A Study on Self-tracking: How Self-tracking Devices Can Motivate Us to Exercise More

The effect of feedback type and valence from a self-tracking device on the intention of self-trackers to

exercise

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Master's Thesis

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July 2023

Contents

Abstract

Self-tracking, which involves collecting personal data using technology, has gained popularity in recent years. Goal setting allows self-trackers to establish goals for themselves and receive feedback on those goals. The potential effects of these self-tracking device feedback notifications have not yet been studied. Therefore, the current study aimed to investigate the effects of feedback type (self-based vs. task-based) and feedback valence (approach-based vs. avoidance-based) on self-trackers' intention to exercise, with self-compassion as a moderator. A 2x2 between-subjects design was used, and data were collected from 102 respondents with prior self-tracking experience through an online survey. Respondents in the study were exposed to one of four distinct feedback notifications, following which their intention to exercise was assessed. Subsequently, a series of questions were administered to gauge the respondents' level of self-compassion. A two-way ANOVA was conducted to analyse the data, revealing that the main effects of feedback type and valence were not statistically significant, and there was no significant interaction effect. Additionally, self-compassion did not moderate the relationship between feedback type, valence, and exercise intention. Despite the non-significant results, the study contributes to the research field of self-tracking by discussing limitations and providing recommendations for future research.

Keywords: Self-tracking, goal setting, feedback, task-based goals, self-based goals, valence orientations, self-compassion, intention, exercise

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The advent of technologies, such as mobile phones and smartwatches, has led to a surge in the popularity of self-tracking (Epstein et al., 2015; Hanci et al., 2021). Self-tracking, involves the automated collection of personal data related to various bodily activities, including walking, exercising, eating, and sleeping patterns (Hanci et al., 2021). By providing valuable insights into individual well-being, self-tracking enables users to monitor key health indicators such as physical activity levels, dietary habits, and sleep quality (Paré, 2018). Users are motivated to engage with self-tracking devices, among other things, due to their desire to gain a deeper understanding of their physical condition and achieve personal health goals (Ajana, 2018). By actively monitoring their progress and receiving daily encouragement, users are motivated to adopt healthier lifestyles (Ajana, 2018). Consequently, the relationship between motivations for self-tracking and the intention to engage in increased physical activity becomes evident. The availability of data-driven insights and continuous incentives provided by self-tracking devices encourages users to elevate their exercise levels and strive for higher fitness.

Goal setting serves as a potent motivator utilized by self-trackers to propel their actions (Sullivan & Lachman, 2017). It empowers users to establish attainable goals and receive informative feedback that propels them to achieve those goals (Stiglbauer et al., 2019). Self-tracking devices provide users the option to either adopt predetermined goals, such as "taking 10,000 steps per day", or to establish personalized goals aligned with their individual aspirations, such as striving for "12,000 steps per day" (Sjöklint et al., 2015). The availability of such personalised goal setting features caters to users' inherent drive to gain a comprehensive understanding of their physical condition and strive towards the realisation of their unique health goals (Ajana, 2018). Because users actively monitor and receive feedback throughout the day, the messages they receive from these self-tracking devices have a major impact on their intention to achieve their established goals (Ansems et al., 2019).

Despite existing literature indicating a relationship between feedback messages provided by self-tracking devices and the intention to achieve goals (Ansems et al., 2019), the specific impact of different types of feedback on exercise behaviour remains unexplored. Consequently, considering the pronounced motivation for self-trackers to pursue healthier lifestyles (Ajana, 2018), the present study aims to investigate the influence of various forms of feedback provided by self-tracking devices on the

intention to exercise. To examine this phenomenon, the study will employ the 3x2 Achievement Goal Model (Elliot et al., 2011), which encompasses three distinct goal types.

In the current investigation, the focus will be on the first two goal types within the Achievement Goal Model, namely mastery goals centred on enhancing competence (Elliot et al., 2011). The first type of mastery goals pertains to task-based goals, which involve pursuing an absolute goal while tracking progress towards a specific target (Elliot et al., 2011). An example of a task-based goal would be "take, 10,000 steps per day". The second type of mastery goals are self-based goals, which are interpersonal in nature and involve striving to improve one's performance in comparison to past attempts (Elliot et al., 2011). An example of a self-based goal would be "take more steps this week than last week". The third goal type was omitted because the scope of this study is the intrinsic motivation of self-trackers to better understand their personal physical health (Ajana, 2018; Paré, 2018). Other-based goals, on the other hand, entail interpersonal competition and aim to outperform others (Elliot et al., 2011). As a result, this study will employ a 2x2 design.

Each goal type within the Achievement Goal Model can be further characterized by two valence orientations. The first valence orientation is approach-based, which reflects the positive subjective value and desire associated with goal attainment (Elliot & McGregor, 2001). For example, a feedback message might state, "take 500 more steps to reach your step goal", emphasizing the drive strive for goal achievement. The second valence orientation is avoidance-based, which entails the negative subjective value linked to goal non-attainment, highlighting the desire to avoid failure or non-achievement (Elliot & McGregor, 2001). An illustrative feedback message could be, "if you don't take 500 more steps, you will not reach your step goal".

Existing literature has examined the effects of different goal types and valences in various domains, but the specific implications within the context of self-tracking are not studied yet. For instance, studies conducted in educational settings have revealed that the presence of mastery goals, encompassing both task-based and self-based goals, enhances students' intrinsic motivation (Barron & Harackiewicz, 2001; Dela Rosa, 2010). Moreover, Pekrun et al. (2009) found a positive association between mastery goals and heightened positive achievement emotions (such as hope and pride), leading to improved academic performance. Another study on motivation based on persuasive feedback

discovered that participants in the self-based condition improved their game score more those in the control condition (Ansems et al., 2019). In additional research on goal setting and motivation, Diseth (2015) discovered that task-based goals are more strongly connected with accomplishment motives (i.e., the motive for success and the motive to avoid failure) and self-efficacy than self-based goals. Given the positive effects of goal types observed in other domains, it is important to explore whether these findings can be extended to the domain of self-tracking.

In addition to goal types, studies have also examined the impact of feedback valence. Pekrun et al. (2009) demonstrated that provision of approach-based feedback enhances individuals' sense of hope and their commitment to goal attainment. Consistent reminders of the possibility of achievement foster increased desire and enthusiasm (Pekrun et al., 2009). In a study conducted by Sjöklint et al. (2015), participants used a self-tracking device to obtain approach-based or avoidance-based feedback on self-selected goals. It was found that approach-based feedback was perceived as more positive and satisfying, whereas avoidance-based feedback was viewed as negative and disappointing. The emotional impact of avoidance-based feedback was greater compared to the positive feelings provided by approach-based input. Additionally, when confronted with unmet goals the next day, these individuals reported heightened feelings concerning goal fulfilment (Sjöklint et al., 2015). These findings were corroborated by Pekrun and Stephens (2015), who found that the fear of failing a goal can trigger a rigid reaction aimed at preventing such failure.

Because the type of valence used for feedback can elicit such deep feelings (Pekrun & Stephens, 2015; Sjöklint et al., 2015) and the value that users place on goal (non)achievement is subjective (Elliot & McGregor, 2001), the question arises whether personality plays a role in how feedback from a self-tracking device is perceived by users. How these users deal with the prospect of not meeting their goals might be affected by personality factors such as self-kindness and having a positive mentality (Neff et al., 2005). These concepts of properly dealing with setbacks come together in the concept of self-compassion.

Self-compassion, characterised by kindness, a broader perspective, and mindful acceptance of negative emotions (Neff et al., 2005), emerges as a crucial element in a variety of domains of human experience. Research indicates that individuals with higher levels of self-compassion tend to approach

their goals with a more optimistic outlook (Akin, 2008; Neff et al., 2005) and exhibit greater resilience in the face of adversity and hardship compared to those with lower levels of self-compassion (Waring & Kelly, 2019). Hanci et al. (2021) discovered in a study on self-tracking that people with growth mindsets, which is the belief that abilities and intelligence can be developed through effort, have a higher level of self-compassion. These respondents also responded with a more positive attitude when confronted with unachieved goals. These findings suggest that individuals scoring higher on self-compassion, characterized by a more open-minded approach and reduced emphasis on goal achievement, may respond more positively to avoidance-based feedback from a self-tracking device.

Based on the aforementioned considerations, this study aims to investigate the effects of different type of feedback provided by self-tracking devices. Given that a potent incentive for self-tracking users is to lead a healthier lifestyle (Ajana, 2018; Paré, 2018), the study will focus on the intention to exercise. The choice for examining the intention to exercise is motivated by its importance as a predictor for actual behaviour (Ajzen, 1991). Consequently, the study seeks to explore how self-track devices, through provision of feedback, can enhance the intention to exercise. Finally, the moderating role of self-compassion on the interaction between feedback type, valence, and intention to exercise will be investigated. Accordingly, the research question guiding this study is as follows:

RQ: To what extent do feedback type (self-based vs. task-based) and feedback valence (approach-based vs. avoidance-based), received from a self-tracking device, influence the intention to exercise of self-trackers, and how does self-compassion moderate this?

Theoretical Framework

Self-tracking

The practice of monitoring and tracking one's health and well-being has been prevalent for a considerable period (Stiglbauer et al., 2019). Initially, individuals relied on manual recording of health observations and storing them for future reference (Maltseva & Lutz, 2018). However, with technological advancements, the process has become automated. The advent of wearable self-tracking devices has revolutionized this process, enabling the automatic collection of comprehensive data pertaining to the user's health and well-being, without requiring any active effort from the users (Maltseva & Lutz, 2018). Notably, these self-tracking devices possess the capability to seamlessly convert the amassed data into personalized feedback, which is then presented to the user through notifications displayed on a screen (Stiglbauer et al., 2019). The appeal of accessing such data and feedback lies in its potential to facilitate data-driven choices among users (Dijk et al., 2017). By basing their decisions on objective information derived from self-tracking devices, users aspire to cultivate and maintain healthier lifestyles (Stiglbauer et al., 2019).

Despite the potential benefits of using self-tracking data to inform decision-making, user engagement has proven to be a challenge in the field of self-tracking technology. Commercial surveys have revealed that a significant portion of users discontinue using self-tracking devices within a few months, with abandonment rates exceeding half after sex months (Ledger, 2017). To address this issue, self-tracking device manufacturers have started incorporating features such as goal setting and feedback to enhance user engagement (Stiglbauer et al., 2019). However, the effects of these functions on user behaviour have yet to be extensively studied.

Self-tracking and Theory of Planned Behaviour

The selection of intention to exercise as the focal point of investigation in this study stems from the understanding that behavioural change is contingent upon the presence of intention to engage in the desired behaviour. (Ajzen, 1991). Extensive research has been dedicated to exploring the dynamics of behaviour change, with Ajzen's (1991) Theory of Planned Behaviour emerging as one of the prominent theories in this field. The Theory of Planned Behaviour focuses on the role of intentions in predicting

and explaining human behaviour. It suggests that individuals are more likely to engage in a particular behaviour if they have a positive attitude towards it, perceive social norms favouring it, and believe they have control over performing it. Intentions act as the motivational force that drives individuals to act in accordance with their attitudes, subjective norms, and perceived behavioural control (Ajzen, 1991). Hence, this study aims to investigate the influence a self-tracking device on users' behavioural intention to exercise. Using the Theory of Planned Behaviour, it can be argued that if a self-tracking device increases a person's intention to exercise, the likelihood of engaging in the behaviour would also increase (Ajzen, 1991). Prior research has already demonstrated the significant impact of feedback from self-tracking devices on users' intention to achieve goals (Ansems, 2018), thus underscoring the potential influence of goal setting and the feedback provided by self-tracking devices on users' intention formation.

Self-tracking and Goal Setting

The effects of goal setting and feedback on performance and motivation have been extensively examined in the existing literature across diverse domains. Locke and Latham (1990), in their research within the realm of organizational psychology, demonstrated the positive impact of goal setting on performance. Subsequent studies have further emphasized the importance of clearly defined goals that facilitate the tracking of individual progress (Locke & Latham, 2002). Additionally, feedback pertaining to goal attainment serves two crucial functions (Lunenburg, 2011). Firstly, it enhances individuals' awareness of their performance in relation to the intended goals. Secondly, it provides guidance regarding the necessary adjustments required to ensure goal achievement.

Self-tracking devices, in the form of visual feedback displayed through screen notifications, offer users a means of receiving feedback (Stiglbauer et al., 2019). Previous research has indicated that such feedback serves as an encouraging factor, as it fosters the desire to achieve set goals (Stiglbauer et al., 2019). Nevertheless, the extent to which the phrasing of feedback influences the motivation of self-tracking device users remains an area that warrants further investigation. To contribute to the existing body of literature, this study aims to explore the different types and valences of feedback derived from

the achievement goal model, with the aim of ascertaining which forms of feedback most effectively motivates users of self-tracking devices in pursuit of their goals.

Achievement Goal Model

The achievement goal construct was developed through collaborative and individual work conducted by various theorists in the 1980s (Ames, 1984; Dweck, 1986; Maehr & Nicholls, 1980; Nicholls, 1984). It represents the purpose underlying engagement in achievement behaviour (Maehr, 1989). Over the years, the Achievement Goal Model has evolved through expansions and refinements. Initially, it was conceived as a Dichotomous Model, wherein mastery and performance goals were categorized as approach goals (Maehr, 1989). In this model, mastery goals emphasize competence and task mastery, whereas performance goals emphasize demonstrating this competence to others. Following that, Elliot and Harackiewicz (1996) introduced avoidance goals, which revolved around the avoidance of incompetence. Building upon this foundation, Elliot and his team emphasized three goal type standards: task-based, self-based, and other-based goals, each employing distinct evaluative criteria. Moreover, goals can be valenced as approach-based or avoidance-based, with approach goals promoting positive outcomes and avoidance goals focused on evading negative outcomes (Elliot & McGregor, 2001). The integration of the goal type standards and valences gave rise to the 3x2 Achievement Goal Model (Elliot et al., 2011), as illustrated in Figure 1. This study aims to investigate the impact of feedback related to these diverse goal types and valences on motivating users of self-tracking devices to increase their exercise levels.

Figure 1

The 3x2 Achievement Goal Model

Definition

	Absolute (task)	Intrapersonal (self)	Interpersonal (other)
Positive (approaching success)	Task-approach goal	Self-approach goal	Other-approach goal
Negative (avoiding failure)	Task-avoidance goal	Self-avoidance goal	Other-avoidance goal

Valence

Note. The 3x2 Achievement Goal Model. Reprinted from "A 3x2 Achievement Goal Model", by A. J. Elliot, K. Murayama, and R. Pekrun, 2011, *Journal of Educational Psychology*, *103*(3), p. 634. Copyright 2011 by the American Psychological Association.

Feedback Type: Task-based vs. Self-based

Elliot et al. (2011) have demonstrated that task-based and self-based goals within the Achievement Goal Model exhibit variations in the perception of competence attainment. In the context of self-tracking devices, which offer users the option to select either pre-set goals or personalised tailored goals (Sjöklint et al., 2015), these distinctions become relevant and warrant investigation. Task-based goals in the self-tracking context can be regarded as default pre-set goals, such as achieving a target of 10,000 steps per day. These goals provide a clear target to strive for, and the feedback provided by self-tracking devices reflects the user's progress toward achieving this target. On the other hand, self-based goals in self-tracking context encompass personalized objectives that are tailored to the individual's capabilities, leveraging the data collected by the device (Sjöklint et al., 2015). The feedback delivered by self-tracking devices concerning self-based goals primarily focuses on enhancing the user's performance in comparison to their previous records.

Contemporary self-tracking systems have predominantly focused on task-based goals, exemplified by devices like Fitbit that incorporate predefined targets for specific physical activities (Ansems et al., 2019). However, research underscores the significance of self-based goals, and consequently the feedback on these goals, in fostering motivation and engagement (see, e.g., Ansems, 2018; Ansems et al., 2019; Gimpel et al., 2013; Martin & Elliot, 2016). A growing body of literature demonstrates the positive association between self-based goals and enhanced motivation and engagement (Ansems et al., 2019; Martin & Elliot, 2016). Self-based goals place emphasis on personal progress, self-improvement, and surpassing previous performance, reflecting an intrapsychic focus on internal growth, mastery, and adaptive drive (Martin & Elliot, 2016). Consequently, self-based goals hold considerable potential for self-trackers, as they align with the pursuit of self-development (Lupton & Smith, 2018).

In contrast, task-based goals revolve around meeting externally imposed criteria and task-oriented goals, such as achieving specific step counts or reaching predetermined activity levels (Elliot et al., 2011). Despite their prevalent use in self-tracking technology, task-based feedback has shown only minimal positive connections with motivation and engagement (Martin & Elliot, 2016). Task-based goals may be less efficient in fostering adaptive motivation and engagement since they are more externally oriented and less focused on self-improvement (Martin & Elliot, 2016). Similar patterns have been observed in studies investigating participants' responses to task-based versus self-based feedback in gaming contexts. Wherein goal achievement and competition were central in the task-based condition, while self-improvement served as the primary motivator in the self-based condition (Ansems et al., 2019).

Drawing on interdisciplinary research on the effects of task-based and self-based feedback, it becomes apparent that self-based feedback holds greater efficacy in motivating individuals (Ansems et al., 2019; Mariot & Elliot, 2016). Moreover, investigations into the motivations underlying self-initiated health monitoring underscore the critical role of self-related factors in individuals' engagement and success (Gimpel et al., 2013; Lupton & Smith, 2018). Self-awareness and self-improvement are emerging as vital components for the effectiveness of health applications (Gimpel et al., 2013). Based on the aforementioned arguments, we propose the following hypothesis:

H1. People's intention to exercise will be higher if they received self-based feedback rather than task-based feedback.

Feedback Valence: Approach-based vs. Avoidance-based

The valence of a goal plays a crucial role in determining its perceived desirability, either as a positive and desirable possibility or as a negative and non-desirable possibility (Elliot & McGregor, 2001). Research indicates that individuals automatically categorize encountered stimuli as desirable or not, leading to corresponding approach or avoidance behavioural tendencies (Bargh, 1997; Cacioppo et al., 1993). Within the context of self-tracking, this implies that approach-based feedback notifications elicit positive and desirable assumptions regarding the potential achievement of the goal. For example, a self-tracker might set the goal that they want to take 10,000 steps in a day, an approach-based feedback notification for this goal might be "*To reach your goal of 10,000 steps, you need to take 500 more steps*". In contrast, avoidance-based feedback notifications evoke negative and non-desirable assumptions concerning the possible non-achievement of the goal. An example of an avoidance-based feedback notification for the goal of taking 10,000 steps in a day could be "*Take 500 more steps, otherwise you won't reach your goal of 10,000 steps*". This automatic cognitive process can significantly influence individuals' perception and response to feedback provided by self-tracking devices (Ansems et al., 2019).

Approach-based goals have been consistently associated with positive affective experiences, such as hope, enthusiasm, and excitement (Pekrun et al., 2006, 2009). Pursuing approach-based goals fosters a broad and open engagement, facilitating deep involvement and commitment to tasks (Elliot, 1999). In contract, avoidance-based goals generate negative emotional experiences, including feelings of danger, worry, and vigilance (Pekrun et al., 2006, 2009). Pursuing avoidance-based goals often triggers self-worth concerns, hindering full engagement and impeding task focus (Elliot, 1999).

Empirical evidence supports the effectiveness of approach-based feedback in various contexts. For instance, participants in a brain-training game study by Burgers et al. (2015) who received approach-based feedback reported higher perceived competence and independence compared to those who

received avoidance-based feedback. Approach-based feedback was also found to enhance intrinsic motivation, with perceived competence and autonomy mediating this relationship, indicating that approach-based feedback promotes motivation through these mechanisms (Burgers et al., 2015). These findings align with the notion that approach-based feedback is perceived as less controlling and fosters competence and autonomy (Deci et al., 1999), which resonates with the self-trackers' desire for personal goal setting and autonomy over their health goals (Ajana, 2018).

In the realm of habit formation, initial hypotheses suggested that approach-based feedback would facilitate the development of automaticity in behaviour (Aarts et al., 1997). However, a study on smartphone apps for habit formation conducted by Stawarz et al. (2015) revealed that groups without approach-based feedback exhibited better performance in habit formation. It was speculated that the enthusiastic nature of approach-based feedback messages may have been perceived as bothersome by some participants, potentially influencing the outcomes (Stawarz et al., 2015). This suggests that individual preferences and perceptions can modify the effects of approach-based feedback.

Conversely, avoidance-based feedback has shown predominantly negative implications, on motivation and perceived competence. A meta-analysis examining the impact of avoidance-based feedback on intrinsic motivation found that it decreased intrinsic motivation to a greater extent compared to approach-based feedback (Fong et al., 2019). Furthermore, avoidance-based feedback significantly reduced perceived competence (Fong et al., 2019). These findings indicate that avoidance-based feedback diminishes intrinsic motivation and perceived competence, impairing task-performance, and persistence (Fong et al., 2019). In another study comparing approach-based and avoidance-based feedback conditions solving puzzles, performance was found to be comparable between the groups. However, it is noteworthy that the avoidance-based group exhibited significantly lower levels of intrinsic motivation to complete the exercise, as reported by Elliot and Harackiewicz (1996). Based on the existing literature, the following hypothesis is proposed:

H2. People's intention to exercise will be higher if they received approach-based

feedback rather than avoidance-based feedback.

Interaction Between Feedback Type and Valence

The existing literature lack exploration of the interplay between feedback type and valence within the context of self-tracking. However, insights from research conducted in various fields shed light on the interaction between these two factors and their impact on individual motivation and engagement. For instance, Tang et al., (2021) conducted a study on citizen science initiatives and found that negatively valenced feedback (avoidance-based) yielded superior motivational outcomes when it was task-based rather than self-based. The authors attributed this finding to the fact that negative task-based feedback targets specific modifiable task conditions, whereas negative self-based feedback solely critiques personal performance, which can be demotivating (Tang et al., 2021). In the same study, self-expansion was used to assess volunteers' intrinsic motivation. Self-expansion refers to the constant striving of individuals to extend themselves by acquiring new skills, broadening their perspectives, and enhancing their competence (Mattingly & Lewandowski, 2012). The study revealed that positive (approach-based) self-based feedback resulted in the highest degree of self-expansion among volunteers (Tang et al., 2021).

Moreover, Zhou (1998) demonstrated an interaction between feedback type and valence on creativity. In this study, feedback type was categorized as informative or controlling. Informative feedback was described as constructive and supportive, aiming to encourage creative expression. This aligns with the concept of mastery goal feedback, where the goal is to foster task performance improvement or personal growth. In Zhou's (1998) study, the group that received positive (approach-based) informative feedback achieved the highest scores on the creative task, indicating an interaction between feedback type and valence with a collaborative contribution to optimal outcomes.

Méndez-Giménez et al. (2018) investigated the 3x2 Achievement Goal Model in relation to self-determined motivation among high school students. A questionnaire was used to assess the students' specific achievement goals, which were then analysed to measure their self-determined motivation. The findings revealed that approach-based goals had a positive influence on self-determined motivation, while avoidance-based goals had a negative impact. The study also explored the influence of the class accomplishment framework of Ames (1992), which distinguishes between self-based or other-based approach environments. In a self-based approach environment, students are encouraged to develop

themselves, while in an other-based approach environment, students compete to outperform others. The findings indicated that a self-based approach environment resulted in the highest level of self-determined motivation among students. Within the context of self-tracking, it can be hypothesized that self-based feedback with approach valence has the highest potential to create an optimal environment for users to enhance their exercise engagement. Based on the reviewed literature regarding the interaction effect between feedback type and valence, the following hypothesis is proposed:

H3. People's intention to exercise will be the highest if they receive a combination of self-based feedback with an approach valence.

Self-compassion

Self-compassion is a construct revolving around kindness, empathy, and self-supporting during challenging times. It involves accepting personal weaknesses and recognizing the shared humanity that concerns us all (Neff & Knox, 2020). Neff (2003) identified three core components of self-compassion each with a negative and a positive pole: self-kindness vs. self-judgment, common humanity vs. isolation, and mindfulness vs. overidentification. Self-kindness involves being loving, gentle, and understanding towards oneself, rather than criticizing or blaming oneself for perceived inadequacies or mistakes. Common humanity entails recognizing that struggles and imperfections are part of the human experience, fostering a sense of connection and belonging with others rather than feeling isolated. Mindfulness refers to maintaining a balanced and present-oriented response to distressing emotions, neither avoiding nor amplifying them, and embracing life as it unfolds in the present moment. When faced with personal difficulties or perceived faults, the positive poles of the components work together to promote a compassionate perspective. Importantly, self-compassion is distinct from self-esteem, as it does not rely on self-evaluations or comparisons to others, making it more stable and less contingent on external factors (Neff, 2003).

In the context of self-tracking, self-compassion is important since it provides a supportive and powerful perspective (Neff, 2011; Neff et al., 2016). When individuals engage in self-tracking, they often encounter challenges, setbacks, and feelings of inadequacy. In such situations, self-compassion

enables individuals to respond to their tracking data and personal reflections with kindness and encouragement, rather than engaging in self-judgement or harsh self-criticism (Neff & Knox, 2020). This cultivating of self-kindness allows individuals to approach their progress with gentleness and understanding.

The emotional impact of goal setting and receiving feedback is influenced, in part, by the level of self-compassion individuals possess (Laudel & Narciss, 2023). Feedback serves as a measure of one's current performance in relation to set goals, which can be perceived as confrontational (Carless, 2020). The extent to which individuals can extend kindness to themselves and relate to feedback, significantly affects their response (Laudel & Narciss, 2023). Moreover, Breines and Chen (2012) demonstrated in their study that higher levels of self-compassion contribute to improved motivation and self-improvement. Consequently, self-compassion interacts with mastery goals by reducing the fear of failure and enabling individuals to focus on mastering tasks despite the possibility of setbacks (Neff & Knox, 2020).

Hanci et al. (2021) conducted a study examining the effects of mindsets, motivation, and self-compassion within the self-tracking context. The researchers compared individuals with fixed mindsets, who perceive human skills as stable and unchangeable, with those possessing growth mindsets, who believe that skills can be developed through learning and experience. Findings indicated that individuals with a growth mindset demonstrated significantly higher levels of self-kindness. They tended to focus more on the process of improvement rather than solely on the outcome, thereby appreciating the effort invested in achieving the self-tracking goals. Conversely, individuals with a fixed mindset exhibited higher levels of overidentification, leading to greater disappointment when failing to meet self-tracking goals (Hanci et al., 2021).

Furthermore, self-compassion is expected to particularly impact self-based goals and associated feedback. For instance, Tang et al. (2021) found that negative self-based feedback had more detrimental effects on motivation compared to negative self-based feedback. The personal nature of negative self-based feedback contributes to its negative impact. However, accepting one's imperfections and expressing self-kindness can potentially mitigate the adverse effects of self-based feedback. This corresponds with the findings of Hanci et al. (2021) where individuals with a growth mindset, who

exhibit higher levels of self-kindness, tend to prioritize improvement over outcome. This suggests that self-kindness may facilitate the benefits of self-based feedback, which emphasize self-improvement (Martin & Elliot, 2016).

Drawing from the existing literature on self-compassion, it is expected to influence the processing of self-tracking feedback by users. By mindfully engaging with feedback, users are more likely to accept and to utilize it for progress (Laudel & Narciss. 2023). Additionally, self-compassion helps individuals navigate self-based feedback, which may be taken personally and consequently demotivating (Tang et al., 2021), by fostering self-kindness. Therefore, higher levels of self-compassion are anticipated to positively influence the impact of the expected interaction effect (H3) between self-based approach feedback on intention to exercise. Figure 2 provides a visual representation of the conceptual framework of the current study, illustrating the variables and associated hypotheses.

H4: Self-compassion moderates the relationship between feedback type and valence on intention to exercise; where higher levels of self-compassion enhance the positive impact of a self-based feedback type combined with approach-based valence.

Figure 2

Conceptual framework
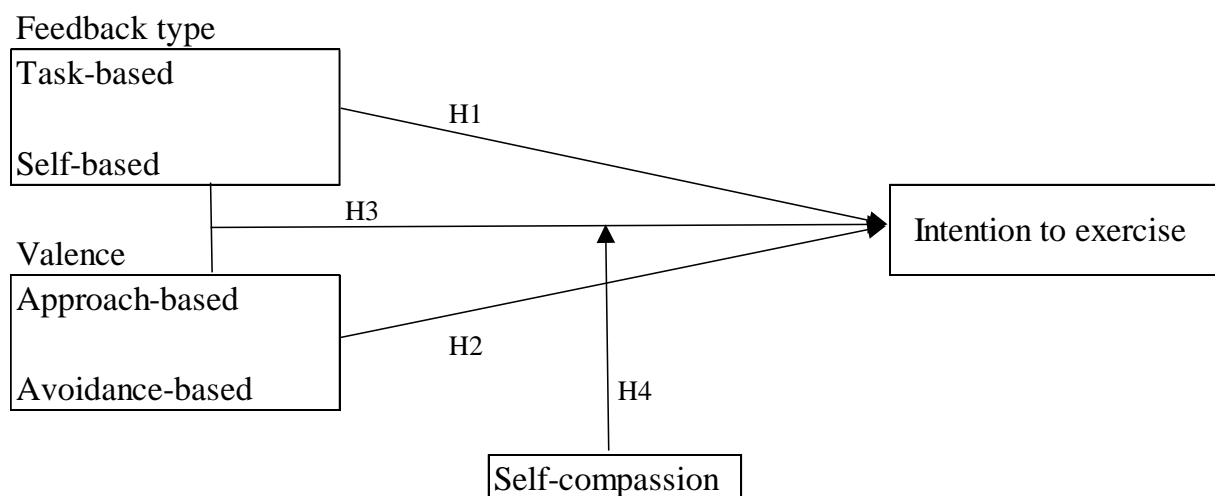
Method

Research Design

A 2x2 between-subjects design was employed to examine the effects of feedback type (self-based vs. task-based) and feedback valence (approach-based vs. avoidance-based), delivered by a self-tracking device, on the intention to exercise of self-trackers. The moderating role of self-compassion was also investigated. The independent variables were feedback type (self-based vs. task-based) and feedback valence (approach-based vs. avoidance-based), the dependent variable was intention to exercise, and self-compassion served as the moderator variable. Data were collected through an online survey administered via Qualtrics.

Participants

Convenience sampling methods were employed to recruit respondents for this study, utilizing platforms such as WhatsApp and the SurveySwap website. The inclusion criterion required respondents to have prior experience with self-tracking, either through the use of a smartwatch or a smartphone app. Those who did not meet this criterion were excluded from participation, as the focus of the study was on the impact of self-tracking device feedback specifically on self-trackers. The final sample consisted of 103 respondents who completed the survey. However, one outlier was identified in the data and subsequently excluded from the analysis. The remaining respondents ($N = 102$) included 55 males and 47 females. The ages of the respondents ranged from 17 to 52 years ($M = 24.69$, $SD = 5.86$ years). Among the respondents, 39 reported using a smartwatch for self-tracking, while 63 reported using a smartphone. To ensure random assignment to the four experimental conditions, a computer-generated randomization procedure was employed.

Measures

Intention to exercise. To access respondents' intention to exercise, the Behavioural Intention Scale (BIS) developed by Ajzen and Fishbein (1980) was employed. The BIS is a reliable instrument designed to gauge individual's likelihood of engaging in a specific behaviour. Consisting of five items, the scale measures the intention to partake in a particular behaviour. An example of an item is "*I intend*

to exercise more in the next week".

Given that the stimulus presented to respondents consisted of a feedback notification on an Apple Watch (see Figure 3), it was important to align the measurement with the natural context of self-tracking. In this context, step goals are commonly used as a means to track exercise behaviour. By directing feedback notifications toward a step goal, the study aimed to replicate a realistic scenario that self-trackers frequently encounter. To ensure clarity and prevent respondent confusion, the decision was made to modify the BIS items from "*intention to exercise*" to "*intention to walk more in the coming week*". This adaptation maintains the underlying essence of exercise while explicitly incorporating walking as a form of exercise. By framing the intention in terms of walking, which is commonly perceived as a component of exercise, the measurement still captures the broader construct of intention to exercise.

The modified scale demonstrated high inter-item reliability (Cronbach's α = .93). Respondents were requested to rate each item on a 7-point Likert scale, ranging from "strongly disagree" to "strongly agree". The average scores across the five items were computed, generating a score reflecting respondents' intention to exercise. Higher average scores indicated stronger intentions to exercise. The modified scale employed in this study can be found in Appendix A.

Self-compassion. Self-compassion was assessed using the Self-Compassion Scale (SCS) developed by Neff (2003). The SCS is a widely employed measure that evaluates an individual's level op self-compassion. It comprises of 26 items, and in the present study, the scale demonstrated high inter-item reliability (Cronbach's α = .91). Respondents rated each item on a 7-point Likert scale, ranging from "almost never" to "almost always". The SCS encompasses six dimensions of self-compassion, namely self-kindness (5 items), self-judgement (5 items), common humanity (4 items), isolation (4 items), mindfulness (4 items), and overidentification (4 items). To ensure interpretability, items pertaining self-judgement, isolation, and overidentification were reverse coded. The average scores across the 26 items were then computed to generate a comprehensive score reflecting participant's level of self-compassion. Higher scores on the self-compassion scale indicate greater self-compassion, characterized by individuals being more understanding and tolerant towards their own shortcomings and mistakes. Conversely, lower scores indicate lower levels of self-compassion, with individuals exhibiting

more self-judgement and being harsher towards themselves in the face of their limitation and errors. The complete scale, including all the items used in this study, can be found in Appendix B.

Materials

Stimuli. To investigate the effects of feedback type and valence on intention to exercise, the study utilized stimuli in the form of digitally manipulated images showcasing an Apple Watch. Each image displayed a distinct feedback notification (see Figure 3), representing a specific combination of feedback type and valence. Consequently, the study encompassed four experimental conditions, in which respondents are exposed to one of the four stimuli, based on their assigned condition.

When developing the stimuli, special effort was taken to ensure that they appeared realistic. The images were photoshopped to include a feedback notification consistent with the font and font size typically used on an Apple Watch. The approach aims to enhance the ecological validity of the stimuli and ensure that participants could relate to them within the context of self-tracking.

Regarding the feedback type manipulation, task-based feedback was implemented by highlighting the achievement of a 10,000 steps per day goal. This choice aligns with the commonly recognized objective of self-tracking devices and represents an absolute goal that entails monitoring progress toward a specific target (Elliot et al., 2011). In contrast, self-based feedback was employed by setting a goal to surpass one's previous average step count. By emphasizing the goal of outperforming oneself, self-based condition fosters a sense of self-improvement (Elliot et al., 2011.

In terms of valence manipulation, approach-based feedback was employed to accentuate the positive prospect of goal attainment. This was achieved by framing the feedback in a manner that emphasizes the potential benefits associated with achieving the goal (Elliot & McGregor, 2001). Respondents in this condition were informed that by taking an additional 2,000 steps, they could attain their desired outcome. Conversely, avoidance-based feedback aimed to evoke a desire to avoid failure or non-achievement. Negative phrasing, including terms such as "*don't*" and "*not*", was used to convey the possibility of not reaching the goal. By emphasizing the consequence of not achieving the desired outcome, this condition sought to elicit avoidance motivation (Elliot & McGregor, 2001).

In summary, the stimuli included four variations: task-based feedback with approach valence

("*You have to take 2,000 more steps, in order to reach your goal of taking 10,000 steps per day*"), task-based feedback with avoidance valence ("*If you don't take 2,000 more steps, you will not reach your goal of 10,000 steps per day*"), self-based feedback with approach valence ("*You have to take 2,000 more steps, in order to reach your average amount of steps per day*"), and self-based feedback with avoidance valence ("*If you don't take 2,000 more steps, you will not reach your average amount of steps per day*").

Figure 3

Visualization of the feedback notification stimuli

(a)	*(b)*	*(c)*	*(d)*

Note. Visualization of the feedback stimuli (a) task-based feedback with approach valence, (b) task-based feedback with avoidance valence, (c) self-based feedback with approach valence, (d) self-based feedback with avoidance valence

Procedure

Respondents were provided with an introductory statement explaining that the survey constituted a research project for a Master's thesis in Business Communication and Digital Media at Tilburg University. The respondents were given a brief description of the self-tracking and survey sections. The survey was advertised as lasting 5-10 minutes, and the possibility to email the researcher with any queries was added.

Upon obtaining respondents' informed consent, they were asked to indicate whether they employed a smartwatch or smartphone for self-tracking purposes. Only respondents meeting the inclusion criteria proceeded to complete the survey. Subsequently, respondents were presented with a scenario aimed at eliciting their imagination of setting the goal on their smartwatch to take more steps. Once the respondent had correctly imagined the scenario, they could proceed to the stimuli. Respondents were then exposed to the specific feedback notification stimuli assigned to their respective condition. After they had seen the stimuli, they were requested to rate their intention to engage in walking activities during the upcoming week using the modified Behavioural Intention Scale (BIS). Additionally, respondents completed the Self-Compassion Scale (SCS) to access their level of self-compassion. Demographic information, including age and gender, was collected from respondents following the completion of the BIS and SCS measures. Upon concluding the survey, respondents were provided with a debriefing statement and expressed gratitude for their participation in the study.

Results

To examine the effects of feedback type and valence on intention to exercise, with the moderating role of self-compassion, statistical analyses were conducted using SPSS. Four hypotheses were tested: (H1) it was expected that respondents in the self-based conditions would exhibit higher intention to exercise compared to those in the task-based conditions, (H2) it was expected that respondents in the approach-based conditions would show higher intention to exercise compared to those in the avoidance-based conditions, (H3) it was expected that respondents in the condition combining self-based feedback with approach valence would score highest on intention to exercise, and (H4) it was expected that self-compassion would moderate the relationship between feedback type and valence on intention to exercise, whereby higher levels of self-compassion would strengthen the positive effect of self-based feedback with approach valence on the intention to exercise.

To test the effects of feedback type and valence on self-trackers' intention to exercise, a two-way ANOVA was performed. Before the ANOVA could be performed, the necessary assumptions were checked. The explore function showed that there were no significant outliers for the intention to exercise variable. The intention to exercise scores were not normally distributed, the data was moderately skewed towards the right (z-score$_{skewness}$ = -3.22, z-score$_{kurtosis}$ = 0.81). Because the skewness was not severe and the ANOVA is fairly robust against violations of the assumption of normality, particularly provided the sample size is reasonable ($50 < N < 300$), this should not significantly distort the outcome. In addition, the assumption of homogeneity of variances across groups was supported, because the Levene's test of equality of error variances was not significant (F (1, 98) = .48, p = .70). Since the data met the assumption of homogeneity, the two-way independent ANOVA could be performed.

The ANOVA showed no significant main effect of feedback type (H1), F (1, 98) = 1.77, p = .186, partial eta^2 = .02. This suggests that the type of feedback received did not have a statistically significant impact on respondents' intention to increase their exercise behaviour. There was also no significant main effect of feedback valence (H2), F (1, 98) = 3.25, p = .074, partial eta^2 = .03. This suggests that the type of valence of the feedback, whether approach-based or avoidance-based, did not have a significant effect on respondents' intention to engage in exercising behaviour. Furthermore, the ANOVA revealed no significant interaction effects between valence and feedback type (H3), F (1, 98)

=.82, *p* =.368, partial eta2 = .01. This indicates that the combinations of different feedback types and valences did not result in a significant difference in respondents' intention to increase their exercising behaviour. The means and standard deviations for the intention to walk more are presented in Table 1 below.

Table 1

Mean intention to exercise for feedback type and valence

	M	*SD*	*N*
Feedback type			
Task-based	4.78	1.15	49
Self-based	4.47	1.31	53
Valence			
Approach-based	4.82	1.18	52
Avoidance-based	4.40	1.29	50

A moderator analysis was performed using PROCESS to determine whether self-compassion has a moderating effect on the interaction effect of feedback type and valence on the intention to exercise of self-trackers. The interaction between feedback type and valence on the desire to walk more was not shown to be moderated by self-compassion (H4) (B = -.137, *p* =.319, 95% CI [-.41, .13]. Suggesting that a self-trackers level of self-compassion has no statistically significant impact on the relationship between feedback type and valence on a respondent's intention to exercise.

Discussion

Wearable self-tracking technologies are becoming more and more prevalent (Epstein et al., 2015; Hanci et al., 2021). Self-trackers attempt to use the data provided by these devices about themselves to make decisions that will allow them to live healthier lives (Ajana, 2018). Setting goals is a significant motivator for self-trackers, as it allows them to establish goals and receive feedback that supports their goal achievement (Stiglbauer et al., 2019; Sullivan & Lachman, 2017). These goals can pertain to various aspects of personal health, such as step count, calorie intake, or sleep duration, contributing to a healthier lifestyle (Paré, 2018). Self-tracking devices provide feedback in the form of textual notifications on a screen, which have been shown to have a significant impact on users' intents to reach their goals (Ansems et al., 2019).

The present study aimed to investigate the influence of different types of feedback notifications on the exercise intention of individuals who engage in self-tracking. To accomplish this, four digitally manipulated images of Apple Watches were created, each displaying a distinct feedback notification. The feedback notifications were based on a modified version of the Achievement Goal Model (Elliot et al., 2011), which suggests that individuals establish goals to enhance their competence. This study investigated how the type of feedback (task-based vs. self-based) and feedback valence (approach-based vs. avoidance-based) from a self-tracking device could influence self-trackers' intention to exercise. Additionally, the study explored whether self-compassion might moderate these effects, considering previous research highlighting the profound emotional responses associated with goal achievement or non-achievement (Pekrun & Stephens, 2015) and the influence of self-compassion on feedback reception (Laudel & Narciss, 2023). However, the study findings did not reveal any significant main effects or interaction effects between feedback type and valence on self-trackers' intention to exercise. Moreover, self-compassion did not moderate the interaction effect between feedback type and valence on intention to exercise. These findings have implications for understanding the impact of feedback on intention to exercise and the role of self-compassion in this context.

Contrary to what was hypothesized, the type of feedback (task-based vs. self-based) did not affect self-trackers' intention to exercise in this study. As a result, H1, which stated that self-based feedback would lead to a higher intention to exercise, cannot be confirmed. This finding contradicts

previous literature indicating that self-based goals, are associated with self-trackers' motivation for self-improvement (Ansems, 2018; Gimpel et al., 2013). Additionally, self-based feedback was found to be effective in enhancing motivation and engagement in various contexts (Ansems et al., 2019; Martin & Elliot, 2016). One possible explanation for the unexpected finding of feedback type in this study is self-trackers' incentive to self-track. All respondents in this study were self-trackers, as the inclusion criteria was having prior self-tracking experience. Self-trackers have already taken the conscious decision to try to attain goals through goal setting. As a result, they already are motivated to pursue these goals in order to exercise more. Because this initial incentive is already present, the distinction between task-based and self-based goals, as well as feedback on them, may no longer be relevant.

Regarding feedback valence, the study findings also diverged from the existing literature, as the results show no significant effect of valence on intention to exercise, failing to confirm H2. Previous research suggested that approach-based feedback leads to positive affective experiences (Pekrun, Elliot, & Maier, 2006, 2009), a sense of competence (Deci et al., 1999), increased motivation (Burgers et al., 2015), and positively contributes to habit development (Aarts et al., 1997). Conversely, avoidance-based feedback predominantly yields negative effects (Elliot & Harackiewicz, 1996; Fong et al., 2019). Based on this evidence, it was expected that approach-based feedback would result in a higher intention to exercise compared to avoidance-based feedback. One possible reason for not finding an effect of valence in this study could be the limited expressiveness of the feedback notifications. The approach-based stimuli read "*You have to take 2,000 more steps, in order to reach your goal...*" and the avoidance-based stimuli read "*If you don't take 2,000 more steps, you will not reach your goal...*". These feedback notifications mainly focused on goal (non)achievement, which might have overshadowed the positive or negative framing of the feedback. For instance, Burgers et al. (2015) incorporated more expressive terms in their approach feedback, such as "*Well done! ... Keep it up!*" and in their avoidance-based feedback, such as "*Poorly done! ... Try to be faster next time!*". These types of expressive statements potentially fostered intrinsic motivation more effectively compared to focus on goal achievement or non-achievement in this study. Subsequent research endeavours may consider integrating such expressive terms into feedback valence notifications to examine their potential impact on intention to exercise.

Additionally, the findings of this study found no significant interaction effects between feedback type and valence indicating that the combined influence of these variables does not synergistically affect self-trackers' intention to exercise, thus failing to confirm H3. While the combination of feedback style and valence had not been previously investigated in a self-tracking context, studies in other research domains (Méndez-Giménez et al., 2018; Tang et al., 2021; Zhou, 1998) have explored the connection between feedback type and valence. The consistent finding in those studies was that the combination of self-based feedback with approach valence yielded the most favourable outcomes. However, this study did not observe this pattern among the self-trackers in our sample. One possible reason for not finding an interaction effect between feedback type and valence on the intention to exercise of self-trackers could be the complexity and multidimensionality of individual's responses to feedback. The influence of feedback on behaviour and intention is influenced by various factors, including personal characteristics, motivational factors, and contextual elements (Kluger & DeNisi, 1996). In this study the manipulation of feedback type and feedback valence may not have captured the full range of factors that can influence intention to exercise.

Finally, the results of this study indicated that self-compassion had no moderating effect on the interaction between feedback type and valence on intention to exercise, thus failing to support H4. Given that self-compassion can affect individual's responses to feedback (Laudel & Narciss, 2023), this study explored the potential moderating role of self-compassion. Feedback notifications represent the possibility of goal achievement of non-achievement, and how individuals manage this prospect depends on their capacity for self-compassion and acceptance of the possibility of failure (Neff & Knox, 2020). The absence of a moderating effect in this study could be attributed to the moderate sample size and the necessity to divide respondents into four different conditions, resulting in approximately 25 respondents per condition. Consequently, detecting significant differences between the conditions becomes challenging.

Theoretical and Practical Implications

The findings of this study have theoretical and practical implications for the field of self-tracking research. Although no significant effects of feedback type or valence on intention to exercise were

observed, and self-compassion did not moderate the relationship, several noteworthy observations can be made within the context of self-tracking research. It is important to note that this study employed a research design that had not been previously explored in the field of self-tracking. However, the effects of different types of feedback have been extensively investigated in other domains, particularly in interpersonal feedback settings where social factors play a significant role in individual's response to feedback (Hattie & Timperly, 2007). In the context of self-tracking, where feedback is delivered by computer systems, there may be distinctions in how individuals perceive and react to feedback compared to feedback delivered by humans. The effect of computer-generated feedback on individuals is an area that requires further exploration, especially considering the increasing integration of artificial intelligence in our lives.

Additionally, practical implications can be derived from the study's results. User engagement is a persistent challenge in the adoption of self-tracking devices. The true value of self-tracking technologies lies in their ability to facilitate meaningful behavioural changes. However, many individuals discontinue the use of self-tracking devices after a brief period (Ledger, 2017). Given that intention to engage in a specific behaviour is a crucial predictor of actual behaviour (Ajzen, 1991), the non-significant findings in this study indicate the need for further research into other factors that can better promote exercise behaviour among self-trackers. For instance, using the prior motivation of the self-tracker, measured with a short questionnaire, as a predictor of goal selection within self-tracking devices. It is essential to identify and address these kinds of factors to change the efficacy and long-term engagement of self-tracking technologies.

Limitations and Future Research

The present study, while contributing valuable insights to the field of self-tracking research, is subject to certain limitations that should be addressed. By acknowledging these limitations, recommendations for future research can be proposed, aiming to advance the existing literature on self-tracking.

One limitation pertains to the operationalization of the dependent variable, namely intention to exercise. In this study, the Behavioural Intention Scale (BIS) (Ajzen & Fishbein, 1980) was utilized as

a measure of respondents' intention to exercise, which is a commonly employed measure in behaviour change research. The scale demonstrated strong inter-item reliability (α = .93). However, the measurement of intention as a single snapshot may not fully capture the complexity of behaviour change and subsequent intention. To address this limitation, future research could adopt a longitudinal approach, conducting a study that examines intention to exercise at multiple time points, in response to feedback notifications from self-tracking devices. This longitudinal design would provide a more comprehensive understanding of individuals' intentions over time.

A second limitation of the study lies in the reliance on self-reported measures of intention to exercise. While self-reported measures are commonly used in behavioural research, they are susceptible to certain limitations that should be acknowledged. Self-reported measures of intention are based on individual's subjective judgment and may be influenced by social desirability bias. There may be discrepancies between individuals' self-reported intentions and their actual behaviours. Furthermore, self-reported measurement is subject to individual interpretation and can be influenced by transient factors or situational context at the time of assessment. To address this limitation and gain a more accurate understanding of individuals' exercise behaviour, future research should consider incorporating objective measurements of physical activity. Objective metrics such as accelerometers or activity trackers can provide more reliable and precise data on individuals' actual levels of physical activity. By integrating self-reported intention measures with objective activity data, researchers can obtain a more comprehensive view of the relationship between feedback, intention, and actual exercise behaviour.

Another recommendation for future research is to explore additional moderating factors that may influence the impact of feedback on exercise intention. While the present study focused on self-compassion as a moderating factor, prior research on feedback and goal achievement has explored other factors that may interact with feedback from self-tracking devices, influencing self-trackers' intention to exercise. For instance, studies have highlighted the relevance of self-efficacy (Diseth, 2015), goal orientation (Wolters, 2004), and openness to experiences (Kaufman, 2013) in shaping individuals' responses to feedback. Investigating these moderating factors within the context of self-tracking feedback and intention to exercise can provide a deeper understanding of the underlying mechanism at play. Such exploration is crucial to gain valuable insights into how diverse individuals respond to

feedback from self-tracking devices and to facilitate the customization of feedback notifications to better align with individual needs and preferences.

Lastly, a few remarks can be made about the sample used for this study. Firstly, it is important to acknowledge that the sample size may have influenced the ability to detect significant effects. A larger sample size enhances statistical power, enabling the detection of even subtle or moderate effects. To strengthen the robustness and generalizability of the findings, future research should prioritize recruiting a larger number of participants. Additionally, expanding the demographic characteristics of the participants is crucial to ensure the applicability of the results to a broader population. The current study relied on a convenience sample, which may limit the generalizability of the findings. The sample also included a 17-year-old respondent. The decision was made to retain this respondent in the sample to maintain a larger sample size and consistency with the inclusion criteria of previous self-tracking experience. Future research should aim to include participants from diverse backgrounds, ages, and fitness levels to ensure the broader relevance of the study's findings.

Conclusion

In summary, this study investigated the effects of feedback type and feedback valence on self-trackers' intention to exercise, with self-compassion as a moderator. The results revealed non-significant main effects for both feedback type and feedback valence on exercise intention. Additionally, there was no significant interaction effect between feedback type and valence. Furthermore, self-compassion did not moderate the relationship between feedback type, valence, and exercise intention. These findings suggest that the specific type and valence of feedback received from self-tracking devices may not have a direct impact on an individual's intention to exercise. However, it is important to acknowledge the potential influence of the study's limitations, including the reliance on self-reported data, which may be subject to subjective biases and may not fully capture an individual's actual exercise behaviour. Despite these limitations, this study contributes to the growing body of research on self-tracking behaviours. The findings indicate that factors beyond feedback type and valence may play a more significant role in shaping individual's intention to exercise. Future research could explore alternative factors, such as feedback notifications incorporating expressive terms, other-based feedback, as well as investigate

moderating effects of self-efficacy, goal orientation, and openness to experience. Investigating these factors and their interactions within the context of self-tracking can provide a more comprehensive understanding of the underlying mechanisms driving exercise behaviour.

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Appendix A

Modified Behavioural Intention Scale (BIS)

1. I intend to walk more in the next week.

2. I plan to walk more in the next week.

3. I am likely to walk more in the next week.

4. I will try my best to walk more in the next week.

5. I am determined to walk more in the next week.

Appendix B

Self-Compassion Scale (SCS)

Self-Kindness Subscale:

1.   I try to be understanding and patient towards those aspects of my personality I don't like.

2.   I'm kind to myself when I'm experiencing suffering.

3.   When I'm going through a very hard time, I give myself the caring and tenderness I need.

4.   I'm tolerant of my own flaws and inadequacies.

5.   I try to be loving towards myself when I'm feeling emotional pain.

Self-Judgment Subscale:

1.   When I see aspects of myself that I don't like, I get down on myself.

2.   When times are really difficult, I tend to be tough on myself.

3.   I can be a bit cold-hearted towards myself when I'm experiencing suffering.

4.   I'm disapproving and judgmental about my own flaws and inadequacies.

5.   I'm intolerant and impatient towards those aspects of my personality I don't like.

Common Humanity Subscale:

1.   When I feel inadequate in some way, I try to remind myself that feelings of inadequacy are shared by most people.

2.   I try to see my failings as part of the human condition .

3.   When I'm down and out, I remind myself that there are lots of other people in the world feeling like I am.

4.   When things are going badly for me, I see the difficulties as part of life that everyone goes through.

Isolation Subscale:

1.   When I fail at something that's important to me I tend to feel alone in my failure.

2. When I think about my inadequacies it tends to make me feel more separate and cut off from the rest of the world.

3. When I'm feeling down I tend to feel like most other people are probably happier than I am.

4. When I'm really struggling I tend to feel like other people must be having an easier time of it.

Mindfulness Subscale:

1. When something upsets me I try to keep my emotions in balance.

2. When I'm feeling down I try to approach my feelings with curiosity and openness.

3. When something painful happens I try to take a balanced view of the situation.

4. When I fail at something important to me I try to keep things in perspective.

Over-Identification Subscale:

1. When something upsets me I get carried away with my feelings.

2. When I'm feeling down I tend to obsess and fixate on everything that's wrong.

3. When something painful happens I tend to blow the incident out of proportion.

4. When I fail at something important to me I become consumed by feelings of inadequacy.