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Research Article

Goal-Setting Interventions in Sports: Public Goal Monitoring Improves Swimmers' Motivation and Performance

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ABSTRACT

Interventions based on the goal-setting theory include a goal-setting situation and different feedback variations. Very few studies have compared the impact of different goal-setting interventions on young athletes' performance. This preliminary work aimed to examine the effectiveness of two interventions, goal-setting with private monitoring and goal-setting with public posting. In the study, young swimmers (N = 42) with a mean age of 10 (M = 9.88; SD = 1.88) were assigned to a public monitoring condition, a private monitoring condition, and a control condition. A difference was found in the attendance of training sessions, with the public posting group being superior to other groups. Controlling for baseline performance, participants in the public posting condition performed better than control participants. Public posting created conditions in which it was easier to accept set goals as focal and put greater effort into their attainment. The results contribute to a better understanding of how goal monitoring motivates behavior and performance.

Keywords: goal, feedback, public posting, attendance, swimming performance.

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Introduction

The core of Goal-setting theory is the goal construct. Locke and Latham (1990) define a goal as the intention or object to which the activity is directed. Goals give purpose to an individual's behavior, and they invest energy to attain them. However, not every goal will result in high commitment. The theory predicts that the higher the goal, the better the performance, and that performance will level off or decrease only when the limits of one's ability are reached or commitment lapses (Locke & Latham, 2002). Second, specific, difficult goals are theorized to lead to higher performance than no goals or vague, abstract goals such as "do your best." Importantly, "goal specificity in itself does not necessarily lead to high performance because specific goals vary in difficulty" (Locke & Latham, 2002, p. 706). As such, Locke and Latham largely advocate for specific, challenging goals to increase performance.

In addition to the mentioned goal characteristics, for goal-setting to be effective, the individual needs to know how close to the goal they are at certain points. Classical work inside the goal-setting theory identified the critical role of feedback in facilitating goal-related behavior (Bandura & Cervone, 1983; Erez, 1977; Lerner & Locke, 1995). It seems that the quality of feedback might explain the complex relationship between goal intentions and behavioral performance (Sheeran, 2002; Sheeran & Webb, 2012). For example, recent studies highlighted that feedback positively affects performance by providing goal-relevant information (Aarts et al., 2008; Fischbach & Choi, 2012) and making the goal-attainment progress more salient (Sleiman et al., 2020). While the present literature also recognizes the importance of feedback in the sports setting (e.g., Lauber & Keller, 2014; McEvan et al., 2016), it mostly discusses it in the context of already developed athletes. Complementing and extending prior research evidence, we argue that feedback introduced in goal progress monitoring facilitates goal-attainment behavior of young athletes. Specifically, we tested the hypothesis that public goal monitoring produces higher training attendance rates and better performance than private monitoring or the absence of monitoring.

Goal-setting and Progress Monitoring

The presentation of feedback might be related to goal progress monitoring. This process explains the large gap between the formation of goal intentions and attainment (Gollwitzer, 1999; Orbell & Sheeran, 1998). Monitoring occurs when the current level of a target behavior is compared to a salient ideal value (Campion & Lord, 1982; Koo & Fischbach, 2012; Webb et al., 2013). By comparing one's behavior to a set standard goal, attainment promotion occurs. Goal progress monitoring helps to identify possible incongruences between current behavior and the desired goal. When incongruency is detected, the individual is motivated to pursue and implement the most likely decision to remove said incongruence. Progress monitoring is an effective facilitator of goal attainment because it strengthens goal intentions (Gollwitzer, 1999; Sheeran et al., 2005; Sutton, 1998) and enables one to identify when and how much additional effort is needed to attain the desired state (Gollwitzer et al., 2009; Myrseth & Fischbach, 2009).

Harkin et al. (2016) identified six dimensions describing goal-monitoring in behavior change interventions. The first five dimensions (focus, recording, reference point, and activity level) are more related to the content of the intervention. The last aspect is more situational in nature: it relates to whether goal progress monitoring is private or made public. In the first condition, participants are asked to monitor their goal progress in private, while in the other condition, progress monitoring involves the presence of others. Group, public monitoring seems to have a more substantial effect than its private counterpart. For example, Lyman (1984) compared the effects of private feedback and public monitoring on the goal-directed behavior of children with intellectual disabilities. Public performance monitoring resulted in longer attention to work materials, listening to the teacher, and asking task-related questions relative to giving individual, private feedback. Furthermore, the mentioned meta-analysis by Harkin and colleagues (2016) found larger effects on goal attainment when participants were asked to monitor their progress in public than in private.

Public goal progress monitoring is usually described as performance public posting. Public posting refers to situations where individuals' performance information is presented so that other relevant group members have visual access to it (Nordstom et al., 1991). Ward (2011) mentions two reasons why public posting is so effective. First, feedback serves to encourage and improve performance. Second, the public posting of performance allows certain public expectations to become norms for behavior in a particular instructional environment.

Goal Progress Monitoring in Sports Settings

To claim that an athletic achievement occurred, it is often not enough to establish the presence of performance progress. Usually, performance is determined by comparing it to some pre-established standards. Performance criteria are pre-determined, and the training process is adjusted accordingly. For these reasons, goal progress monitoring has found its place in behavior change interventions aimed at the sport setting. In sports and recreation, interventions that combined goal setting, progress monitoring, and feedback were successful in increasing the physical activity of children during school breaks (Koufoudakis et al., 2016), the performance of football players during training (Brobst & Ward, 2002), goal-oriented behavior of rugby players (Mellalieu et al., 2006), tactical performance of American football players (Smith & Ward, 2006), basketball performance of young athletes (Tzetzis et al., 1997), swimmer's chronometric performance (Simões et al., 2012), and tennis serve of physical education students (Boyce et al., 2001). These interventions are widely used in sports and recreation.

Making goal progress monitoring public is a common behavior change intervention in sports. Public posting of performance has increased the attendance and performance of swimmers (McKenzie & Rushall, 1974), the performance of soccer players during training (Brobst & Ward, 2002), the achievement of American football players during training and matches (Ward et al., 1997), movement accuracy in professional dancers (Quinn et al., 2017), performance during college football players' training and matches (Smith &

Ward, 2006; Ward et al., 1997), and time spent in recreational walking (Earney & Bungum, 2004). Galvan and Ward (1998) have demonstrated that public posting can decrease problematic behavior, such as unsportsmanlike conduct.

The mechanisms often studied in group processes may provide a more theoretical explanation of the effectiveness of public posting. According to the social comparison theory (Festinger, 1954; Wood, 1996), people tend to relate their behavior to other relevant individuals to receive feedback on their abilities and values. Furthermore, people choose similar others as their sources of comparison. According to Wood (1996), if the response to social information is positive in creating the motivation to increase one's achievement, one can assume that behaviors that serve that purpose will occur. Comparing one's performance with that of others makes public posting a powerful tool that encourages healthy competition against group members. If individuals perceive others to perform better under the same conditions, they might be motivated to improve their performance.

Another explanation emphasizes that the intervention highlights the value of increased performance. Behavior change theories posit that external influences (among other factors) might be a strong motivator in deciding to translate from goal attainment intention to goal-directed behavior. For example, the theory of planned behavior (TPB; Ajzen, 1991, 2001) understands goal pursuit as a complex interplay between attitude valence, perceived behavior control, and the presence of subjective norms. The *public* component of public goal monitoring might increase the perceived importance of subjective norms by highlighting the social pressure to be successful in goal pursuit. Specifically, making goal monitoring public might increase the value of obtaining higher performance rates (Ward, 2011).

The Multi-process action control (MPAC; Rhodes, 2017, 2021; Rhodes et al., 2021) adapts, integrates, and expands behavior change frameworks to physical activity. According to this perspective, engagement in physical activity is determined by three related processes. *Reflexive processes* include conscious deliberations that result in intention formation. While reflexive

processes are included in several cognitive behavior change models (Ajzen, 1991; Bandura, 1998), they are not directly responsible for behavior formation (Gollwitzer, 1999; Orbell & Sheeran, 1998). The MPAC assumes that *regulation processes* that include behavioral, emotional, and cognitive tactics that maintain goal pursuit are relevant to translate from intentions to *reflexive processes* where more stable habits are formed. Therefore, public goal monitoring can be seen as an outside intervention to increase engagement in regulation processes (Allan et al., 2013; Carraro & Gaudreau, 2013). Quinn and colleagues (2017) argued that the public disclosure of one's performance creates an atmosphere that strengthens an individual's attainment motivation. Therefore, public goal monitoring may increase the adoption and implementation of behaviors relevant to goal pursuit.

If one can understand public goal monitoring as a strategy to increase regulation processes, it might also contribute to (habit) attainment. Deliberate practice, a systematic activity conducted to improve performance (Ericsson et al., 1980), might explain why public goal monitoring can be seen as a useful tool in skill development. Studies testing the effectiveness of deliberate practice have shown that such activities contribute to increased performance and behavioral goal attainment (Ericsson et al., 1980; Ericsson et al., 1993; Gobet & Campitelli, 2007; Macnamara et al., 2014, 2016). By making a goal and its related progress public, this type of progress monitoring might contribute to constantly repeating performance-related skills and, over time, result in habit attainment.

Simić and Vardo (2018) attempted to extend these findings to the context of young athetes (i.e., youth-level swimmers). In a within-participant longitudinal research design, they compared the effectiveness of a public goal monitoring, with a private feedback and a control condition. Their analysis suggested public goal montitoring to be particularly effective in increasing training attendance rates compared to private feedback and baseline rates. However, their study did not focus on a more important aspect of training participation: performance improvement. Furthermore, the study lacked a viable control group to determine which changes or outcomes are due to the intervention

as opposed to being due to some other variable (Rosenthal, 1990). Finally, the mentioned studies did not answer how public posting improves performance (Kim et al., 2016; Brobst & Ward, 2002). Thus, additional research is required to explore the effects of public goal monitoring and its limitations.

The Present Research

From this short review of previous studies, it is noticeable that interventions combining goal-setting and feedback were shown to be effective. However, previous work did not directly compare the effect of public posting with the provision of private monitoring (for an exception, see Harkin et al., 2016; Lyman, 1984) and their effect in combination with goal-setting. Furthermore, it is not clear whether public goal monitoring improves performance directly or by providing more opportunities for practicing different achievement-related skills. For example, a tennis player whose attendance is publicly recorded may be present in more training sessions, thus improving their serve. By excluding studies focusing on children in their meta-analysis, Harkin et al. (2016) could not assess the effectiveness of monitoring interventions in younger age groups. Furthermore, although Simić and Vardo (2018) compared the effectiveness of goal monitoring interventions on young athletes, their research design lacked a relevant control group. As previously stated, without a control condition it is hard to make conclusions of a real intervention effect on young athlete's sport behavior. This is particularly relevant for two reasons. First, developmental studies have shown that children and younger adolescents show weaker consideration of future outcomes (Steinberg et al., 2009) and a lower tendency to engage in goal-setting or planning (Verstraeten, 1980; Nurmi, 1991). Second, under the assumption that goal progress monitoring increases the tendency to engage in deliberate practice (Harkin et al., 2016; Mann et al., 2013), such interventions could help develop young athletes' core skills.

Two interventions, including goal-setting and progress monitoring, were compared to fill the mentioned gaps in the literature. The target behaviors in this explorative study were training attendance and the swimming

performance. First, in line with the literature (Boyce et al., 2001; Brobst & Ward, 2002; Koufoudakis et al., 2016; Mellalieu et al., 2006; Simões et al., 2012; Smith & Ward, 2006; Tzetzis et al., 1977), both public and private goal monitoring interventions are expected to increase participants' attendance relative to the situation in which no feedback is provided. Moreover, based on theoretical assumptions about the strong motivational impact of public posting (Quinn et al., 2017; Ward, 2011) and empirical work on children (Lyman, 1984; Simić et al., 2018), combining goal setting and public goal monitoring might produce greater higher attendance rates than the private monitoring intervention.

Crucially, if attendance increases, it could be assumed that further development of sports skills will occur over time. This assumption is supported by the findings of some studies (Ericsson et al., 1980; Ericsson et al., 1993; Gobet & Campitelli, 2007; Macnamara et al., 2014; Macnamara et al., 2016), which have emphasized the importance of repeating specific actions to obtain and memorize skills. For these reasons, implementing the interventions is expected to increase athletic performance by providing the chance to engage in relevant skill practice. Accordingly, private monitoring is expected to lead to higher swimming performance compared to the control group. Finally, participants in the public posting condition are expected to perform better than participants in other conditions. Such hypotheses have been explored through an experimental study on a sample of young swimmers. The local Ethics Committee approved the study, and consent was obtained from all participants and their guardians. The study was conducted following the ethical standards of the Declaration of Helsinki.

Method

Participants

The convenience sample consisted of 42 swimmers (30 male and 12 female participants) from one local swimming club. The average age of the sample participants was 10 years (M = 9.88; SD = 1.88; Min = 7, Max = 14). All

participants had gone through elementary swimming instructions, were able to swim competitively 50-meters freestyle without any outside assistance, and were coming from a training group that contained swimmers actively participating in swimming competitions between two and five years.

Materials and Procedure

The study was conducted at the beginning of the competitive swimming season. Before the experimental procedure, the baseline performance in 50-meter freestyle was assessed at the end of the previous season. Following a one-month season break, the interventions were introduced at the beginning of the new competitive season. The procedure lasted two months and consisted of 12 training sessions and a post-intervention performance measurement. During each training session, three coaches recorded attendance in the checklists. Unlike the baseline measurement, where the performance was measured in a competition event at the end of the season, the post-intervention performance was assessed at the end of the last training session included in the intervention to control all relevant factors related to the competitive situation and physical performance levels of the participants.

The participants were randomly assigned into three groups: public posting, private goal monitoring, and a control group. Training sessions were held three times per week during the same timeslot for all three groups but on separate days. All swimmers worked with the same coaches during the intervention. A detailed procedure for the control and two experimental groups follows.

Control group - no intervention. Before the start of the swimming season, the coach informed the swimmers about the importance of high attendance at training sessions. To reduce the likelihood that participants set specific attendance goals (Weinberg & Weigand, 1993, 1996; Weinberg, 2013), participants did not set a "do your best goal." The participants did not have an insight into their attendance during the training nor the attendance of other participants.

Private goal monitoring group (PGM). Each swimmer in the PGM conducted an individual interview with the coach. The participants received the following instructions:

"Now, together, we will try to increase your training attendance. I want you to decide on how many training sessions you would like to come to next month. The maximum number is 12, and the minimum is 0. The number of training sessions is a goal that you will strive to achieve next month. The goal should encourage you to do better, but it should not be too difficult. Think about it, are you sure you can come to all 12 training sessions? Now I will write down that number on this card as it will serve as a reminder of your goal".

The instructions were given to ensure the acceptance of set goals (Erez & Zidon, 1984). Specifically, the coach represents a trusted person for the participants. Participants were also included in the goal-setting process by asking them to indicate how many sessions they would like to attend. Finally, it was emphasized that participants do not set too difficult, unattainable goals. Over the next 12 training sessions, attendance was recorded by three coaches. At the beginning of each training session, the coach indicated on the private cards that the participant was present at the training so that the participants had an insight into their attendance. However, the participants did not know the attendance of other participants in their group.

Public posting (PP) group. As in the second group, the participants in the PP group had an identical conversation with the coach. Instead of a card, the participants were shown an attendance table at the end of each conversation, and their goals were entered into the table. Also, the participants received additional instructions:

"I will now put your goal on the scoreboard. At the beginning of each training session, this chart will wait for you to see how close you are to your goal. Together with your friends, you will observe the table to see how well you are doing. "

Over the next 12 training sessions, three coaches recorded attendance. Participants had insight into their own and other participants' attendance and

goals at the beginning and during each training session. Participants were asked to gather around the board and analyze the table for a few minutes.

Attendance rates were operationalized as the average practice attendance over 12 training sessions. The participant needed to be physically present during goal monitoring at the beginning of each training session to be recorded as present. Data was collected using a simple checklist to record swimmers' training attendance frequency. The checklist was constructed in a table format and consisted of participants (columns) and 12 training sessions (rows). Swimmer's session presence was recorded as 1, while the non-arrivals were recorded as 0.

Swimming achievement was assessed by measuring the chronometric performance on 50-meters freestyle. The measured swimming performance expressed in seconds was transformed to the FINA points scale. The World Swimming Federation prescribes the FINA scoring system. It provides a framework to compare different swimming performances where the main reference point is the current world record. In general, more points reflect better performance. It is theoretically possible to score 0, and more than 1000 points are awarded for times faster than the world record in a given event. FINA scores make age group, gender, and swimming event comparisons more straightforward and intuitive. In this study, the swimming performance was expressed on the 2017 FINA points scale for short-course pools. Finally, swimming performance was assessed during baseline and after the implementation of the experimental conditions.

Results

Statistical analysis

A one-way, three-level (control, PGM, PP) ANOVA was conducted to test group differences in age and baseline performance. Both analyses were carried out to examine randomization effects. The same omnibus test was implemented to study group differences in average training attendance. Planned orthogonal contrasts were used as a follow-up analysis. The first

contrast compared the PP and PGM groups to the control participants, while the second contrast tested for differences between PP and PGM groups.

A one-way, three-level (control, PGM, PP) ANCOVA controlling for baseline swimming performance was used to examine group differences in post-intervention swimming performance. Simple, non-orthogonal comparisons were used as follow-ups. The control group was compared to PGM (first contrast) and the PP (second contrast). Finally, a mediation analysis was run to examine whether FINA points differences between the PP and control conditions were mediated by training session attendance. Thus, a mediation model (Model 4; Hayes, 2018) was carried out using the experimental condition as the independent variable (0=control condition; 1=PP condition), training attendance as a mediator, and performance as the dependent variable. The significance of the indirect effect was tested using the bootstrapping method (Hayes, 2018) on 10,000 bootstrapped samples.

Baseline performance differences

The groups did not differ significantly by age F (2,39) = 1.02, p = .369, Ω^2 = .05; and based on their baseline performance, whether it was expressed in seconds, F (2,39) = .64, p = .534, Ω^2 = .03, or on the FINA score scale, F (2,39) = .32, p =. 612, Ω^2 = .02. Thus, it was found that the groups were not different in characteristics expected to affect the internal validity of the intervention.

Average attendance differences

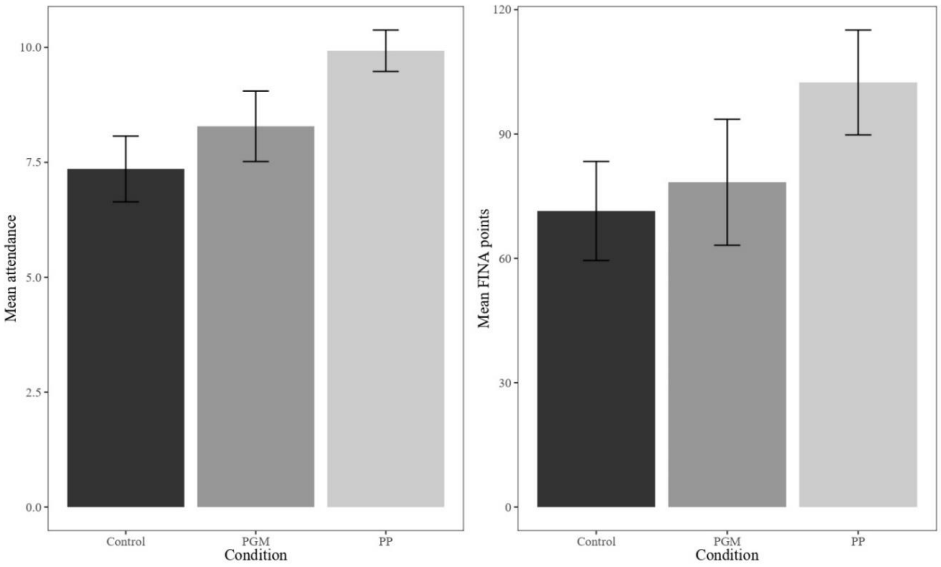

Figure 1. Average attendance rates and swimming performance of the Control (N = 14), PGM (N = 14), and the PP group (N = 14). Vertical bars indicate 95% confidence intervals of group means.

As shown in Figure 1, participants in the control group attended approximately 7 out of 12 training sessions (M = 7.35; SD = 2.68). Participants in the PGM group averaged eight training sessions (M = 8.28; SD = 2.87), while participants in the PP group attended ten training sessions on average (M = 9.92; SD = 1.68).

The groups were found to be significantly different from each other, F (2, 39) = 3.90, p = .028, Ω^2 = .12. The average training attendance increased by applying either of the two interventions relative to the control situation t (39) = 2.17, p = .018 (one-tailed), d = .57, 95% CI [.13, 1.04] [1]. Additionally, the PP group had

[1] Due to a small sample used in this study, all effect sizes in follow-up analyses were corrected by following the procedure described in Ivarsson et al. (2013; see also Schweizer & Furley, 2016). All 95% CIs reported in follow-up analyses are related to confidence intervals for the differences between means.

attended more practices than the PGM group, t (39) = 1.77, p = .043 (one-tailed), d = .33, 95% CI [.03, 1.60]. Both interventions led to an increase in average training attendance relative to the control situation. Furthermore, a statistically significant difference in average training attendance was found between the two interventions favoring public posting.

Post-intervention swimming performance differences

Figure 1 shows the participants' performance on 50 meters freestyle. The control group's average performance was 71 FINA points (M = 71.43; SD = 44.73). Participants in the PGM group achieved an average of 78 FINA points (M = 78.36; SD = 56.88). Finally, participants in the PP group achieved 102 FINA points (M = 102.36; SD = 47.83). Translated into seconds, the participants in the control group swam 50 meters freestyle event in 53.38 seconds on average. The average time of participants in the PGM group was 52.20 seconds. On average, participants in the PP group needed 45.75 seconds to finish the event.

The covariate, the baseline performance on 50-meters freestyle expressed using FINA points, was significantly related to the baseline measurement results, F (1, 38) = 128.67, p < .001. A statistically significant difference was found between the control and experimental groups, with control of the baseline results, F (2, 38) = 3.40, p = .044, Ω^2 = .10. The group differences explained 10% of the swimmer's performance variance at the 50 meters freestyle event.

Participants in the control and the PGM group did not differ significantly, t (38) = 1.58, p = .123 (one-tailed), d = .14, 95% CI [-3.17, 25.66], while a significant difference was found between the control and PP group, t (38) = 2.58, p = .014 (one-tailed), d = .50, 95% CI [4.00, 32.99]. Participants who received private feedback were found to be no different from control participants based on their performance. On the other hand, participants in the public posting condition performed better than control participants.

Another ANCOVA was conducted on the raw performance measurements expressed in time units to check if the performance expression on the FINA points scale affected the analysis results. The covariate was statistically

significant, F (1, 38) = 170.53, p <.001. Controlling for baseline performance, significant differences between the groups were detected, F (2, 38) = 3.70, p = .034, Ω^2 = .11. The PGM group did not differ from the control group, t (38) = 1.37, p = .089 (one-tailed), d = 0.09, 95% CI [-6.27, 1.20]. On the other hand, participants in the PP group were significantly faster than control participants, t (38) = 2.72, p = .005 (one-tailed), d = .58, 95% CI [1.28, 8.79]. The second analysis confirmed that the expression of swimming performance on the FINA scoring scale and in time units did not influence different interpretations of the collected data.

A mediation model (Model 4; Hayes, 2018) containing experimental condition as the independent variable (0=control condition; 1=PP condition), training attendance as a mediator, and performance as the dependent variable showed a significant mediation effect of training attendance. Specifically, when including training attendance in a model containing the experimental condition as the independent variable and performance as the dependent variable, the differences between the public posting and the control group become non-significant (β = .076, t (38) = .216, p =.830). The mediation was found to be significant as the bootstrapped indirect effect (27.16) did not include zero, 95% CI [9.11, 53.30]. In other words, the public posting intervention affected swimming performance through training practice attendance.

Discussion

This study found that goal progress monitoring significantly increased attendance in swimming training sessions. Both the PGM and PP conditions were different from the control group. It can be assumed that goal progress monitoring had a stimulating effect on the target behavior. Moreover, participants in the PP condition attended more training sessions than participants in the PGM condition. This intervention was more effective than private feedback in increasing attendance. In other words, the current work presents a replication of the results of Simić and Vardo (2018) highlighting that PGM might significantly contribute to increased attendance rates.

Group differences were found in the performance on 50 meters freestyle. PP group participants achieved significantly better results than control participants in the post-intervention measurement. Furthermore, these participants improved their baseline performance in the post-intervention assessment. Participants from the other groups performed worse in the second measurement. As previously stated, the post-intervention assessment was made at the end of a training session at the beginning of the competitive season. One expects that the swimmers' physical capabilities have not yet reached peak levels in these conditions. In other words, all things being equal, a worse performance should be expected in the post-intervention assessment than in the baseline. While the control and PGM showcased this trend, participants in the PP group improved their performance by an average of just over one second. This finding adds additional strength to the public goal monitoring intervention. Finally, it was found that training attendance mediates the differences between the PP and the control group. Participants who underwent public goal monitoring had higher attendance rates and thus performed better than control participants.

It is important to note that these findings could not be attributed to potential confounds controlled in this study. In addition to the described differences between baseline and post-intervention assessment, the training sessions for groups were held separately to avoid swimmers being aware of the groups' intervention differences. Finally, a post-hoc randomization check revealed no age and baseline performance assessment differences.

In line with the results from previous studies (e.g., Lyman, 1984; McKenzie & Rushall, 1974; Brobst & Ward, 2002; Ward et al., 1997; Harkin et al., 2016), this experiment confirms the applicability of goal-setting interventions in sports and recreation. Combining goal setting with public posting produced the best results. Although public posting is not the only factor contributing to performance improvement (group differences account only for 10% of the variability in FINA points scores), higher training session attendance provided more chances to practice core, performance-related skills. Deliberate practice is known to profoundly affect mastering and remembering complex motor

skills (Ericsson et al., 1980; Ericsson et al., 1993). Participants from the public group had more opportunities to engage in meaningful exercise. This indirect impact of the public posting intervention could explain the progress of participants from this group.

Notably, some results contradict previous research studies (e.g., Koufoudakis et al. 2016) in which private feedback affected athletes' performance. One possible explanation is that private feedback offered a lack of social comparison with the performance of other participants. The lack of opportunity to compare one's performance with others may have diminished the set goal's importance. Specifically, public goal monitoring might have increased the importance of the perceived social pressure for goal achievement (Ajzen, 1991, 2001). Furthermore, feedback acquired from public goal monitoring could have also facilitated the engagement in regulatory processes relevant to bridging goal intentions with goal-directed behavior (Rhodes, 2017; Rhodes et al., 2021). For example, perceived goal importance is a necessary condition for the effectiveness of the interventions based on the goal-setting theory (Locke et al., 1994; Erez & Zidon, 1984). By perceiving that other group members actively engage in goal-striving, participants could assess the importance of achieving their goals. This type of social feedback may have elicited cognitive, affective, and behavioral reactions and influenced the formation of motivation to improve performance (Rhodes, 2021; Wood, 1996). The quality of social feedback might be particularly relevant for children transiting to competitive sports participation (i.e., specialization phase, Côté et al., 2009; Côté & Vierimaa, 2014) where peer comparison becomes the standard of performance (Barreiros et al., 2013; Baker et al., 2005). Simply put, public goal monitoring might enable more peer social comparison, facilitating the motivation to perform and do better (Bruner et al., 2011).

In addition to providing empirical support to some of the theoretical assumptions that arise from the goal-setting theory, the study also has important practical implications. First, the public posting method is an economic intervention aimed at positive behavior change. In a short time, it

is possible to determine the presence of deficiencies in athletes' physical, technical and motivational capabilities and correct them by a combination of goal setting and public posting. Public posting seems to be well-accepted by coaches because of its simplicity and effectiveness in reducing problem behavior (Galvan & Ward, 1998; Ward et al., 1997) as well as increasing motivation to engage in deliberate practice (Brobst & Ward, 2002; O'Brien et al., 2009). For example, coaches can test the effectiveness of this intervention by simply analyzing and comparing the pre-and post-intervention performance.

Second, public goal monitoring was shown to be beneficial for younger athletes. The implementation of performance posting is related to reducing off-task behavior by recognizing publicly that those who do well comply with the coach's instruction (Balderson & Sharpe, 2005). This method strengthens the motivation to become more engaged in sports and contributes to higher retention of relevant skills. Children who invest significantly more in developing skills related to success stay longer in sports (Côté et al., 2009; Güllich et al., 2020; Ward et al., 2007). Third, the results of this study offer recommendations for writing sports programs to increase motivation for sports participation and performance. The method can be replicated and tested with different participants and situations.

However, the effect of public goal monitoring might be contained only to more externally regulated behaviors. Public performance posting might foster ego-oriented goal orientations by making athletes aware that others are also striving for a similar objective, highlighting the importance of becoming superior to others and avoiding failure (Duda, 1992, 2005). While ego-oriented goals might be more relevant for motor skill learning and retention (Meira & Fairbrother, 2018), they are also linked with negative cognitive responses to failure and maladaptive behavior when one doubts their performance (Pensgaard & Roberts, 2003; Lochbaum & Roberts, 1993). On the other hand, their task-oriented counterparts that emphasize the intrinsic value of task involvement have a greater impact on developing positive athlete self-perceptions (e.g., Lochbaum et al., 2016; Machida et al., 2011). In that regard,

Côté and Vierimaa (2014) posit that the gradual introduction of ego-oriented goals is recommended in the transition to the specialization phase, but not at the expense of task-oriented goals development.

This study also has some limitations. First, it was based on a convenient sample of participants mastering specific physical skills. Therefore, the generalization of results to other sports areas and conditions that differ from those listed above should be approached with caution. Second, the results indicate that a combination of goal setting and feedback is successful when working with younger swimmers. However, more research must be conducted to determine whether public goal monitoring is more successful than private feedback. The lack of significant differences between the private monitoring and control conditions could be attributed to our small sample size. In a well-powered study, public goal monitoring might also contribute to significant performance increases. Although statistically significant, the differences between the two methods are weak to moderate, and further research is needed to replicate the findings of this paper. Furthermore, as previously stated, public goal monitoring might have been more effective than its private counterpart due to the characteristics of the study sample. For example, private feedback could be useful when applied to older athletes. Third, this study did not consider the long-term effects of goal-based interventions. The effects of this intervention may not lead to a long-term behavior change. Also, behavior maintenance may not occur when returning to baseline conditions (Kim et al., 2016; Brobst & Ward, 2002). For these reasons, more complex experimental and longitudinal designs need to examine the effectiveness of goal-based interventions. Fourth, this study failed to account for external factors relevant to the motivation of young athletes. Parents greatly influence the sport experience of a child by providing financial (Holt et al., 2011) and emotional support (Elliot & Drummond, 2017; Ullrich-French & Smith, 2006), as well as having significant influence in managing their child's sports activities by providing instrumental support (Côté, 1999). It is possible that parents contributed to the decision to attend for some participants.

Future studies should aim to test the effectiveness of these interventions for older individuals and in other sports environments. Furthermore, girls seem to respond better to non-normative evaluation characteristic of private goal monitoring (Murcia et al., 2008; Cooper-Patrick et al., 1999). Future work might build on this study by examining how young athletes' gender interacts with the characteristics of goal monitoring. Finally, it was previously specified that public goal monitoring might also adversely affect young athletes' development. Therefore, it is necessary to study whether combining public goal monitoring with methods derived from different motivational theories diminishes the disadvantages of this intervention. More complex research designs might also provide an opportunity to integrate theoretical knowledge and improve the coaching practice. This paper aimed to determine the contribution of goal progress monitoring interventions to athletes' behavior change and performance improvement. Examining the relationship of such interventions with other individual differences variables was out of the scope of this study. Since the situational motivational climate interacts with dispositional goal orientations (Elliot & McGregor, 2001), future work should aim to understand the relevance of the psychological characteristics of young athletes for goal progress monitoring interventions.

Conclusion

Interventions based on goal-setting theory should be used in sports and recreation. This study found that the application of goal progress monitoring contributed to an increase in average training attendance relative to control participants. More specifically, public goal monitoring produced the best results. Private feedback, on the other hand, had a less promising effect. Goal and performance posting led to higher average attendance and better swimming performance than private feedback and the control condition. The results indicate that the situation (private vs. public) in which progress monitoring occurs impacts goal-directed behavior.

Conflict of interest

We have no conflicts of interest to disclose.

Data availability statement

The dataset used in this study can be accessed at https://osf.io/7pkfq/.

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