Planning Interventions for Improving Physical Activity

Subjects: Behavioral Sciences

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Planning interventions such as action planning (AP) and coping planning (CP) have been recognized as influential strategies in promoting physical activity (PA), but mixed results of existing evidence have been observed. Researchers aim to perform a systematical meta-analysis to evaluate the efficacy of planning interventions for improving PA in the general population. The findings indicate that planning interventions significantly improved PA behavior, and, in some contexts, the effects performed better. Future research needs to be conducted to explore the underlying mechanisms of planning interventions and validate their effects more extensively.

Keywords: planning interventions ; action planning ; coping planning ; implementation intentions ; physical activity

1. Introduction

Insufficient physical activity has become a public health issue globally [1]. Regular physical activity (PA) reduces the risk of noncommunicable diseases and all-cause mortality and delivers important prevention and treatment benefits for many different physical and psychological conditions [2]. Nevertheless, according to a global survey of 1.9 million individuals in 168 countries, over one-quarter of people engage in minimum or no PA (150 min of moderate exercise per week or comparable) [3]. Globally, 81% of teenagers aged 11–17 years are insufficiently physically active [4], and older adults engage in the least amount of physical activity of all age groups [5][6]. In Canada, only 9% of children meet PA recommendations [7]. Thus, it is critical for public health practitioners to encourage regular PA by developing more effective interventions.

Despite persistent efforts to enhance physical activity (PA) through public health policies and behavior change techniques (BCTs) [8], interventions aimed at increasing public involvement in and adherence to PA have generated limited outcomes [9][10]. For instance, a comprehensive meta-analysis of 27 PA intervention studies found that the overall effectiveness of PA behavior change is d = 0.27 (95% CI = 0.17 to 0.37) [11], indicating that the effect size is small but significant [12]. More recently, Whatnall et al. [13] conducted a systematic review of 66 RCT studies that examined the effects of behavioral change interventions on step-, moderate-, vigorous-intensity PA and total PA, which identified between-group differences in only 52% of the studies. Additionally, there is currently no consensus regarding which BCTs, including web-based and mobile interventions, are more effective for promoting PA [14][15][16]. To promote PA effectively, theory-based interventions that address behavioral determinants are required.

Intention, an antecedent variable of behavior in the theory of planned behavior (TPB) [17], which has been taken as a crucial factor, plays a positive role in the domain of PA promotion. However, empirical studies have confirmed that there is still a gap between the formation of goal intention and PA behavior initiation [18]. Based on existed theories [19][20], Gollwitzer identified that implementation intentions, which are self-regulatory strategies, can help bridge the intention–behavior gap [21]. Health practitioners typically prefer the operational approaches of action planning (AP) and coping planning (CP) when applying implementation intention interventions, that is, to specify when, where, and how to perform behaviors and determine corresponding responses to obstacles [22].

2. The Effectiveness of Planning Interventions for Improving Physical Activity in the General Population

Thirty-five high-quality RCTs were included for meta-analysis, and the results found that the planning strategies intervention significantly promoted physical activity in the general population, with the overall effect size (SMD = 0.35, 95% CI: 0.25, 0.44) being “small-to-medium” according to Cohen’s classification criteria of effect size (Cohen, 1988). Subgroup analyses were conducted and revealed that the planning interventions were more effective in the patient group, the group with fewer females. Moreover, the delivery mode of individual or group face-to-face sessions during the imposition of the intervention and the group that underwent post-intervention reinforcement performed better. Researchers

also found that the effects of different measurement instruments and sample sizes on the pooled effect sizes suggested that they may be sources of heterogeneity between studies.

A positive and significant intervention effect, identified that planning strategies can improve PA successfully. Bélanger-Gravel et al. [23] conducted the first meta-analysis of an AP-induced trial, showing that the planning intervention had a significant effect on physical activity, both post-intervention and at follow-up. Almost simultaneously, Carraro and Gaudreau [24] also conducted a meta-analysis combining data from both correlational and experimental studies; it showed that both spontaneous and experimentally induced AP and CP were successful in promoting physical activity. A recent meta-analysis of BCT interventions incorporating AP, conducted by Howlett et al. [16], also showed a significant small-to-moderate effect size effect of BCTs on initiating PA behaviors. The largest meta-analysis of high-quality RCTs to date, further validated the significant effect of planning interventions to promote physical activity, which results from the key role that planning strategies play in behavioral change as self-regulatory strategies [25]. According to the health action process approach (HAPA), two types of planning strategies, AP and CP, play a key role in the initiation and maintenance of intended behavior [26]. The function of AP is to enhance awareness in the individual about potential future scenarios in which the behavior may be performed by making clear when, when, and how the individual would initiate the behavior [27]. CP focuses on the anticipation of barriers that may interfere with a desired activity and how to choose alternative behaviors that may be implemented to overcome those barriers [28][29]. As mental simulations of a series of behavioral processes, planning strategies facilitate the successful translation of good intentions into action through the pre-construction of situations that initiate behavior and the management of possible anticipated obstacles [30][31]. Moreover, AP and CP have been designed in HAPA as mediating variables between intentions and behaviors, helping to bridge the gap between intention and behavior [32]. Some studies have empirically confirmed that AP and CP can also moderate the relationship between intention and behavior [33][34][35][36]. From the above analysis, it can be identified that AP and CP are crucial psychological determinants of PA initiation, and future research should explore the deeper mechanisms of action of AP and CP in promoting PA [37].

The exploratory subgroup analyses conducted revealed that the effects of the planning interventions differed across conditions and contexts, which contributes to a cautious interpretation of the overall effect sizes. In the intervention strategy group, the intervention effects of AP were superior to AP combined with CP, which may stem from the fact that the AP conducted in the trials was more acceptable to the participants, while the combined strategy added an extra CP to the psychological process of behavior change using an if–then format “cue” in response to behavior obstacles [24], which may have led to a decline of intervention effects. However, the combination of AP and CP is also a promising choice of an effective strategy for increasing PA, and its efficacy needs to be verified by more RCTs. Moreover, in terms of intervention delivery modes, face-to-face sessions were the most effective, with online sessions alone (e.g., telephone calls, emails, or visiting websites) being the least effective; post-intervention groups with reinforcement achieved better results. As self-regulatory strategies, planning strategies need to control the details of the interventions to be effective in promoting complex behaviors such as physical activity, so the interventions were more effective in the cases using the delivery mode of face-to-face sessions that were adept in focusing the participants’ attention and the addition of reinforcements during the follow-up period. Subgroup analysis by publication year showed a higher effect size for studies published before 2012 than those published after 2012, indicating a decreasing trend in overall effect sizes for studies in the last decade; this trend needed to be verified by more evidence. Furthermore, in the subgroup analysis of the different samples, it was found that the planned interventions were more effective with the patients than with the healthy population, which supports the idea that planning interventions were important interventions for rehabilitating patients [38]. In addition, the interventions were less effective in the population with a high proportion of females, which may be more related to the intention status of the study sample. The planning interventions had a better effect among those with PA intention [39][40], while most females are usually unintentional due to a lack of interest in PA. Although no visible difference was observed between the student and non-student groups, planning strategies remain promising interventions to promote students participating in PA because of their low cost and ease of implementation in campus settings.

Of note, the results from the instrument group in the subgroup analyses suggest that differences between instruments may have contributed to the heterogeneity of the studies. Future studies should employ validated instruments of PA, such as objective instruments (e.g., accelerometers and pedometers) or widely recognized self-report questionnaires (e.g., LTEQ [41] and IPAQ [42]). Given that objective instruments and self-reported questionnaires measure the different parts of PA and that such measurement outcomes are not equivalent [43], further investigation of more appropriate approaches to merging objective instruments and self-reported questionnaires would contribute to improving the validity of evidence based on PA measurements.

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