explored the spectator aspect of the ACM by determining the relationship between personal control and perceptions of positive momentum. The Belief in Personal Control Scale (BPCS; Berrenberg, 1987) was completed by 68 participants who then observed one-half of an intercollegiate basketball game, recording perceived momentum sequences using a momentum inventory (Burke, Aoyagi, Joyner, & Burke, 2003). Researchers hypothesized those individuals with low external control, high internal control, or low God-mediated control scores would perceive more positive momentum sequences than

peers with opposite scores. Results showed a significant inverse relationship between numbers of perceived positive momentum sequences and external control scores, thus partially supporting the ACM and the hypotheses. The level of external control may be more important in explaining perceptions of momentum than the level of internal or God-mediated control. Furthermore, feelings of exaggerated internal control or one's belief in a Higher Being's control did not affect the perception of control in achievement-oriented events.

## **Introduction**

Most athletes and coaches would acknowledge that momentum exists, but if asked to specifically define momentum, they may have difficulty. Furthermore, researchers have found momentum to be extremely difficult to quantify scientifically (Burke & Houseworth, 1995), thus making momentum difficult to study.

One definition of momentum refers to a bidirectional force that changes the way a sporting event is played or its outcome based on preceding events (Adler, 1981). Several other definitions have been offered by researchers to operationally define momentum (Iso-Ahola & Mobily, 1980; Taylor & Demick, 1994; Vallerand, Colavecchio, & Pelletier, 1988), including Burke and Weinberg's two-part definition (as cited in Burke, Edwards, Weigand, & Weinberg, 1997). This definition defined momentum in terms of positive momentum and negative momentum. Positive momentum was defined as a mental state affecting performance in a positive way where everything seems to go right. Negative momentum was defined as a mental state affecting performance in a negative way where everything seems to go wrong.

To make matters more confusing, there have been studies suggesting that momentum does not exist. Vergin (2000) used outcome scores of National Basketball Association (NBA) and Major League Baseball games to construct winning and losing streaks. Expected wins and losses were compared, and no differences were found. Vergin's finding did not support the notion of momentum contributing to winning and losing and led to the conclusion that momentum does not exist. However, "losing and winning streaks" may be independent of various momentum sequences. In other words, games may have momentum streaks, but not determine the eventual outcome of the game (i.e., A losing team may have several positive momentum occurrences, but the winning team may have had more!). Also, studying "winning and losing streaks" is likely not a precise enough method to discover the causes of momentum.

Because of the lack of use of a common, useful model, researchers have continually found momentum to be a difficult to scientifically measure. Investigating momentum within the parameters of a working model may provide an important framework to empirically study certain aspects of this seemingly immeasurable factor. Although mostly ignored by researchers, the Antecedents-Consequences Model (ACM; Vallerand, Colavecchio, & Pelletier, 1988) provided a specific framework in which to understand this potentially broad concept. Vallerand et al. suggested that perceptions of momentum may be experienced by both performers and spectators, and situational (i.e., perceived

situational control, crowd behavior, task difficulty, game/contest importance) and personal (i.e., skill level, need for personal control, sport competition anxiety, motivation) variables influence one's perceptions of momentum (Vallerand et al.). Situational variables may include momentum starters, such as a steal or a dunk in basketball or winning the first set in volleyball or tennis. For situational variables to enhance perceptions of control, the events must be attributed to internal, not external, causes. This "personal control" in the situation and/or need for control by the individual is a fundamental psychological variable that is suggested to establish whether momentum is perceived.

Personal control has been defined outside of sport as an individual's belief that events and outcomes in one's life result from one's own actions (Ross & Mirowsky, 2002). Even though personal control is integral to individual well-being, researchers and counselors often have a difficult time agreeing on the meaning of the constructs employed (Elliott, 1997). Perceptions of control (or loss of control) determine whether outcomes are positive or negative (Spector, 1986). Spector found that in the workplace, employees who perceive higher levels of control were more satisfied, motivated, committed, and involved. This conclusion supports the ACM in that those who perceive a greater sense of control have a better understanding of the environment and of important achievements, which could cause higher satisfaction, motivation, commitment, and involvement.

In exploring gender differences, Ross and Mirowsky (2002) hypothesized that men perceived a greater sense of personal control than women and that the differential between genders is greater for older rather than for younger individuals. Results showed that men have a higher sense of personal control than women. Additionally, the study found that women's sense of personal control declines more than men's over time.

Although links from personal control literature and the personal control aspect of the ACM can be made, no supporting research was found in support of Vallerand et al. (1988) suggestion that personal control is a factor in the perception of momentum. Furthermore, there are still questions in the research pertaining to the aspect of the ACM on spectators' perceptions of momentum.

According to the explanation by Vallerand's et al. (1988), spectators' experiences with momentum are more based on their perceptions of what the athletes are experiencing than on the true motivations and emotions of the game. So spectators may not be able to experience momentum as intensely as the athletes (Vallerand et al.). Researchers have tested this aspect of the ACM and have found mixed results. Burke et al. (1997) conducted two studies in which spectators watched a videotape of a tennis match or basketball game and found low levels of agreement of momentum events among spectators. Another study found a low to moderate level of agreement concerning momentum events when multiple trained spectators observed collegiate basketball games (Burke, Aoyagi, Joyner, & Burke, 2003). More research needs to be conducted to scientifically validate this elusive concept.

One of the challenging decisions of attempting to study momentum is whether to investigate the phenomenon with spectators, or athletes (or both). Because the nature of most scientific inquiries of momentum thus far are intrusive to coaches and athletes, it remains difficult to study momentum among athletes during a sporting event – which may be arguably the ideal time to conduct an investigation of momentum. Asking athletes and coaches to remember events from a previous game may not provide needed accuracy of measurement. However, in exploring spectators’ perceptions of momentum, it is logistically less difficult (and less intrusive) to obtain data during sporting events, simply because of the less direct participation in the contest. Yet, spectators, unlike the athletes, do not directly participate in the contests.

Since the ACM stated that both spectators and athletes may experience momentum, the primary purpose of the present study was to test the spectator aspect of the ACM by determining the relationship between levels of personal control and numbers of perceptions of positive momentum (PM). Personal control was assessed with the Belief in Personal Control Scale (BPCS; Berrenberg, 1987), allowing researchers to examine three facets of personal control (i.e., external control, exaggerated internal control, and God-mediated control). Hypotheses included the following: 1) individuals with higher levels of external personal control would perceive fewer PM sequences; 2) individuals with higher levels of internal personal control would perceive more PM sequences; 3) individuals with higher levels of God-mediated control would perceive fewer PM sequences. Gender differences were also explored, and it was hypothesized that men, because of their tendency to have higher levels of internal personal control (Ross & Mirowsky, 2002), would perceive more PM events.

The spectator aspect of the ACM has been tested as previously discussed resulting in mixed findings, but no research was found which included both the spectators’ perceptions and the personal control variable. Based upon the work of Burke et al. (2003; 1997), secondary purposes of this investigation were to explore differences in perceptions of momentum between men’s and women’s games and the perceived events surrounding momentum by increasing the understanding of how to operationally define momentum. Therefore, it was hypothesized there would be more recorded perceptions of PM in men’s than women’s games because spectators’ may often perceived a more “flashy, above the rim” nature of men’s games, which may arguably solicit more potential cases of momentum changes.

## **Method**

### *Participants*

The participants (40 men and 28 women) consisted of undergraduate and graduate students ( $N = 68$ ) at a university located in the southeastern United States. The mean age was 21.24 years ( $SD = 2.43$ ) and ranged from 18 to 28 years. The sample self-identified as 52.94% Caucasian, 44.1% African-American, 1% Hispanic, and 1.5% Native American. Academic class was also identified as: 19.1% freshmen; 23.5% sophomores; 20.6% juniors; 19.1% seniors; and 17.7% graduate students.

Only participants with sufficient knowledge of basketball were selected to take part in the study, as to control for the sport knowledge variable in participants. A screening process was used to determine the level of basketball knowledge. Participants were initially asked about their playing and coaching experience. If participants had no playing or coaching experience, they were asked five questions to validate competency in the study: 1) How long have you been an avid basketball spectator? 2) How many games do you watch per season? 3) Do you usually watch basketball games live or on television? 4) Are you familiar with basketball terminology? 5) What does it mean to have a *hot hand* in basketball? Based upon the evaluations by researchers of the potential participants' responses, there were 20 other participants excluded due to insufficient basketball knowledge or schedule conflicts.

### *Measures*

Personal control was assessed using the Belief in Personal Control Scale (BPCS; Berrenberg, 1987). The BPCS is a 45-item instrument designed to measure three dimensions of personal control: 1) general external control, which measures the extent to which a person believes outcomes are due to internal or external factors, 2) exaggerated internal control, which assesses an excessive belief in personal control, and 3) the God-mediated dimension, which measures the belief that a Higher Being assists in the achievement of outcomes. Each of the 45 items was rated on a 5-point Likert scale with 1 (always true) to 5 (never true). The BPCS is scored by summing each subscale. The scale was designed to avoid a response set by having some items written in the direction of a high belief, and others in the direction of a low belief in personal control. The BPCS has excellent construct validity, which is correlated with an earlier 85-item version, with alphas of .85 and .95. The reliability of the instrument has alphas of .85, .88, and .97, respectively, for the subscales (Berrenberg).

A momentum inventory (Burke et al., 2003) was also used to establish participants' perceptions of positive psychological momentum during intercollegiate basketball games. The momentum inventory is a form that consists of items requiring participants to denote whether a momentum sequence is started by a good performance by one team, a poor performance by the other team, or a combination of both; events beginning momentum; events occurring during momentum sequences; events ending momentum sequences; and game times and scores when momentum began and ended. For every separate momentum sequence, spectators were asked to complete a momentum inventory form. Because of the nature of this inventory, obtaining psychometric properties is challenging. As with other observational coding forms, researchers could use interrater and intrarater reliability to support the instrument. But because of the perceptual idea of the momentum phenomenon, interrater reliability may not be appropriate. Therefore, the psychometric properties of this instrument have not been established.

### *Procedures*

Three to nine participants attended at least one half, or 20 game minutes, of one of ten university men's and women's basketball games. The researcher met the participants

45 minutes before the beginning of each game at a predetermined location to distribute essential forms. Participants gave informed consent by completing a demographics questionnaire, which included defining momentum, and the administration of the BPCS. Participants were briefed on momentum and given examples of basketball-related positive momentum based upon the Burke et al. (2003; 1997) definition. Burke et al. defined positive momentum as a psychological state of mind affecting performance in a positive direction where most everything seems to "go right" for the performer(s). For example, within a short time frame in a basketball game a player may steal the ball from the opponent, make a good pass, get the next rebound, and score two points. Negative momentum was defined as a psychological state of mind affecting performance in a negative direction where most everything seems to "go wrong" for the performer(s). For example, within a short time frame in a basketball game a player may commit a foul, get a pass stolen, go in the incorrect direction on a play, and get a shot blocked. Task instructions were given, and participants had an opportunity to ask questions.

The briefing ended ten minutes before the beginning of the game, and the participants dispersed to find designated seats. Specific and separate locations to view the game were assigned to each participant to reduce the likelihood that collaboration occurred. While most sat alone, some participants viewed a half of the game with others who were not participating in the study. The investigator asked participants who sat with others to not let others affect data collection. Participants collecting data during the second half watched the first half without collecting data. All of the participants viewed either the first or second half of a game from beginning to end. Upon completion of the half, participants met the researcher at a designated location to return the completed momentum inventories. Participants were thanked and given a debriefing statement.

## Results

After 20 halves of basketball games were observed, the momentum inventories were analyzed to determine the number of spectator-perceived events of PM. The BPCS was scored to assess the level of personal control experienced by each participant. Two participants' data were eliminated from the study because one participant's momentum inventories contained handwriting that appeared to be written by two different people, while the other was due to incomplete questionnaires.

Because no previous literature was found on the relationship between personal control and perceptions of momentum, a conservative alpha level of .01 was used in the statistical analyses. A Pearson product-moment correlation coefficient was computed to examine whether the number of perceived PM sequences were related to all three personal control subscale scores. A significant negative relationship was found between numbers of perceived PM sequences and general external control scores ( $r = -.32; p < .01$ ); thus representing that individuals with higher levels of external control perceived few PM sequences. For the exaggerated internal control subscale, a non-significant negative correlation was found ( $r = -.12; p = .32$ ), indicating that individuals with higher levels of internal control perceived fewer PM sequences than individuals with lower levels of internal control. For the God-mediated control subscale, a low, negative

correlation was also found ( $r = -.18; p = .15$ ). A negative correlation for this subscale indicated that individuals who had strong beliefs in God-mediated control perceived few PM sequences than individuals who did not have strong beliefs in God-mediated control. An independent t-test was computed to explore the differences in gender for general external control scores, and no significant differences were found,  $t = -.35, df = 66, p = .73$ . Additionally, an independent t-test was computed to explore the gender differences for numbers of perceived PM sequences. There was no statistical significance found,  $t = -1.37, df = 66, p = .18$ .

### *Secondary Research Purposes*

An independent t-test was computed to examine whether there were significant differences between numbers of perceived PM sequences during men's and women's basketball games. No significance was found,  $t = 2.16, df = 66, p = .04$ . After computing a Pearson product-moment correlation coefficient, a moderate, positive correlation was found between total points scored during a half and the average number of perceived PM sequences for each half ( $r = .55; p < .01$ ). Another Pearson product-moment correlation coefficient was computed that determined a low correlation between point differentials of game scores after each half and the average number of perceived PM sequences for each half ( $r = .06; p < .01$ ). To ascertain whether there was a significant difference between numbers of perceived PM sequences and whether the first or second half was observed, an independent t-test was computed. No statistical significance was found,  $t = .18, df = 66, p = .86$ .

Frequencies were calculated to determine the most commonly perceived game actions that began, continued, and ended momentum sequences. Results ascertained the four most common game actions that started momentum sequences were crowd noise ( $f = 106$ ), a two-point lay-up ( $f = 94$ ), a three-point shot ( $f = 84$ ), and a steal ( $f = 84$ ). The most common actions during momentum sequences were crowd noise ( $f = 191$ ), a caused turnover ( $f = 138$ ), a three-point shot ( $f = 117$ ) and a steal ( $f = 111$ ). The most common actions that ended momentum sequences were a timeout by the opposing team ( $f = 83$ ), a foul by the momentum team ( $f = 72$ ), a missed shot by the momentum team ( $f = 71$ ) and a turnover by the momentum team ( $f = 53$ ). Frequencies were found for the numbers of perceived PM sequences begun by good performances by one team, poor performances by one team, and combinations of both. Of the 262 total momentum sequences, there were 178 momentum events begun by good performances (67.94%), 24 begun by poor performances (9.16%), and 60 begun by a combination of both (22.90%).

There were a total of 262 positive momentum sequences reported by the participants. A significant difference was found between the number of points scored by the team with positive momentum and opposing teams during momentum sequences,  $t = 11.30, df = 440, p = .001$ . The team with momentum scored an average of 5.48 points ( $SD = 4.02$ ) during momentum sequences. The opposing team scored an average of 1.93 points ( $SD = 2.38$ ) during momentum sequences.

## Discussion

The ACM stated that both performers and spectators can experience momentum, and the current study exemplified this notion in that spectators perceived and recorded positive momentum sequences during basketball games. Furthermore, according to the ACM, an individual who felt a greater sense of personal, or internal, control would perceive more momentum; this idea was partially supported by the current findings.

By using the BPCS, three specific areas of personal control (i.e., external control, exaggerated internal control, and God-mediated control) were measured to further understand this personal variable included in the ACM. External control was the only subscale that had a significant relationship with perceptions of PM, meaning that those who feel outside variables influence situations perceived more PM sequences. This finding could be interpreted to mean that momentum may be viewed as a force that is controlled by others or events beyond the individual's control. There were no statistically significant relationships found between the exaggerated control and God-mediated subscales of the BPCS and numbers of perceived positive momentum sequences.

These results were generally supportive of the Antecedents-Consequences Model (Vallerand et al., 1988) and partially supportive of the hypotheses. The BPCS subscale with the strongest relationship with the number of perceived PM events was the general external control subscale, while the level of exaggerated internal control or God-mediated control did not have even a moderate relationship with perceived PM. It was predicted that high external control scores would be inversely related to the perceived number of PM sequences, which was an accurate prediction. On the other hand, it was predicted that internal control scores would be directly, and God-mediated scores indirectly, related to perceived PM sequences. These later hypotheses were not supported. The level of external control one has may be more important in explaining perceptions of momentum than the level of internal or God-mediated control. Furthermore, a feeling of exaggerated internal control or belief in a Higher Being's control did not affect participants' perceptions of their own control in achievement-oriented events, like momentum.

Results from the present study also suggest there were no differences in gender for personal control scores or numbers of perceived PM sequences. Additionally, there were no differences between numbers of perceived PM sequences during men's and women's basketball games. Results from the t-test showed a p-value of .04. Because alpha was set at .01, this statistic was not significant. Additionally, there was no significant relationship found between point differentials of final game scores and average numbers of perceived PM sequences. However, the correlation found between total points scored during a half and the average number of momentum sequences per game was moderately correlated, indicating that number of points scored is a more important factor in predicting perceived PM sequences than gender of participants or point differential.

Two of the most common game actions reported to have begun momentum sequences (two-point lay-up and three-point shot) were in agreement with the Burke et al. (2003) findings. Similarly, in agreement with Burke et al., two of the most common game

actions reported to have occurred during momentum sequences were a three-point shot and steal. Crowd noise was the most frequently reported game action to have started and maintained momentum. Although inconsistent with previous research, the finding demonstrates how influential crowd noise was in the participants' perceptions of momentum. Also, concurring with Burke et al. (2003), two of the most common game actions that ended momentum sequences were the opponent calling a time-out and a foul being committed by the momentum team.

Consistent with the findings of Burke et al. (2003; 1997), the majority of the momentum sequences, as reported by participants, were begun by good performances by one team. This finding, however, was inconsistent with the results found in the Burke, Burke, and Joyner (1999) study as momentum was reported to occur most frequently due to a combination of a good performance by one team and a poor performance by the opponent (84%).

The present study indicated a mean of 5.48 points ( $SD = 4.02$ ) for the momentum team and a mean of 1.93 points ( $SD = 2.38$ ) for the opposing team during momentum sequences, which is comparable to the findings from previous studies (Burke et al., 2003; Burke et al., 1999). The latter two studies found the momentum team scored two more points during momentum sequences than the present study and that the momentum team scored five more points than the opposing team. The present study found the team with momentum scored only four more points than the opposing team during momentum sequences. While four or five points may not appear to be a great advantage in a basketball game, over the course of several momentum sequences, four or five points could be substantial. For example, a team who has four momentum sequences of five points each may generate a 20 point advantage for total of these time periods!

Future studies may wish to have all participants collect data at a single game, thus reducing possible discrepancies in uncontrollable factors (e.g., talent of opposition, team effort). However, having spectators view various contests allows the testing of momentum across a broader context. Also, future momentum studies may specify that spectators either watch in groups versus individually to examine if "collective" viewing impacts the number of momentum sequences perceived by spectators. Another possible future study may be to utilize "less knowledgeable" spectators to attempt to perceive momentum sequences in sports where they lack particular game knowledge. While this may be problematic for grasping the particular game events, being able to perceive momentum in these situations may provide even stronger support for the measurement of this elusive concept. Because athletes may more directly experience and are affected by momentum, more, but less intrusive, studies should be conducted on the experiences and cognitions of the acting agents (Burke & Houseworth, 1995; Miller & Weinberg, 1991). Finally, studies measuring momentum and personal control should be continued to be conducted in basketball and other sports. As Crust and Nesti (2006) suggest, more in-depth qualitative studies may assist in better explaining the potential relationships among momentum and other seemingly related variables. Overall, further exploration of the ACM and other forthcoming models of momentum should be examined before any definitive conclusions may be drawn about the potentially influential variable.

Although the present study focused on spectators' perceptions, basketball coaches and athletes may benefit from knowing if there are certain events that may trigger or continue momentum sequences, thus enabling a team's or individual's success. Also, awareness of the events consistently ending teams' momentum sequences could be invaluable. Coaches and athletes usually feel that fans cheering (support) helps teams gain or keep momentum. Since crowd noise was the most frequently reported game action to have started and maintained momentum, coaches and athletes should try to perform game actions to get the crowd more involved. If coaches and athletes know which events start and maintain momentum (as perceived by the spectators), they can focus on performing these actions to initiate crowd noise which may make a momentum period more likely to occur. Also, based upon this study's findings, coaches and athletes should continue to call "time outs" or "draw a foul" to end an opponent's momentum sequence. The relationship between perceived momentum and personal control could be greatly utilized by coaches and athletes, as well, because a belief in the ability to change an outcome (e.g., regain the lead, stop a scoring drive) could possibly increase confidence and, subsequently, effective sport performance.

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