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Plans Not Needed if You Have High and Stable Self-Efficacy: Planning Intervention and Snack Intake in the Context of Self-Efficacy Trajectories

Forming action plans is expected to move people from intention to action. We hypothesized that the effects of planning interventions may depend on changes in self-efficacy beliefs. Participants (182 nurses and midwifes, 89% women, aged 19-50) were assigned to the control or the planning intervention (three planning sessions) groups and reported their self-efficacy, sweet and salty snack intake at the baseline and four months later. The results suggest that an increase of efficacy beliefs over time augmented the effects of the planning intervention and resulted in the lowest snack intake (the enhancing effect of self-efficacy). Planning intervention also prompted lower unhealthy snacking if efficacy beliefs were decreasing (the protective effect of planning). Those who have stable-high self-efficacy were able to achieve low snack intake regardless of the group assignment (the buffering effect of self-efficacy).

Keywords: *Self-Efficacy, Intentions, Implementation Intention, Snacking, Nurses*

Regardless their knowledge about benefits of healthy lifestyle, not all healthcare providers follow lifestyle guidelines, with 34-53% reporting poor nutrition and/or sedentary lifestyle (Miller, Alpert, & Cross, 2008; Sanford, Johnston, Porter, Lowe, & Oxby, 2008). Although a vast majority of healthcare providers indicated that they value healthy lifestyle (Rafiroiu & Evans, 2005; Miller et al., 2008), they find it difficult to stick to the healthy diet and maintain optimal body weight (Miller et al., 2008). In line with Social Cognitive Theory (Bandura, 1997) it may be assumed that a person providing lifestyle guidelines acts as a healthy lifestyle model. The effectiveness of their advice on nutrition may depend on implementing changes in advisors' own behaviors, such as the intake of sweet and salty snacks.

Health educators target the motivation as well as the skills necessary to practice health-enhancing behaviors. Motivation is reflected by intentions to make changes in one's lifestyle, but having an intention is not a sufficient condition for action (Schwarzer, 2008). Although the construct of intention is crucial in explaining health behavior change, its predictive value is limited, because the relationship between intention and behavior is weak to moderate (Abraham & Sheeran, 2000; Webb & Sheeran, 2006). Besides motivational factors, several theoretical approaches suggested volitional constructs which facilitate the initiation and maintenance of behavior, such as action planning (Gollwitzer & Sheeran, 2008) and self-efficacy beliefs (Bandura, 1997; Schwarzer, 2008).

The Effects of Planning on Nutrition

Planning (or implementation intention) facilitates the initiation of an action because it includes specific situation parameters and a sequence of action. People are likely to act upon their intentions when they are specified in a when, where, and how manner (Webb & Sheeran, 2008). Planning may also refer to the anticipation of barriers and generation of alternative behaviors to overcome them. Coping plans (Sniehotta, Scholz, & Schwarzer, 2006) include scenarios that hinder people in performing their intended behavior, followed by specific plans to cope with such challenging obstacles. For example: "If I plan to have a healthful lunch at work, but I am offered a favorite unhealthy snack by my colleague, I would indicate I want to take care of my

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cholesterol and turn immediately to my healthful lunch". After people contemplate the "when", "where" and "how" of an action, they may imagine possible obstacles and generate coping strategies. Thus, a combination of action and coping plans may secure behavior change, regardless of the environmental influences.

Planning can be communicated easily to individuals who have strong motivation, but suffer from self-regulatory deficits. Correlational studies indicated that a combination of action and coping planning may have a synergistic effect on implementing healthy behaviors (Araújo-Soares, McIntyre, & Sniehotta, 2009). Several randomized controlled trials suggested that planning has beneficial effects on nutrition behavior (e.g. Chapman & Armitage, 2010; Luszczynska & Haynes, 2009; Luszczynska, Tryburcy, & Schwarzer, 2007).

Planning is expected to mediate the intention-behavior relationship (Gollwitzer & Sheeran, 2006), but not all studies confirm that this mediation is significant across the health behaviors (Norman & Conner, 2005). Further, the effects of planning on intentions may be negligible (Webb & Sheeran, 2008). Besides the effects of intentions, the relationships between planning and behavior may depend on other cognitions, which moderate the effectiveness of forming action and coping plans. For example, individuals with low impulsivity benefit more from forming plans to avoid eating high-calorie snacks (Churchill & Jessop, 2010).

To regulate their food intake people may form approach goal intentions (e.g., to increase the amount of fruit and vegetable consumed instead of biscuits or crisps) or avoidance goal intentions (e.g., to decrease the amount of sweets consumed; Sullivan & Rothman, 2008). A pursuit of avoidance intentions was linked to negative outcomes as worse health (Elliot & Sheldon, 1998). This effect may be due to the fact that people who form avoidance intentions for their snacking behavior are more likely to fail (and consume more calories in long term) that those who formed approach intentions. The self-regulation of snack intake usually refers to avoidance goal intentions (i.e., a reduction of snack intake) and therefore it is more likely to fail. It has been suggested that those who form intentions for avoiding snacking behavior, should form action plans in order to consume less fat and calories over a 2-week period (Sullivan & Rothman, 2008). Further, forming action and coping plans which address both approach and avoidance actions (e.g., eating a fruit instead of a tempting sweet snack) may help to reduce unhealthy snacking even more effectively.

Perceived Self-Efficacy as a Moderator of Planning—Behavior Relationship

Self-efficacy captures individuals' beliefs in their capabilities to exercise control over challenging demands (Bandura, 1997). These beliefs regulate thought processes, affective states, motivation, and behavior. Self-efficacy refers to personal competence when predicting one's own behavior in challenging situations (e.g., "I am certain that I can refrain from snacking even if my friend eats my favorite cookies just in front of me."). Thus, the ability to change an unhealthy habit depends to some degree on a firm belief in one's capability to exercise control over that habit. In particular, implementation intentions may need to be supported by strong self-efficacy in order to maintain effective goal pursuit over longer periods of time (Koestner et al., 2006).

Perceived self-efficacy is a potential moderator for the degree to which planning has an effect on subsequent behaviors (Luszczynska, Schwarzer, Lippke, & Mazurkiewicz, in press). Individuals harboring self-doubts might fail to act upon their plans, whereas among those who harbor strong self-efficacy, planning might be more likely to facilitate goal achievement. Self-efficacious people may feel more confident about translating their plans into actual behaviors. In other words, whether the planning intervention (the independent variable) actually affects unhealthy snacking (the dependent variable) might depend on the individual's self-efficacy beliefs (the moderator). Several longitudinal studies confirmed that self-efficacy beliefs moderate the relationships between action planning and health behaviors (Lippke, Wiedemann, Ziegelmann, Reuter, & Schwarzer, 2009; Luszczynska et al., 2010). Only those who had a sufficiently high level of baseline self-efficacy acted upon their plans. There is some evidence suggesting that forming action plans may have no direct effects on self-efficacy (Webb & Sheeran, 2008). In sum, the accumulated research evidence suggested that self-efficacy may affect planning or moderate its effects on health behaviors.

Self-efficacy levels may fluctuate over time, depending on mastery experiences, the exposure to vicarious experiences, persuasive suggestions and emotional arousal (Bandura, 1999). For example, an individual may observe a coworker who refrains from snacking for weeks; such a vicarious experience may foster their beliefs about the ability to avoid eating sweet or salty snacks and therefore facilitate implementing action plans. Previous research suggested that self-efficacy measured before the intervention boosters the effects of planning intervention on fruit and vegetable intake (Luszczynska & Haynes, 2009) or physical activity (Luszczynska et al., in press). An increase of efficacy beliefs over time may augment the effects of the planning intervention and result in adopting the healthy lifestyle (the enhancing effect of self-efficacy). On the other hand, the planning intervention may promote

Table 1
Characteristics of Measures.

Variable	Item example	Response range	Number of items	M[1]	SD	Reliability coefficient[2]
Intention to reduce snack intake	Within the next 3 months, I intend to eat a healthy diet every day (e.g., reduce unhealthy snacks).	1 (not at all true) – 4 (definitely true)	2	3.07	0.61	.67
Time 1 self-efficacy	I am able to withdraw sweets even if I am under stress or worried.	1 (not at all true) – 4 (definitely true)	7	2.82	0.57	.86
Time 2 self-efficacy	I am able to avoid buying unhealthy snacks when shopping for food with family/partner.	1 (not at all true) – 4 (definitely true)	7	2.76	0.54	.83
Time 1 snack intake	How often do you eat a portion of salty snacks (e.g., crisps, pretzels)?	0 (never) – 4 (daily)	2	2.23	0.93	.49
Time 2 snack intake	How often do you eat a portion of sweet snacks (e.g., cookies, candy bars)?	0 (never) - 4 (daily)	2	2.20	0.89	.42

Note. - does not apply due to single-item measures. 1 – mean item responses are provided; 2 – for scales comprising of two items, Pearson r was provided, for scales with at least 3 items Cronbach's alpha was displayed.

healthy behaviors if other cognitive resources (such as self-efficacy) are decreasing (the protective effect of planning). Finally, those who have high and stable self-efficacy beliefs may be able to maintain their healthy behavior even if they do not form plans (the buffering effect of self-efficacy).

Study Aims

Our study examines the effects of a dietary planning intervention for nurses and midwives (enrolled in nutrition education courses). The planning intervention is also known as prompting specific goal-setting behavior change technique (Abraham & Michie, 2008). It was hypothesized that the planning intervention (including two booster sessions) may affect sweet and salty snack intake, depending on trajectories of changes in self-efficacy. In particular, we assumed that patterns representing an increase of self-efficacy beliefs would enhance the intervention effects, whereas high and stable self-efficacy levels may buffer a lack of planning (i.e., among the control group participants).

Methods

Participants and Measures

Participants were nurses and midwives (N = 182), mostly women (89%), aged 19-50 (M = 28.73, SD = 9.51), working as health-care professionals and attending postgraduate nutrition counseling courses at a university in England. The majority was White (82%), with 7% indicating African/Caribbean origin and 3% indicating Asian origin (8% did not report their ethnicity). At Time 1 (T1), the average body mass index (BMI) was 26.07 (SD = 4.96; 46% had BMI above 25 at T1).

Data were analyzed on the intention-to-treat basis with the last-observation-carried-forward procedure for imputation of dropouts. Measures, item examples, response range, means, standard deviations and reliability coefficients are displayed in Table 1.

Procedure

The study was presented as dealing with health behaviors and respective cognitions. Respondents were randomly assigned to either the planning intervention or the control group on the basis of a random number sequence (without blocking or stratification). Those participants who indicated that they do not intend to change their snacking behavior (indicating *not at all* in the respective intentions measure) were removed from analysis, after randomization. Thus, although originally randomized groups included 120 (the intervention group) and 118 (controls) participants, the final analyzed sample consisted of 104 planning group participants and 78 intervention group respondents.

T1 packages handed out to the participants included the questionnaires to measure behavior and cognitions as well as either the control or the intervention forms. T1 was followed by two booster sessions (a total of three intervention sessions or control group treatment). The booster sessions took place six and nine weeks after T1 measurement, respectively. Time 2 (T2) assessments took place four months after T1 and included the measurement of behavior and cognitions. There were no deviations from the planned protocol. Personal codes helped to match the participants across the waves of data collection. To ensure that study participants would receive the forms assigned to them during randomization (i.e., control or intervention), they provided their personal codes.

The control group forms were designed to control for attention and motivational factors. The forms included educational materials (text, figures, tables, crosswords) referring to food balance guidelines, nutrient recommendations, and general guidelines regarding healthy nutrition and exercise depending on gender, age, BMI, and health condition. The same forms were used after T1 measurement and during the booster sessions.

The intervention group forms incorporated the shortened educational materials, followed by the planning sheet, which consisted of action plans and coping plans.

The respondents were asked to make their own plans when filling out the forms: "This is my plan to reduce unhealthy snacks (e.g., sweets, salty snacks high in saturated fats) for the next seven days. If I am hungry, then instead of eating an unhealthy snack I plan to ___ (please write down what you plan to do). If someone offers me my favorite unhealthy food, then in order not to eat it I plan to ___ (please write down what you plan to do)." Further, respondents were invited to rethink their snacking behaviors and plans to change their snack intake, adjusting them to the nutrition recommendations that they were reading for the university courses. If they had decided to consume snacks between meals, they would be invited to generate plans regarding snacking, following the healthy nutrition guidelines. The plans included the following formula: "These are my plans about snack consumption for the next seven days. During the next week, I plan to eat ___ (please write down which type and amount of snacks you plan to eat daily) at ___ (write down time of day) in/at ___ (describe the situation/ place where you plan to eat this snack)." The plans usually included small amounts of fruit.

The study was approved by the Ethics Committee at University of Surrey, England.

Results

Preliminary Results: Dropout Analysis, Randomization Check, and Correlations Among the Study Variables

Of 182 nurses and midwives who took part in the study, 67% participated in both measurement points (T1, T2) and the two booster sessions. Those persons who completed the study and those who dropped out did not differ in terms of gender, χ^2 (1, 182) = 2.19, *ns*, age, F (1, 181) = 2.05, *ns*, ethnicity, χ^2 (3, 182) = 5.03, *ns*, T1 snack intake, F (1, 181) = 3.22, *ns*, and T1 self-efficacy, F (1, 181) = 0.78, *ns*.

Control and intervention participants did not differ in terms of age, F (1, 181) = 0.65, ns, gender, χ^2 (1, 182) = 0.82, *ns*, T1 BMI, F (1, 159) = 0.70, *ns*, T1 snack intake, F (1, 181) = 0.28., *ns*, T1 self-efficacy, F (1, 181) = 1.03, *ns*, and intention to follow a healthier diet, F (1, 181) = 1.77, *ns*.

Intention to follow a healthier diet was positively related to self-efficacy at T1 (r = .54, p < .001) and T2 (r = .50, p < .001), and related to lower unhealthy snack intake at T1 (r = -.37, p < .001) and T2 (r = -.21, p < .01). Baseline self-efficacy was related to T1 snack intake (r = -.36, p < .001), but not T2 behavior, whereas T2 self-efficacy was associated with snack consumption at T1 (r = -.38, p < .001) and T2 (r = -.42, p < .001). Finally, snacking behaviors at both measurement points in time were closely interrelated, r = .72, p < .001. Age was unrelated to the study variables.

Effects of the Planning Intervention

Analysis of covariance with T1 sweet/salty snacking entered as the covariate suggested that participants of the intervention group consumed fewer sweet/salty snacks at T2 (M = 3.78, SD = 1.60) than those assigned to the control group (M = 5.22, SD = 1.66), F (1, 181) = 32.78, p < .001, $\eta 2$ = .16. Analysis of covariance, controlling for intention, age, and gender indicated that the group assignment had a significant effect on reported snack intake, F (1, 181) = 32.62, p < .001, $\eta 2$ = .16. T1 behavior was a significant covariate, F (1, 181) = 28.21, p < .001, $\eta 2$ = .14, whereas effects of intention, age, and gender were not significant.

Within the experimental group, the effect of the intervention was moderate (Cohen's d = 0.41), with participants reporting lower sweet/salty snack intake at T2 (M = 3.76, SD = 1.60) than at T1 (M = 4.46, SD= 1.82). For the control group, means at T2 were slightly higher at T2 (M = 5.22, SD = 1.66) than at T1 (M = 4.74, SD = 1.90).

Effects of the Planning Intervention Among Respondents With an Increase or Decline of Self-Efficacy or Stable Self-Efficacy Trajectories

Participants were divided into self-efficacy trajectories groups, depending on their self-efficacy scores: (a) an increase trajectory (n = 22) if T2 self-efficacy was higher (at least one standard deviation) than at T1 (change in mean self-efficacy levels from 2.51 to 2.92); (b) a decline trajectory (n = 40) if T2 self-efficacy was lower (at least one standard deviation) than at T1 (change in mean self-efficacy levels from 3.20 to 2.61). Remaining participants were assigned to either (c) stable-high trajectory (n = 23) if both T1 and T2 self-efficacy were at least one standard deviation above the group mean (change in mean self-efficacy levels from 3.51 to 3.50); and (d) stable-moderate trajectory (n = 97) if their T1 and T2 self-efficacy were within the brackets of one standard deviation above or below the group mean (change in mean self-efficacy levels from 2.64 to 2.66). The standard deviation of T1 self-efficacy, as obtained by the total group, was applied. For all subgroups, standard deviations at T1 and T2 varied from 0.34 to 0.60. Two participants who had stable but low self-efficacy (i.e., below 1 SD at both measurement points) were assigned to the stable-moderate trajectory.

Analysis of variance across the self-efficacy trajectories groups (between-factor) was applied to test the effects of the planning intervention on T2 behavior. Sweet/salty snack intake at T1, age, gender, and intention were entered as covariates. The effect of group assignment remained significant, F (1, 181) = 19.09, p < .001, $\eta 2$ = .10, with a significant effect obtained for the self-efficacy trajectories, F (1, 181) = 9.73, p < .001, $\eta 2$ = .15. T1 snack consumption was the only significant covariate, F (1, 181) = 48.13, p < .001, $\eta 2$ = .22. The interaction between the assignment to the intervention or control condition and the four self-efficacy trajectories was also significant, F (3, 179) = 3.33,

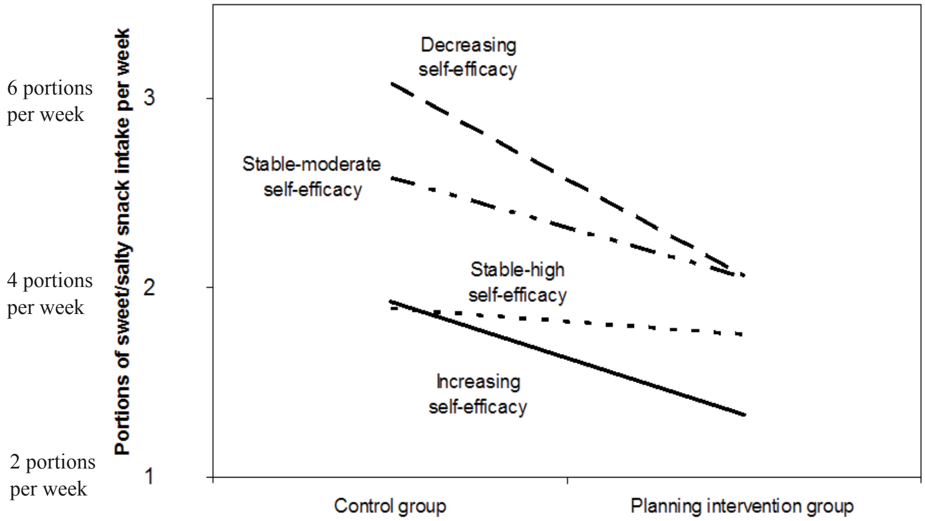

Figure 1. Portions of sweet/salty snack intake per week among nurses and midwives with 4 self-efficacy trajectories. Effects of the planning training.

$p < .05$, $\eta2 = .06$ (see Figure 1).

Post-hoc tests (Bonferroni) within the experimental group and across the self-efficacy trajectories indicated the following significant differences: increase versus decline trajectories ($p < .05$), stable-moderate versus increase trajectories ($p < .01$), stable-moderate versus stable-high trajectories ($p < .05$). The post-hoc tests within the control group indicated significant differences between the participants with a decline trajectory and all other trajectories (all *p*s < .05) as well as between stable-moderate versus stable-high trajectories ($p < .05$). The comparison of the control and experimental groups within one trajectory indicated a significant effect of the group assignment for all groups (increase: $F\,[1, 21] = 6.70$, $p < .05$, $\eta2 = .25$; decline: $F\,[1, 39] = 18.96$, $p < .001$, $\eta2 = .33$; stable-moderate: $F\,[1, 89] = 12.53$, $p < .001$, $\eta2 = .08$), except for the stable-high trajectory, $F\,(1, 22) = 0.55$, *ns*.

In sum, except of those participants who had the stable-high trajectory of self-efficacy, nurses and midwifes assigned to the planning group reported eating fewer sweet and salty snacks at T2, compared to the controls. However, within the intervention group, those with an increasing self-efficacy trajectory consumed significantly fewer sweet and salty snacks than other intervention group participants. The stable-high trajectory of self-efficacy buffered against a lack of planning, as participants with this trajectory reported similar sweet/salty snack consumption regardless of the group assignment.

Discussion

Our study has confirmed the assumption that planning interventions can make behavior change more likely, depending on self-efficacy trajectories. Individuals who have set the goal to reduce their sweet and salty snack consumption needed cognitive strategies to face challenges and temptations. To facilitate health behavior change they needed to form action and coping plans about snacking avoidance and healthy food consumption. These effects, however, depended on the trajectories of beliefs about ability to control one's own snacking behavior. The observed moderator effect underscores the particular contribution that perceived self-efficacy makes to our understanding of mechanisms of health behavior change.

The results of the present study help to elucidate the complex relationships between the self-efficacy trajectories and the planning intervention. First, the most pronounced beneficial effects of a planning intervention were observed among participants who reported either an increase of self-efficacy or a decrease of self-efficacy. An increase of beliefs about the ability to control snack intake augmented the effects of the planning intervention and enabled individuals to use their action and coping plans across the challenging situation. Those individuals reported the lowest level of unhealthy snacking behavior (e.g., ate significantly less sweet and salty snacks than intervention participants with decreasing self-efficacy or those with stable moderate efficacy beliefs). On the other hand, those who suffered from a decrease of self-efficacy beliefs but participated in a planning intervention were able to consume significantly less unhealthy snacks, compared to controls with the same self-efficacy trajectory. Among control group participants those with a decline trajectory reported the poorest nutrition habits. Thus, the forming action and coping plans played a protective role and facilitated a significant behavior change, despite a decline in beliefs about the ability to control one's own behavior. In sum, planning intervention was beneficial for those who reported either an increase or a decrease of efficacy beliefs, but those with a decrease trajectory may particularly need to form plans about their future actions.

Nurses and midwifes who reported high and stable beliefs about ability to control their own diet had similar levels of snack intake, regardless of the group assignment.

Both control and planning intervention participants reported eating similar amount of snacks. Their snack intake was relatively low (e.g., significantly lower than the intake among participants with stable-moderate trajectory). Concluding, there is no evidence that individuals with stable-high self-efficacy beliefs may benefit from the planning intervention. Keeping self-efficacy beliefs high may buffer a lack of forming action or coping plans.

Previous longitudinal and experimental research tested the effects of baseline self-efficacy on behavior change (Lippke et al., 2009; Luszczynska et al., in press). The present study proposes to look beyond the baseline beliefs and indicates that individuals with strong, stable self-efficacy may actually act upon their intentions even if they do not specify their action or coping plans. These findings are in line with our previous research showing that adding a planning intervention to a self-efficacy intervention did not result in a further improvement of healthy nutrition (Luszczynska et al., 2007).

The results of our study also suggested that high baseline self-efficacy (combined with a planning intervention) is not sufficient to guarantee optimal health behavior change among the participants of the implementation intentions intervention. Such conclusion could be drawn from the previous studies, testing the moderating effects of self-efficacy (cf. Luszczynska et al., in press) or its predictive effect across the stages of behavior change (Wiedemann, Lippke, Reuter, Schüz, Ziegelmann, & Schwarzer, 2009). Instead, the present study indicated that the most pronounced diet change may be observed if self-efficacy increases. This conclusion is in line with the assumption made by Koestner et al. (2006) who showed that interventions improving self-efficacy may enable people to make use of their action and coping plans and thus foster behavior change. Further, individuals with high baseline self-efficacy (which remains high over time) may actually not benefit from the planning intervention, and positive changes in their nutrition may be observed regardless the absence of planning.

Self-efficacy trajectories were used to illustrate the moderator effect. Identifying moderators elucidates the mechanisms of behavior change (Conner, 2008; Norman & Conner, 2005). Other moderators of the intention-planning-snacking behavior relationship include impulsivity (Churchill & Jessop, 2010), gender (Stok, de Ridder, Adriaanse, & de Wit, 2010) and avoidance or approach intentions (Sullivan & Rothman, 2008). Further, motives for autonomy (self-presentational versus agentic) are directly related to unhealthy snack purchase (Stok et al., 2010). It seems plausible that tendencies to achieve autonomy in order to self-regulate may predict self-efficacy trajectories and thus further moderate the effects of planning intervention on unhealthy snack consumption. Finally, planning to change snacking behavior may be more effective, if it is tailored to personal motivational cues to decrease snack intake (Adriaanse, de Ridder, & Wit, 2010). Thus, the effects of the planning interventions on snacking behavior may depend on incorporating the individual motives to change the behavior (e.g., "If I am offered my favorite cookies, I tell myself that I want to lower my blood sugar/lose weight/show my personal strength and then refuse the temptation").

The present study has its limitations. Outcomes were measured by self-reports. Although the validity of self-reports appears to be satisfactory in general (e.g., Armitage & Conner, 2001; Armitage, 2007), their enrichment by objective measures of dietary behaviors is desirable. As we have excluded non-intenders after randomization, our study does not follow all standards of a randomized controlled trial, and fits the standards of the controlled trials. The measurement itself (i.e., the assessment of intentions and self-efficacy) could affect the obtained results. Further studies should include a control group providing only behavioral data. Longitudinal studies with several assessment points are needed to further disentangle the relationships between self-efficacy trajectories and the effectiveness of planning interventions. Finally, further research should test for the effects of planning and efficacy interventions, and account for trajectories of respective efficacy beliefs or self-reported planning.

Concluding, our findings showed that nurses and midwifes with increasing and decreasing self-efficacy trajectories may benefit from forming action and coping plans. People with stable-high self-efficacy beliefs may act upon their intentions regardless of an absence of a planning intervention. Among those who experience a decrease of self-efficacy planning interventions may protect from adopting less healthy behavior patterns.

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