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Comparing the effects of goal type on performance and psychological outcomes in physical activity

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This study aimed to generate preliminary evidence on learning goals in physical activity (PA) by comparing the performance and psychological effects of learning goals to SMART and open goals. Twenty-eight healthy adults (high PA level n = 14; moderate PA level n = 12; low PA level n = 2) completed a baseline 6-minute walk test (6MWT), before completing learning, open, and SMART goal conditions. Distance walked, affective valance, felt arousal, and perceived exertion were assessed during the tests. Perceived enjoyment, motivation, self-efficacy, mental fatigue, performance, goal achievability, future exercise goal intentions, and post-exercise perceptions were reported afterwards. Qualitative data were generated on the learning goal used and reasons for goal preferences. Participants walked significantly further using a learning goal versus an open goal. SMART goals produced significantly lower perceived goal achievability and self-efficacy versus other conditions. Further research is needed to determine the utility of learning goals in PA.

KEY WORDS: Behaviour change, Goal setting, Exercise, Physical activity.

Introduction

The health benefits of regular physical activity (PA) are well-documented, with evidence linking regular PA with lower risk of disease, prevalence of negative mental health symptoms, and mortality (Pedersen & Saltin, 2015). Compared to insufficiently active individuals, active individuals have been found to be at 20-50% lower risk of chronic diseases (Warburton et al., 2017)

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and 17-26% reduced risk of depression and anxiety incidence (see Schuch et al., 2019 for a meta-analysis). Despite overwhelming evidence for the benefits of regular PA, physical inactivity is a worldwide issue, with prevalence data from 2016 estimating that 27.5% of adults are not meeting the recommended PA guidelines, with this figure as high as 36.8% in high-income countries (Guthold et al., 2018). Therefore, given the potential negative consequences of physical inactivity, the development of behaviour change techniques that help to encourage greater PA could be valuable.

Goal setting is an effective strategy for improving PA (McEwan et al., 2016) and is one of the most common behaviour change techniques used in PA interventions (e.g., Carraça et al., 2021; Howlett et al., 2019). A goal is defined as "what the individual is trying to accomplish; it is the object or aim of an action" (Locke et al., 1981, p. 126). In practice, traditional recommendations for PA generally focus on promoting PA through specific goals (i.e., focus on a single, end-state reference point), such as reaching 10,000 steps (Vandelanotte et al., 2020) or completing 150 minutes of moderate-intensity PA per week (World Health Organisation, 2020). A popular approach used for setting specific goals is the SMART acronym (Doran, 1981), which generally has been interpreted in PA as meaning a goal should be: specific; measurable; achievable; realistic; and time-bound (Swann, Jackman et al., 2022).

Although widely advocated, questions have been posed in recent years about the suitability of current goal setting practice in PA, including the widespread use of specific goals (e.g., Beauchamp et al., 2018; McEwan et al., 2016) and SMART goals (Swann & Rosenbaum, 2018; Swann, Jackman et al., 2022). In a meta-analysis of 52 goal setting interventions in PA (N = 5,912), McEwan et al. (2016) found no significant difference in PA based on goal specificity, with similar improvements in PA elicited by specific goals ($d = 0.589$, 95% CI [0.43-0.75]) and vague goals (e.g., "to be more active" - $d = 0.511$, 95% CI [0.33-0.70]). Considering these findings, Swann and Rosenbaum (2018) argued that further research focused on examining the effects of qualitatively different goals on PA and psychological outcomes related to long-term PA engagement is warranted (Swann & Rosenbaum, 2018). Therefore, the current study sought to compare the effects of different goal types on PA and psychological outcomes in healthy adults in a brief PA task.

Non-Specific Goals

Recent research using 6-minute walking tests (6MWT) has generated novel evidence on a variety of non-specific goals (Hawkins et al., 2020; Swann et al., 2020; Swann, Schweickle et al., 2022). According to Wallace and Etkin (2018), a goal is non-specific if it has "some degree of ambiguity or diffuseness in the exact level of performance required" (p. 1034). Do-your-best (DYB) goals (e.g., "do-your-best for six minutes") have featured in PA research for several decades (e.g., Boyce & Wayda, 1994) and encourage participants to exert a high level of effort to reach their perceived "best" performance level, which could be based on pre-existing exercise knowledge (Hawkins et al., 2020). Open goals were first reported in qualitative studies in sport (e.g., Swann et al., 2017) and are described as exploratory and open-ended; for example, Swann, Schweickle et al. (2022) asked participants to "see how far you can walk in six minutes" (p. 390). In an initial comparison of open, DYB, and SMART goals, Swann et al. (2020) found no significant difference in distance walked between groups assigned to each goal type but found that the open goal group reported significantly higher perceptions of performance and effort/importance than those in the SMART goal condition.

In a later study, Hawkins et al. (2020) reported that active participants walked significantly further and reported significantly greater enjoyment and pleasure in the SMART condition, whereas insufficiently active participants walked significantly further and reported significantly greater enjoyment and pleasure in the open goal condition. More recently, Swann, Schweickle et al. (2022) also found that even though there were no significant differences in distance walked between the trio of non-specific goals compared (open, DYB, and as-well-as-possible), open goals produced significantly higher interest in repeating a session and pursuing a program based on this goal type versus the control conditions. Collectively, this evidence from 6MWTs highlights that open goals appear to confer additional psychological benefits compared to SMART goals, even in the absence of significant performance differences (Swann et al., 2020; Swann, Schweickle et al., 2022).

Learning Goals

One goal type that has yet to be compared to SMART goals and open goals in the context of PA is a learning goal (Swann et al., 2021; Swann, Jackman et al., 2022). Rather than focusing on the outcome of a task, as would be expected with a SMART goal, a learning goal directs attention towards knowledge or skill acquisition and emphasises the discovery or mastery of "appropriate strategies, processes, or procedures necessary to perform a given task" (Seijts et al., 2013, p. 196). For example, in a laboratory-based, 24-minute experimental trial involving a class-scheduling task, Sejits and Latham (2001) told participants that "Your goal for the next 24 minutes is to identify and implement 4 or more shortcuts" (p. 296). Learning goals have been found to improve performance in several other domains outside PA, including in education (e.g., Seijts & Latham, 2001), entrepreneurship (e.g., Noel & Latham, 2006), and business (e.g., Seijts et al., 2004). Although evidence on learning goals in other settings is encouraging, researchers have advised against the generalisability of findings to other settings and highlighted the need for further research on this goal type (Sejits et al., 2013). Thus, as an initial starting point, an evaluation of the effects of learning goals in comparison to other goal types used recently in PA is warranted.

The Present Study

The present study aimed to provide a preliminary test of learning goals in PA by comparing the effects of learning, SMART, and open goals to a control condition (i.e., to walk at your normal pace) in 6MWTs in healthy adults. More specifically, we sought to examine the effects of the aforementioned goal types on performance (i.e., distance walked) and psychological outcomes. Swann and Rosenbaum (2018) called for further research on qualitatively different goal types to include both measures of PA and psychological outcomes, especially those related to long-term PA engagement (e.g., enjoyment, affect, confidence, motivation). Recent studies that compared the effects of specific goals to non-specific goals in walking tests (Swann et al., 2020; Swann, Schweickle et al., 2022) have found significant differences in psychological responses between goal types despite the absence of any significant difference in objective performance (i.e., distance walked). Given the centrality of psychological responses in exercise for promoting longer-term PA, it is important to consider the impact of goals on psychological outcomes. Furthermore, we sought to explore qualitatively the strategies used by participants in the learning goal condition and the reasons underlying their goal preferences during the 6MWTs. Therefore, a mixed methods approach was employed.

Based on past literature, several hypotheses were proposed. First, similar to previous studies (Hawkins et al., 2020; Swann et al., 2020; Swann, Schweickle et al., 2022) and based on extensive evidence concerning the benefits of setting goals in PA (McEwan et al., 2016), it was hypothesised that participants would walk significantly further in the SMART, open, and learning goal conditions compared to the control condition. In addition, we sought to examine how performance compared across the three goal conditions. Second, we hypothesised that the rate of perceived exertion (RPE) would be significantly higher in the SMART, open, and learning goal conditions compared to the control condition, similar to past research (Swann et al., 2020;

Swann, Schweickle et al., 2022). Third, based on past research (Swann et al., 2020), we hypothesised that enjoyment would be significantly higher in the SMART and open goal conditions versus the control condition. As the first study to examine the effects of learning goals in a PA setting, we also sought to explore the effects of a learning goal on enjoyment.

In addition, we sought to address multiple exploratory research questions. First, affective valence during exercise is positively associated with long-term engagement in PA (Rhodes & Kates, 2015). Thus, we examined the effects of goal setting on affective valence during the 6MWTs. Second, we investigated the effects of goal type on self-efficacy and motivation, both of which have been positively associated with PA engagement (Bauman et al., 2012). Third, additional cognitive strategies are used to support goal attainment when pursuing learning goals (e.g., Seijts & Latham, 2011). Thus, we compared participant perceptions of mental fatigue across all conditions. Fourth, given that achievability most commonly represents the 'A' in SMART (Swann, Jackman et al., 2022), we examined perceptions of goal achievability across all three conditions. Fifth, to develop initial evidence on the effects of learning goals, we also examined the effects of learning goals on perceptions of performance, future exercise goal intentions, and post-exercise perceptions (i.e., preferred goal rankings, goal most likely to apply in PA, interest in using a goal in their PA) to the SMART goal, open goal, and control conditions. Finally, as the first study to compare learning goals to a SMART goal and an open goal in a 6MWT, we sought to understand the strategy, or strategies, that participants employed in this goal condition.

Methods

Participants

An *a priori* power analysis using GPower 3.1 (repeated-measures ANOVA, within-factors) was conducted. Meta-analytical evidence indicates that goal setting has a moderate effect on physical activity (McEwan et al., 2016). The calculation, using a moderate effect size (f = .30), alpha score of .05, power of .95, a modest repeated-measures correlation of .50 (Hawkins et al., 2020), and four measurements, suggested a sample size of 26 participants. To account for participant drop-out and potential exclusion from the analyses, the desired sample size was adjusted to 28 participants. After receiving ethical approval at the authors' university, 28 healthy adults (male n = 11, female n = 17; M age = 29.75 years, SD = 14.47) were recruited via social media advertisements, email advertisements, and snowball sampling. Before testing, participants completed an International Physical Activity Questionnaire (IPAQ; Craig et al., 2003) to determine whether they engaged in low (≤ 599 MET-mins·week^{-1}), moderate (600-1499 MET-mins·week^{-1}), or high activity levels (≥1500 MET-mins·week^{-1}). Most participants reported high (n = 14) or moderate (n = 12) PA levels, with two categorised as engaging in low levels of PA.

Procedures

A repeated-measures experimental design was employed, with four conditions performed by each participant on a synthetic, outdoor playing surface. Past 6MWT studies have taken place in sports halls (Swann et al., 2020; Swann, Schweickle et al., 2022), but this was not possible on this occasion due to the increased risks of indoor exercise during the COVID-19 pandemic. Each testing session lasted approximately 90 minutes, with all testing taking part in warm, dry conditions (*M* temperature = 18.9°C) during the morning or early afternoon (09.00-14.00). No significant weather changes took place during any testing session. Each participant provided informed consent and completed a health screening form before taking part in all four conditions during a single visit. The control condition was performed first, with a randomised, counter-balanced approach used for sequencing the three experimental conditions to prevent practice- and fatigue-order effects. Prior to each 6MWT, participants were given the condition instruction and provided verbal ratings of three measures (i.e., affective valence, perceived exertion, and felt arousal). Furthermore, participants were asked to state their goal (i.e., "remind me of your goal") immediately before initiating goal pursuit as a manipulation check. During the conditions, measures of affect, exertion, and arousal were taken every two minutes and the manipulation check was repeated half-way through the condition. Immediately after each 6MWT, measures of affect, exertion, and arousal were immediately taken, and participants completed a survey consisting of six single-item questions and a measure of enjoyment. After all conditions were finished, participants responded to three final questions to indicate their goal type preferences. To reduce the potential for carryover effects, participants completed a concentration grid (Harris & Harris, 1984) for five minutes between conditions to direct attention away from the previous condition.

Six-Minute Walk Test

Similar to previous research (Hawkins et al., 2020; Swann et al., 2020; Swann, Schweickle et al., 2022), the 6MWT (Enright, 2003) was used. The 6MWT has demonstrated excellent test-retest reliability (intraclass correlation coefficient ≥ 0.90) in healthy adults (Northgraves et al., 2016). Participants were required to walk between two cones for six minutes. To reduce the likelihood of knowledge transfer between conditions, the shuttle lengths (20m, 25m, 30m, 35m) were randomly counterbalanced across conditions and participants (i.e., a specific distance was not allocated to a particular condition).

Experiment

Based on past experimental goal setting research in 6MWTs (Hawkins et al., 2020; Swann et al., 2020; Swann, Schweickle et al., 2022), the instructions for the control, open, and SMART goal conditions were as follows: control condition "walk at your typical comfortable walking pace for six minutes"; open goal "see how far you can walk in six minutes"; and SMART goal "walk [control distance + 16.67%] metres". In a previous study that implemented learning goals in a 24-minute class-scheduling task, Sejits and Latham (2001) asked participants to identify and implement four or more shortcuts. Although the nature of the task differed, given that the 6MWT represented 25% of the time length used by Sejits and Latham (2001) and that the current study represented the first test of learning goals in a 6MWT, participants in the current study were asked to "identify and implement one strategy to increase your distance over the 6-minute walk. The strategy can be physical, technical, tactical, psychological, pacing, or any other strategy that will help you to increase your distance".

Data Collection

Quantitative Measures

Performance. Distance walked was measured by the researcher tallying the shuttles completed during the 6MWT and multiplying this by the shuttle distance. Participants were instructed to drop a bean bag at the end of the test, with additional distance, measured from the start-point of the last shuttle to the bean bag, added to the lapped distance.

Affective valence. Affective valence was measured before, during (minutes 2 and 4), and immediately after the exercise via the 11-point bipolar Feeling Scale (FS; Hardy & Rejeski, 1989). Participants indicated how they were feeling from -5 (*very bad*) to +5 (*very good*). Convergent validity correlation scores for the FS and other measures of affective valence have ranged between r = .41-.88 (Van Landuyt et al., 2000).

Perceived exertion. Perceived exertion was assessed before, during (minutes 2 and 4), and immediately after the 6MWT via the Rating of Perceived Exertion Scale (RPE; Borg, 1998). Participants indicated how hard they felt they were working from 6 (*no exertion at all*) to 20 (*maximal exertion*).

Felt arousal. Perceived arousal levels were assessed before, during (minutes 2 and 4), and immediately after the 6MWT via the Felt Arousal Scale (FAS; Svebak & Murgatroyd, 1985), whereby participants indicated their arousal level from 1 (*low arousal*) to 6 (*high arousal*). When compared to other measures of perceived arousal, the FAS has exhibited correlation scores of r = .45-.70 (Van Landuyt et al., 2000).

Enjoyment. Enjoyment was measured after each condition via the short-form Physical Activity Enjoyment Scale (PACES-8; Raedeke, 2007). The PACES-8 consists of eight items on a 7-point scale, with varying bipolar phrases. The scale previously demonstrated good reliability (ICC = .61) and excellent internal consistency (α = .92 – Chung & Leung, 2019). The internal consistency coefficient of the PACES-8 in the current study was excellent (α = .92).

Perceived performance. Perceived performance was measured similar to previous research (Hawkins et al., 2020; Schweickle et al., 2017). Participants were asked after each condition, "*How would you rate your performance in the task?*", on a scale from 1 (*I performed extremely badly*) to 10 (*I performed extremely well*).

Perceived achievability. Perceived goal achievability was measured using a similar approach to Swann, Scweickle et al. (2022). Participants were asked after each condition, "*How achievable did you perceive the goal to be?*", on a single-item measure from 1 (*not achievable at all*) to 10 (*very achievable*).

Perceived motivation. A single-item measure was used to assess perceived motivation recalled during the task. After each condition, participants were asked to respond to the question, "*How motivated did you feel to achieve your goal*", on a scale ranging from 1 (*not motivated at all*) to 10 (*very motivated*).

Perceived self-efficacy[1]**.** Drawing on guidelines for measuring self-efficacy (Bandura, 2006), a single-item measure of perceived self-efficacy during the task was employed. After each condition, participants were asked, "*How confident did you feel that you would achieve your goal?*", with the scale spanning 1 (*not confident at all*) to 10 (*fully confident*).

Perceived mental fatigue. A single-item measure was used to assess perceptions of mental fatigue during the 6MWT. Swann et al. (2020) previously used a measure of "fatigue", but this did not discriminate between mental fatigue and physical fatigue. Accordingly, participants were asked after each condition, "*How mentally fatigued did you feel?*", with possible responses ranging from 1 (*not at all fatigued*) to 10 (*completely exhausted*).

Future exercise goal intentions. After each condition, participants were presented with a single-item question asking, "*How likely would you be to use this type of goal setting when undertaking your own exercise?*" Possible scores ranged from 1 (*not at all likely*) to 10 (*extremely likely*).

Post-condition perceptions. After completing all conditions, participants were asked to, "*Rank the goal conditions from 1 (least preferred) to 3 (most preferred)*". Then, participants were asked, "*Which goal setting condition would you be most likely to apply to your own physical activity*", with three options based on the three experimental conditions: (i) "Exercise for a specific duration in a set time frame" (SMART); (ii) "Based on participation and seeing how much exercise you can complete (no set duration or timeframe)" (open); (iii) "Identifying and implementing strategies to increase your exercise participation" (learning). Finally, using the same three options as above, participants were asked to indicate their interest in using the different types of goals in their own PA on a 5-point Likert scale from "*definitely interested*" to "*no interest*" with a "*neutral*" midpoint.

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[1] Hawkins et al. (2020) used the same measure but termed this as "perceived confidence". Based on the terminology used in measures of self-efficacy (Bandura, 2006), the term self-efficacy was selected as the label for this item.

Qualitative Data Collection

Learning goal used. Immediately after completing the learning goal condition, the researcher asked each participant to verbally explain the strategy they used during the task and noted their response to this question.

Post-condition perceptions. After ranking the three goal conditions from least preferred to most preferred subsequent to completing all conditions (see above), participants were asked to provide qualitative responses on the reasons for the rankings. Specifically, participants were asked the following question: "*Why did you rank the conditions in this order?*".

Data Analysis

Statistical Analysis

Data were analysed using IBM SPSS 27. Before the main analyses, Shapiro-Wilks tests were performed and Mauchly's test of sphericity was assessed. Greenhouse-Geisser estimates were used to correct the analyses in the event of a violation of Mauchly's test of sphericity. Descriptive statistics for each variable were calculated to create mean and standard deviation scores. For measures obtained before, during (i.e., 2-minute and 4-minute points), and after (i.e., 6-minute point) the conditions (i.e., affective valence, perceived exertion, and felt arousal), a mean score was calculated. A series of one-way repeated measures ANOVAs were conducted to determine differences between conditions. Frequency statistics were calculated for the preference rankings and the conditions most likely to be applied by participants (see below). Due to the exploratory nature of learning goal research and the use of multiple outcome measures, we determined that data in the current study were most at risk from Type I errors. Therefore, Bonferroni corrections with a standard alpha (p = .05) were utilised for all pairwise comparisons.

Qualitative Analysis

Adopting a post-positivist perspective (Fox, 2008), qualitative data generated were analysed using content analysis (Miles & Huberman, 1994). To classify the strategy used in the learning goal condition, a deductive approach was combined with an inductive approach, wherein an existing framework of attentional focus (Brick et al., 2020) was used to interpret the qualitative responses, with data not captured by this framework analysed inductively. To interpret the reasons underlying preferences for different goal types, abductive logic (Halpin & Richard, 2021) was used. After familiarisation, relevant text segments addressing our questions were labelled as codes. Separate codes were generated for the various goal conditions depending on the rankings provided by participants. The codes for each goal condition were reviewed and similar codes clustered to establish categories for each goal condition. The first author led the initial analysis, but the third author acted as a critical friend (Smith & McGannon, 2018).

Results

Mean and standard deviations for all quantitative measures are presented in Table I. Results of the manipulation checks for the control and experimental conditions indicated that participants correctly recalled their goal at on all occasions. The quantitative results are presented first, followed by the qualitative findings.

TABLE I
Descriptive and inferential statistics for the study variables.

Measures	Control[a]		SMART goal[b]		Open goal[c]		Learning goal[d]	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Distance (m)	505.63[b,c,d]	67.09	613.30[a]	15.55	618.99[a]	12.60	648.61[a,c]	13.90
Affective valence	3.31	1.65	3.01	1.44	3.11	1.42	2.93	1.48
Enjoyment	40.89	7.49	39.50	9.94	39.57	9.99	41.25	9.88
RPE	7.50[b,c,d]	1.28	8.83[a]	1.66	9.26[a]	1.74	9.89[a,b]	1.99
Felt arousal	2.37	1.97	2.55	0.98	2.73	1.07	2.75	1.25
Perceived mental fatigue	1.76[b,c,d]	1.18	3.95[a]	1.96	3.33[a]	2.29	3.81[a]	2.36
Perceived motivation	7.89	1.60	7.44	2.41	8.00	1.30	8.67	1.40
Perceived self-efficacy	9.29[b,d]	1.23	5.50[a,c,d]	2.47	8.17 [b]	1.63	8.29[a,b]	1.52
Perceived goal achievability	9.50[b,c,d]	1.23	5.57[a,c,d]	2.57	8.07[a,b]	1.50	8.25[a,b]	1.80
Perceived performance	8.21[b]	1.81	6.39[a]	1.95	7.46	1.58	7.25	1.86
Future exercise goal intentions	7.13	2.15	5.83[d]	2.93	7.17[d]	1.86	8.17[b,c]	1.49
Interest in using goal type in participant's own physical activity	-	-	3.86	1.04	3.64	1.10	4.29	0.85

Note: Superscript letters represent significantly different scores ($p < .05$) compared to another condition: a = significantly different from control; b = significantly different from SMART goal; c = significantly different from open goal; d = significantly different from learning goal

Quantitative Results

Performance

There was a large, significant effect for goal type on distance walked, F (2.44, 65.87) = 47.43, $p < .01$, $\eta_p^2 = .64$. Significantly greater distances were walked in the open, learning, and SMART goal conditions compared to the control condition ($p < .01$). Participants walked significantly greater distances in the learning goal condition compared to the open goal condition (95% CI [2.89, 56.37], $p = .02$, $d = 0.42$). No further significant differences were found between goal conditions. Additionally, 18 participants (64%) reached and/or surpassed their SMART goal and 25 participants (89%) achieved the learning goal.

Affective Valence

There was a small, but non-significant, effect of condition on affect, F (1.93, 52.00) = 1.88, $p = .17$, $\eta_p^2 = .07$.

Perceived Exertion

There was a large, significant effect for RPE between conditions, F (2.57, 69.31) = 23.44, $p < .01$, $\eta_p^2 = .47$. Perceived exertion was significantly greater in the open, learning, and SMART goal conditions compared to the control condition ($p < .01$). The learning goal condition produced significantly higher RPE than the SMART goal condition (95% CI [0.28, 1.84], $p < .01$, $d = 0.58$). No other significant differences were observed between conditions.

Felt Arousal

No significant effect of condition on arousal scores was demonstrated, F (1.25, 33.63) = .73, $p = .43$, $\eta_p^2 = .03$.

Enjoyment

The level of enjoyment was not significantly affected by goal condition, F (2.68, 72.49) = .93, $p = .43$, $\eta_p^2 =.03$).

Perceived Performance

A significant, moderate effect of goal condition on perceived performance was found, F (2.19, 59.17) = 6.92, $p < .01$, $\eta_p^2 = .20$. Perceived performance was significantly greater in the control condition compared to the SMART goal condition (95% CI [0.37, 3.27], $p = .01$, $d = 0.97$). No significant differences were revealed between open, learning, or SMART goal conditions ($p > .05$).

Perceived Goal Achievability

A large, significant effect for condition on perceived goal achievability was found, F (2.54, 68.52) = 29.27, $p < .01$, $\eta_p^2 = .52$. Goal achievability was significantly lower in the SMART goal condition versus the control (95% CI [-5.29, -2.57], $p < .01$, $d = -1.95$), open goal (95% CI [-3.92, -1.08], $p < .01$, $d = -1.19$), and learning goal conditions (95% CI [-4.05, -1.31], $p < .01$, $d = -1.21$). The mean score produced for the SMART goal condition ($M = 5.57$, $SD = 2.57$) fell midway between the two bipolar statements (i.e., between "*not achievable at all*" and "*very achievable*"), thus suggesting the goal was perceived as moderately achievable, on average. The control condition also produced significantly higher goal achievability scores compared to the open goal condition (95% CI [0.45, 2.41], $p < .01$, $d = 1.05$) and learning goal condition (95% CI [0.29, 2.21], $p = .01$, $d = 0.81$). No significant difference was found between the open and learning goal conditions.

Perceived Motivation

A moderate, but non-significant effect of condition on perceived motivation was present, F (1.77, 46.12) = 2.71, $p = .08$, $\eta_p^2 = .09$.

Perceived Self-Efficacy

A large, significant effect of goal condition on perceived self-efficacy was revealed, F (2.39, 55.09) = 28.73, $p < .01$, $\eta_p^2 = .56$. The SMART goal condition produced significantly lower self-efficacy compared to the control (95% CI [-5.32, -2.27], $p < .01$, $d = 1.94$), open goal (95% CI [-3.97, -1.36], $p < .01$, $d = 1.28$), and learning goal conditions (95% CI [-4.18, -1.40]. $p < .01$, $d = 1.36$). Self-efficacy scores in the control condition were also significantly greater than the learning goal condition (95% CI [0.08, 1.92], $p = .03$, $d = 0.72$). There was no significant difference in perceived self-efficacy between the learning goal and open goal conditions.

Perceived Mental Fatigue

A large, significant effect on mental fatigue was found, F (2.59, 51.82) = 9.33, $p < .01$, $\eta_p^2 = .32$. Compared to the control condition, mental fatigue was significantly higher in the open (95% CI [0.49, 2.65], $p < .01$, $d = 0.84$), learning (95% CI [0.70, 3.40], $p < .01$, $d = 1.08$), and SMART conditions (95% CI [0.86, 3.53], $p < .01$, $d = 1.32$). No significant differences were demonstrated between the SMART, learning, or open goals.

Future Exercise Goal Intentions

A moderate, significant effect was revealed between goal conditions on the likelihood of using goals in future exercise, F (1.80, 41.35) = 5.89, $p < .01$, $\eta_p^2 = .20$. The learning goal condition produced a significantly greater future goal intention than the open (95% CI [0.13, 1.87], $p = .02$, $d = 0.59$) and SMART goal conditions (95% CI [0.47, 4.20], $p = .02$, $d = 1.00$). No further significant differences were revealed between the control condition and experimental conditions.

Goal Conditions Ranking

Frequency statistics regarding the goal condition rankings indicated considerable heterogeneity in goal condition preferences. The learning goal condition was “most preferred” by the highest number of participants (42.9%), followed by the SMART goal (35.7%) and open goal (21.4%). Conversely, the least preferred condition was the SMART goal (39.3%), followed by the open goal (35.7%) and learning goal (25.0%).

Interest in Using Goal

There was no significant effect for interest in using the goal type in the participants own PA between conditions F (2, 54) = 2.67, $p = .08$, $\eta_p^2 = .09$.

Application in Future Exercise

The learning goal condition was the condition participants reported they would be most likely to apply to their own PA (46.4%), followed by the SMART (32.1%) and open (17.9%) goal conditions (data were missing for one participant).

Qualitative Findings

Learning Goal Used

Based on categorisations of attentional focus in self-paced exercise activity (Brick et al., 2020), the majority of strategies (92.1%) reported by participants were classified as active self-regulation, with the most commonly reported strategies including walking technique and pacing. The remaining strategies (7.9%) were classified as distraction.

Table II
Learning goals reported by participants.

Example quote	Code	Category
I also counted the steps, so 10 to the middle and 10 to the cone	Counting	Active self-regulation
Telling myself I had to walk further in the same amount of time; convince myself I could do it	Goal-directed self-talk	
Walked 1 fast shuttle, then 1 moderate shuttle; Walk to my limit and keep it up	Pacing	
Increase stride length; I leaned forwards and swung my arms more	Walking technique	
Breathe more	Breath control	
More efficient turning; keep pace high when changing direction	Tactical	
Singing	Distraction	Active distraction

Reasons for Goal Preferences

The open-ended responses on reasons for ranking the goals indicated a range of reasons as to why participants identified the respective goals as their most preferred goal (Table III). Motivational and affective reasons for preferring a goal were identified across all three goal conditions. In terms of goal-specific findings, participants reported liking the learning goal due to it being individualised, clear, and mentally stimulating. Others stated that a SMART goal provided a target to focus on or liked the simplicity of the open goal.

Table III
Reasons for preferring a goal condition.

Goal Type	Example quotes	Code	Category
Learning goal (12 responses)	Liked being able to make my own goal to improve	Autonomy	Motivational reasons
	Found it interesting to implement my own strategy	Interesting	
	More of a challenge	Provides challenge	
	Felt more motivated with a goal in mind	Increased motivation	
	More enjoyable to choose my own strategy	Enjoyment	Affective reasons
	Focuses on the individual rather than what anybody can achieve	Individualised	Goal structure
	A clear goal	Clarity	
	More in-depth goals gave me more to think about	Mentally stimulating	Engages cognition
	It makes you think about what you could do to improve that you might not have thought originally	Makes you search for strategies	
SMART goal (9 responses)	Less frustrated	Less frustration	Affective reasons
	It was good to have a tangible goal, otherwise it just felt like trying to exert myself but not really knowing what to achieve	Target to focus on	Goal structure
	Degree of challenge; I liked trying to work out how many I needed to do	Provides challenge	Motivational reasons
	The direct number made me want to make it within the times and gave me greater drive	Increased motivation	
Open goal (7 responses)	Enjoyable	Enjoyment	Affective reasons
	A simple goal	Simplicity	Goal structure
	Less pressure	Less pressure	Goal appraisal
	I had more freedom and focused less on achieving a set goal	Autonomy	Motivational reasons
	I saw it as a competition against myself	Mastery	

Discussion

The current study aimed to provide preliminary evidence on the effects of learning goals in PA by comparing the effects of learning goals to SMART and open goals on distance walked and psychological outcomes in a 6MWT in healthy adults. While the hypotheses were only partially supported, the use of learning goals appeared to provide similar or greater benefits compared to SMART and open goals. Taken together, the findings extend previous goal setting research on SMART and open goals in 6MWTs in adults (Hawkins et al., 2020; Swann et al., 2020; Swann, Schweickle et al., 2022) by providing preliminary evidence on the efficacy of learning goals in PA settings, as well as qualitative insights into participant perceptions on the various goal types examined.

The first hypothesis, that participants would walk significantly further in the experimental goal conditions compared to the control group (H_1), was supported, thus aligning with previous research indicating that setting a distance-related goal produces better performance compared to being asked to walk at one's typical walking pace (Hawkins et al., 2020; Swann et al., 2020; Swann, Schweickle et al., 2022). The current study found further evidence supporting the absence of significant differences between SMART and open goals in 6MWT performance (Swann et al., 2020; Swann, Schweickle et al., 2022). A novel finding was that the learning goal produced the greatest distance walked, with this distance being significantly greater than the open goal condition. Given that most participants reported using active self-regulation strategies during the learning goal condition and these types of strategies have been associated with increased pace in endurance activity (Brick et al., 2014), it is also plausible to suggest that being instructed to find and use a specific strategy to achieve better performance could have reaped similar benefits. Indeed, by using a learning goal, the participants were explicitly instructed to draw upon more than one psychological technique by being asked to (a) increase their distance (i.e., goal setting), and (b) find at least one strategy to help them achieve it. Together, these strategies appeared to confer additional performance benefits over being set a SMART goal or open goal alone, though we cannot verify whether or not participants may have drawn upon self-regulatory strategies during these conditions spontaneously. Furthermore, although learning goals are proposed to activate additional cognitive functions (Seijts & Latham, 2011), no significant differences in mental fatigue were found. However, due to the brevity of the task, this finding should be interpreted with caution.

The second hypothesis, that RPE scores would be higher in the SMART, open, and learning goal conditions compared to the control condition, was supported, thus aligning with results from previous research (Hawkins et al., 2020; Swann et al., 2020; Swann, Schweickle et al., 2022). However, a notable finding was that RPE scores were highest in the learning goal condition, with this condition producing significantly and moderately higher RPE than the SMART goal condition. Bandura (2013) notes that belief in one's ability is fundamental to persisting in difficult situations. Given that perceived self-efficacy and perceived goal achievability were significantly lower in the SMART goal condition compared to the learning goal condition, one potential explanation is that if the participants doubted their ability to achieve their SMART goal, this might have lessened the degree of effort mobilisation in the SMART goal condition compared to the learning goal condition. This proposition is supported by evidence on the effects of mental contrasting on energy mobilisation, which indicates that when people contrast their current reality to a desired future state and perceive their chances of success are low, they are less likely to commit the energy needed to realise their goal (Oettingen et al., 2009). Although the absence of a significant difference in motivation raises some doubts about this proposal, as perceived motivation was lowest in the SMART goal condition and highest in the learning goal condition. More so, we suggest that the significantly lower perceptions of performance in the SMART goal condition versus the control condition offers further potential evidence to support the assertion that while mentally contrasting their in-task and end-goal realities, participants may have produced lower expectations of success in the SMART goal condition compared to the learning goal condition. However, future research is needed to test these proposed explanations.

The final hypothesis, that enjoyment would be significantly higher in the experimental goal conditions compared to the control condition, was not supported as no significant differences were present between conditions. Relatedly, no significant effects were found on affect or arousal between conditions. Collectively, results of the current study do not concur with previous studies that reported higher enjoyment for the SMART and open goal conditions compared to the control condition (Hawkins et al., 2020; Swann et al., 2020; Swann, Schweickle et al., 2022), as well as higher affect and arousal compared to the control condition (Hawkins et al., 2020). In attempting to explain these findings, it is important to note that a key methodological difference compared to the aforementioned studies was that participants in the current study engaged in their 6MWTs outdoors, whereas past research involved indoor 6MWTs (Hawkins et al., 2020; Swann et al., 2020; Swann, Schweickle et al., 2022). Given that outdoor PA can produce more pleasant and enjoyable experiences than indoor exercise (Lahart et al., 2019), it is possible, although somewhat speculative, that this methodological difference may have contributed to these contrasting findings.

By comparing the effects of learning, open, and SMART goals to one another, this study had produced several insights that extend understandings of each goal type. In responding to calls for further examination of learning goals in PA (Swann et al., 2021), this study provides the first evidence to suggest the potential utility of learning goals within PA. In addition to resulting in the highest distance walked and eliciting the highest perceptions of self-efficacy and goal achievability, the learning goal was ranked as the most preferred condition and the goal type participants were most likely apply to their own PA. Our qualitative findings indicated that some participants liked the task of searching for strategies to aid performance enhancement, consistent with understandings of the application of learning goals (Seijts et al., 2013). While the current study is, to the best of our knowledge, the first study to investigate learning goals in PA and the findings require further examination, this initial evidence suggests learning goals could have utility in this context. Future studies could compare the effects of learning goals to other goals in active and insufficiently active participants to further examine potential similarities or differences between activity levels.

Limitations and Future Directions

Several limitations should be noted when considering the findings. First, the study involved very brief walking tests and findings should not be generalised beyond this task. For example, although no significant differences in mental fatigue or affective valence were found between conditions, future studies focused on specific sport or exercise tasks should compare the effects of goal types in higher-intensity activities and in more prolonged tasks. In future, the long-term effects of various goal types should also be assessed. Second, the current sample consisted mainly of moderately- or highly-physically active individuals, but previous research suggested differences in at least some goal types between active and insufficiently active individuals (Hawkins et al., 2020). Based on goal setting theory (Locke & Latham, 2002, 2015), it has been suggested that learning goals could be particularly useful for those in the early stages of learning to be physically active (Swann et al., 2021). Thus, future studies should compare the effects of this goal type to other goal types in this population. Third, and related to the above point, in the current study, participants were asked to identify one strategy that could help them to increase their performance. According to goal setting theory (Locke & Latham, 2015), goals should be specific *and* challenging to maximise the effects on performance. As the current study did not obtain measures of perceived challenge, it is not possible to determine whether the goal was sufficiently challenging. Future research using learning goals in PA should consider this and other core assumptions of goal setting theory (e.g., moderators - Locke & Latham, 2015). Fourth, although single-item measures are widely used and can be suitable in some circumstances (Allen et al., 2022), we suggest that future studies interested in developing more nuanced insights into the effects of goals on complex psychological constructs (e.g., motivation) should consider multidimensional measures. Finally, although the same percentage increase from baseline was used in the SMART goal condition as the second SMART goal trial in previous research (Hawkins et al., 2020; Swann et al., 2020; Swann, Schweickle et al., 2022), participants in the current study rated this goal as significantly less achievable than other goal types. Although almost two-thirds of participants did achieve this goal, it remains unknown to what extent the moderate achievability of the goal for the SMART goal condition affected the measured outcomes as opposed to the specificity of that goal (i.e., having a single end-state as a reference point). In line with our discussion, we suggest further research comparing SMART, non-specific, and learning goals could benefit from consideration of theoretical perspectives on self-efficacy (Bandura, 1997) and mental contrasting (Oettingen et al., 2009), or the broader strategy of mental contrasting with implementation intentions (Oettingen, 2012), as a potential future avenue for research in this area.

Conclusion

This was the first study to provide evidence on the efficacy of learning goals in PA, thus addressing calls for research comparing qualitatively different goals in PA (Swann & Rosenbaum, 2018), especially learning goals (Swann et al., 2021). Current findings support past work (McEwan et al., 2016) in suggesting that any goal is beneficial for PA, but learning goals produced significantly higher distance walked compared to an open goal. Although the results indicated differences in the psychological responses of participants to different goal types, participants varied in their preferences for the goal conditions used. Based on the preliminary experimental evidence presented here from our 6MWTs in healthy adults, there is tentative evidence that learning goals could be a useful strategy. Nevertheless, further research is needed to disentangle and better understand the mechanisms underlying the effects of qualitatively different goals on PA and psychological outcomes. More specifically, long-term comparisons of SMART, open, and learning goals in more ecologically valid PA settings are needed.

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