Enhancing planning strategies for sunscreen use at different stages of change

Catrinel Craciun1,2*, Natalie Schüz2, Sonia Lippke3 and Ralf Schwarzer2,4

1Department of Psychology, Babes-Bolyai University, Republicii 37, 400015, Cluj-Napoca, Romania, 2Department of Psychology, Freie Universität Berlin, Berlin, Germany, 3Health Psychology, Jacobs Center on Lifelong Learning and Institutional Development, Jacobs University Bremen, Campus Ring 1 (Research V, 2nd Floor, Room 34), D-28759 Bremen, Germany and 4Warsaw School of Social Sciences and Humanities, Department Wroclaw, PL-50-357 Wroclaw, Poland

*Correspondence to: C. Craciun. E-mail: catrinelcraciun@yahoo.com

Received on August 4, 2011; accepted on July 11, 2012

Abstract

To promote sun safety by implementing different plans for sunscreen use, different psychological interventions are compared. Self-regulatory strategies such as action planning and coping planning are seen as proximal predictors of actual behavior. The study compares a pure planning intervention with a broader resource communication and examines differential effects at different stages of change. A sun safety online study was designed with two intervention groups (resource communication versus planning) and one control group at two assessment points, 2 weeks apart. Participants (N=292) were grouped post hoc according to their stage of change, resulting in 51 pre-intenders (no intention to use sunscreen), 102 intenders (high intention but no regular use of sunscreen) and 139 actors (sunscreen use on a regular basis). No overall treatment effects on planning, but an interaction between time, stage and intervention emerged. The resource communication was more effective for pre-intenders, whereas the planning intervention proved more effective for intenders. A planning treatment was more beneficial in motivated individuals, whereas a broader approach was better for unmotivated ones. Findings highlight the potential that stage-matched interventions might have in the context of sun safety promotion.

Introduction

The rising incidence of skin cancer as well as the ease with which its occurrence can be prevented make it a suitable target for prevention campaigns [1, 2]. Four out of five cases of skin cancer could be prevented by introducing behavior changes, such as reducing sun exposure or adopting preventive measures; for example, by applying sunscreen, wearing protective clothing, or seeking shade [3, 4]. Whereas the latter two indicate that the person reduces sun exposure altogether, the use of sunscreen allows the person to enjoy the healthy properties of the sun and outdoor activities while being protected. Regularly applying sunscreen with a sun protection factor (SPF) of 15+ has proven to be an effective prevention method, reducing the occurrence of squamous cell carcinoma by 40% in a 4.5-year community randomized controlled trial conducted in Australia [5].

Skin cancer prevention has focused on increasing sun protection methods and decreasing unprotected sun exposure by designing policy interventions or educational randomized controlled trials within community, school, tourist and work settings. Several multicomponent community-based interventions that have been implemented have proven to be successful, such as: ‘Slip!Slop!Slap!’ [6], the SunSmart campaign [7], the Under Cover Skin Cancer Prevention Project [8] or the Skin Safe program in schools [9]. Although effective in changing
intentions and behavior, these studies fail to clarify which specific program ingredients account for its respective effectiveness.

Reviews show that most sun protection interventions augment knowledge about sun protection, sunbathing and cancer risk. In addition, they attempt to change attitudes toward tanning, reducing sunbathing or taking protective measures [10–14]. However, studies report that following interventions, very few people manage to reduce their exposure to the sun or to increase sun protection behaviors [15, 16]. Moreover, motivational factors such as awareness of skin cancer risk and knowledge about protective measures do not necessarily lead to behavior initiation and maintenance [17]. Therefore, it may be useful to identify post-intentional strategies that facilitate sun-protective behavior. Most interventions until now have assumed that a behavioral intention constitutes the best determinant of sun protection. However, many individuals fail to translate their intentions into practice [18]. Once people are motivated to perform a health behavior, they need post-intentional, self-regulatory strategies, such as strategic planning, to act upon their intentions.

**Action planning and coping planning**

Planning mediates between intentions and behaviors [19, 20]. Action planning refers to when, where and how to perform the target behavior. Another type of planning is the anticipation of barriers and the generation of alternative behaviors to overcome them. This has been called coping planning [19]. People are asked to imagine scenarios that would hinder them in performing their intended behavior and then to develop one or more plans to cope with such a challenging situation. Coping planning might be a more effective self-regulatory strategy than action planning, partly because it implies the former. After people contemplate when, where and how to act, they go on to imagine possible barriers and generate coping strategies. Thus, coping planning occurs after action planning [20]. Planning strategies can easily be communicated to individuals with self-regulatory deficits. Several randomized controlled trials have documented the effectiveness of planning interventions for health behavior change [e.g. 19–26]. A substantial evidence base has been accumulated, documenting the importance of planning in predicting sunscreen use [27–30]. However, there seem to be no studies that have tested the effectiveness of action planning and coping planning for sunscreen use at different stages of change.

Beginning with the premise that interventions should be tailored to the stage of change of the target population, several stage-matched sun protection programs have been developed. The trans-theoretical model of change [TTM; 31] has been the most popular theoretical background chosen as the basis for such programs. A stage-matched intervention based on TTM and tailored photo aging information was effective for increasing self-reported sun protection behavior and moving people across stages [32]. Another TTM-based stage-matched intervention was successful in promoting sun protection use and stage progression, but not in decreasing sun exposure among beachgoers [33]. Although these stage-matched interventions were aimed at behavior change, they did not examine the post-intentional antecedents of behavior such as planning. This, however, would be a step further into the elucidation of volitional mechanisms that intervene between intentions and behavior.

**Three stages of change: pre-intenders, intenders and actors**

As individuals might be differently sensitive to health messages, depending on their stage of change, a subdivision of the audience into more or less motivated ones might be useful. The health action process approach [HAPA; 34] constituted the theoretical backdrop of our intervention study. This model divides the health behavior change process into at least two phases. First comes the motivation phase in which people develop an intention; second, they enter the volition phase. There is a switch of mindset when a person moves from deliberation to action. People who are not yet motivated to change are characterized by inaction and low intention. They are in a pre-intentional stage and are
thus called ‘pre-intenders’. All others are defined as post-intentional (i.e. in a volitional phase). Risk perception (‘I will develop skin cancer if I do not apply sunscreen’), outcome expectancies (‘If I use sunscreen, I reduce my risk of having skin cancer’) and self-efficacy (‘I am certain that I can use sunscreen regularly even if others laugh at me’) were shown to be good predictors of developing the intention to apply sunscreen [29].

Moreover, it is theoretically meaningful to subdivide the volitional group into those who perform as opposed to those who only intend to perform the behavior. In the post-intentional-pre-actional stage, individuals are labeled ‘intenders’, whereas in the action stage, they are labeled ‘actors’.

Compared with the TTM, the HAPA has the advantage that the staging algorithm is not based on time frames (i.e. a preparer is defined as someone who wants to change within 3 months). Instead, it depends on the combination of a person’s intention and behavior levels. This can be more relevant in the case of sunscreen use, which is a weather-dependent behavior.

Interventions may be most effective when tailored to such stages [34, 35]. For example, ‘pre-intenders’ are supposed to benefit from developing outcome expectancies, self-efficacy and some level of risk communication. They need to learn that the target behavior (e.g. sunscreen use) has positive outcomes (e.g. fewer wrinkles, healthier skin) as opposed to the negative outcomes that accompany the risk behavior (e.g. sunburn [17]).

In contrast, ‘intenders’ should not benefit much from such health messages because, after setting a goal, they have already moved to an advanced mindset. They want to change, but have not yet taken action. Intenders (who are in the volitional pre-actional stage) are motivated to change, but they do not yet act because they might lack the appropriate skills. Thus, they should benefit from planning interventions that help translate their intentions into action. Planning is a key strategy at this point, serving as a mediator between intentions and behavior.

Finally, ‘actors’ do not need any treatment unless they want to prevent relapses. In such a case, they should be prepared for high-risk situations in which lapses are imminent and might benefit, for instance, from self-efficacy, action control and coping planning.

There is empirical evidence in favor of this three-stage approach with matching intervention designs, but there is no evidence at all in the context of sunscreen use. For example, a study on physical activity [35] has documented differential treatment effects when using this stage approach. Adolescents were assigned to two experimental groups (resource communication and planning) and a control group. Moreover, they were divided according to stages (pre-intenders, intenders and actors). Physical activity frequency as the dependent variable was measured at two points in time 4 weeks apart. Pre-intenders in the resource communication condition improved their activity levels, whereas intenders increased their activity in the planning condition. Actors maintained their activity level independent of the treatment they received. Using these findings as the starting point, we set out to explore the same staging and treatment approach in the domain of sunscreen use. Previous studies on the difference between motivational and volitional interventions have shown the relevance of planning interventions for sunscreen use [30]. The present study takes this one step further and examines interventions for particular stages of behavior change.

**Aims of the Study**

Based on the vast literature on the benefits of planning for health behavior change, we explored whether this also applies to sun safety promotion, and moreover, whether such planning benefits depend on the particular stage of change in which the individuals reside. Participants were assigned to three stages of change (pre-intenders, intenders and actors) and we looked for differential effects, namely, which stage group would benefit in particular from one or the other treatment. Thus, the question was in which group either a planning or a resource communication would raise volitional readiness as reflected by the levels of planning for...
sunscreen use. In detail, the study aimed to address the following research questions.

First, we expected that individuals at higher stages of change would report higher levels of the two dependent variables: action and coping planning. This was most likely because action and coping planning reflect volitional readiness that should be higher in intenders and actors than in pre-intenders. Thus, a main effect of stage was expected to emerge. Second, we expected that the treatments would result in changes in the dependent variables. Thus, a main effect of time was expected to materialize. Third, treatment groups were expected to be superior at T2 than the control group. This would be reflected by a treatment by time interaction. Fourth, this effect was expected to be of a different nature between stage groups, as demonstrated by a triple interaction. In Stage I (pre-intenders), a gain for the resource treatment group was expected to evolve. In Stage II (intenders), a gain for the planning treatment group was expected to emerge. In Stage III (actors), either an improvement for both treatment groups was expected to occur, or no change at all. Actors were not expected to benefit very much from either type of treatment because their sun prevention and intention levels were already high by stage definition. But, as this study was originally based on a three-stage theory (HAPA), all stages were included in the research design to avoid an incomplete picture.

Methods

Participants and procedure

Participants were recruited through announcements on university websites, blogs and discussion forums in the beginning of Summer 2009. Individuals (N = 524) who were interested in the study gave their informed consent for participation and provided their e-mail addresses at which they would receive the follow-up questionnaire.

By randomization, participants were assigned to a control group (they received feedback on their skin type), a planning treatment (they were instructed to generate action and coping plans), or resource communication (they received a risk communication treatment in addition to forming plans). These groups were further subdivided with regard to the stage the individuals were in based upon self-reported levels of intention and behavior from the baseline questionnaire (Time 1, T1). There were three stage groups (pre-intenders, n = 51; intenders, n = 102; actors, n = 139) nested within three intervention groups (planning, n = 109; resource communication, n = 87; control, n = 96).

After 2 weeks, at Time 2 (T2), all participants received an e-mail asking them to fill out a follow-up questionnaire. The final sample consisted of 35 (12%) men and 257 (88%) women, with a mean age of 25.33 years, SD = 8.42, ranging from 18 years to 65 years.

Measures

Sunscreen use

‘Sunscreen use’ was measured at T1 by asking respondents whether they applied sunscreen with an SPF of 15+ when they were outside in the sun. Responses ranged from ‘strongly disagree’ (1) to ‘strongly agree’ (4). Only those indicating 3 and 4 were actors, all others were labeled intenders. Based on recommendations from the Healthy People 2010 skin cancer prevention goals [1] and the World Health Organization [2], we have focused here on sunscreen use with an SPF of 15+.

Intention to use sunscreen

‘Intention to use sunscreen’ was measured at T1 and T2, with one item asking about their intentions during the coming months: ‘I intend to use sunscreen with an SPF of 15+ when I am in the sun for a long time (more than 15 min)’. Responses ranged from ‘strongly disagree’ (1) to ‘strongly agree’ (4). Those checking 3 or 4 were actors, whereas those checking 1 or 2 were labeled pre-intenders.

Stage

To assess stages, a sunscreen-use staging algorithm was applied to classify participants based on their
behavioral intentions and their present sunscreen use at T1 (see above). Those who had low intentions and low sunscreen use were classified as pre-intenders; those with high intentions but low sunscreen use were labeled as intenders. Actors were those who were high on sunscreen use at baseline. The procedure of staging was stepwise: First, actors were identified by self-reported sunscreen use. Then, all non-actors were subdivided into those who intended to use sunscreen (intenders) and those who did not (pre-intenders).

Planning to use sunscreen
Action planning and coping planning were measured at baseline and follow-up after 2 weeks, and served as the dependent variables. Action planning was measured by one item (see below). Coping planning was measured by a three-item scale; $\alpha = 0.80$ at T1, $\alpha = 0.81$ at T2. The wording of these four items was ‘Some people would like to protect themselves when they are exposed to the sun and make an active plan to do so. How about you? I have already made concrete plans (1)… on how, when, and where to use sunscreen. (2)… about what to do if I don’t have sunscreen with me when I am in the sun. (3)… about what to do if I feel awkward when applying sunscreen because nobody else does it. (4)… about what to do if I forget to apply sunscreen when I am in the sun’. Answers ranged from 1 (strongly disagree) to 4 (strongly agree).

Means and standard deviations for action planning and coping planning are presented in Tables I and II, respectively. These tables also illustrate the research design (three intervention groups $\times$ three stages of change) at two measurement points in time. They provide detailed information about changes in the mean levels of the two dependent variables that occurred within the 2-week time frame.

Interventions
The two conditions of the intervention were a web-based task asking participants to actively generate their responses to a number of questions; this took about 15 min to complete. In the ‘control group’, people received only brief feedback on their skin type as a result of completing the questionnaire and a brief message that they should take care of their skin.

The ‘planning intervention’ focused on forming action plans and coping plans to initiate, maintain or resume sun protection behaviors. Participants were asked to generate a plan on when, where and how they would protect themselves from the sun. First,

Table I. Action planning regarding sunscreen use (Time1, Time2), divided in terms of stages (Time1) and intervention groups

<table>
<thead>
<tr>
<th>Group</th>
<th>Planning intervention</th>
<th>Resource communication</th>
<th>Control group</th>
<th>Total ($N = 292$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n$</td>
<td>M (SD)</td>
<td>$n$</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Pre-intenders</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>17</td>
<td>1.29 (0.58)</td>
<td>17</td>
<td>1.35 (0.49)</td>
</tr>
<tr>
<td>Time 2</td>
<td>17</td>
<td>1.53 (0.71)</td>
<td>17</td>
<td>1.94 (0.82)</td>
</tr>
<tr>
<td>Intenders</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>36</td>
<td>2.28 (0.94)</td>
<td>31</td>
<td>2.35 (0.98)</td>
</tr>
<tr>
<td>Time 2</td>
<td>36</td>
<td>2.56 (0.73)</td>
<td>31</td>
<td>2.42 (0.99)</td>
</tr>
<tr>
<td>Actors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>56</td>
<td>2.46 (0.83)</td>
<td>39</td>
<td>2.54 (0.79)</td>
</tr>
<tr>
<td>Time 2</td>
<td>56</td>
<td>2.63 (0.64)</td>
<td>39</td>
<td>2.79 (0.61)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time 1</td>
<td>109</td>
<td>2.22 (0.92)</td>
<td>87</td>
<td>2.24 (0.92)</td>
</tr>
<tr>
<td>Time 2</td>
<td>109</td>
<td>2.43 (0.78)</td>
<td>87</td>
<td>2.49 (0.86)</td>
</tr>
</tbody>
</table>

M, mean; SD, standard deviation; n: sample size.
they received a brief example of a plan and were given the opportunity to produce their own plan by filling in boxes within the online template. After formulating their plan, they were allowed to make adjustments in case they believed that something was missing or incorrect. A message about the utility of coping plans and a short example of coping planning in the context of sun protection followed. Participants were then asked to think about three obstacles that would interfere with their sun protection behaviors and to name three strategies that would help overcome these barriers. Using the information the participants provided, the computer program generated three coping plans. The opportunity was given to correct these coping plans if the respondents were not satisfied with the way they had formulated them. The planning intervention here was designed as the most parsimonious way of treating people who are already motivated. The planning module was the same in both intervention groups.

The resource communication combined planning with risk communication. Participants received a message about the risk of unprotected sun exposure, highlighting negative consequences, such as premature aging of the skin and skin cancer. Then, followed a brief description of positive outcome expectancies concerning sunscreen use (i.e. what are the benefits of using sunscreen for skin health and appearance). Also, in a self-efficacy message, a role model explained how easy it is to use sunscreen, emphasized its advantages (e.g. sunscreen can substitute for a normal skin moisturizer, the smell of sunscreen reminds one of a vacation) and gave tips on how to remember to use sunscreen (e.g. always carry a bottle or tube in your bag during the summer).

### Analytical procedure

A quasi-experimental $3 \times 3$ between-factor design with repeated measures was chosen. The data were analyzed with repeated measures analyses of variance using SPSS 20. Stage (pre-intenders, intenders and actors) and treatment (planning, resource communication and control groups) were chosen as between-subjects factors. Action planning and coping planning were the dependent variables measured at two points in time 2 weeks apart (pre–post measures).

### Results

#### Action planning

A repeated measures ANOVA was applied with action planning as the dependent variable at two points in time, and stage (three levels) and treatment...
groups (three levels) as between-subjects factors. There was no triple interaction (i.e. Time × Treatment × Stage), and there was no overall treatment effect, $F(2, 283) = 0.91, P = 0.40$. However, a stage effect, $F(2, 283) = 39.52, P < 0.001, \eta^2 = 0.22$, emerged as individuals at higher stages planned more sun protection.

Within-subject contrasts were as follows: A Time effect, $F(1, 283) = 8.64, P < 0.001, \eta^2 = 0.03$, and a Time × Treatment interaction, $F(2, 283) = 3.34, P < 0.05, \eta^2 = 0.023$. Figure 1 displays the patterns of pre–post mean differences in action planning.

Coping planning

A repeated measures ANOVA was computed with coping planning as the dependent variable at two points in time, and stage (three levels) and treatment groups (three levels) as between-subjects factors. There was no overall treatment effect, $F(2, 282) = 0.6, P = 0.55$, but there was a stage effect, $F(2, 282) = 43.23, P < 0.001, \eta^2 = 0.23$, as people at higher stages developed more coping plans.

Within-subject contrasts were as follows: a Time effect, $F(1, 282) = 27.08, P < 0.001$, a Time × Treatment interaction, $F(2, 282) = 2.35, P < 0.10, \eta^2 = 0.02$, and a Time × Stage × Treatment interaction, $F(4, 282) = 2.87, P < 0.05, \eta^2 = 0.04$. This triple interaction means that within each of the three stages, there was a unique pattern of change between T1 and T2, depending on the treatment group. Figure 2 displays the patterns of pre–post mean differences in coping planning for the three stage groups.

Discussion

This study examined the differential effects of two interventions on plans for using sunscreen, replicating the research design of a study on physical activity in Chinese adolescents [35]. There were two dependent variables, action planning and coping planning, which can be viewed as proxies for volitional readiness. Individuals who contemplate about when, where and how to use sunscreen and generate alternative ways of action in the face of barriers are very close to performing actual behaviors, and any intervention that moves people to such a point has a preventive value. Previous studies have found that the two kinds of planning are essential factors in the volitional phase of health behavior change as they are predictors of behavioral improvement, operating as mediators between intentions and behaviors [19–26, 35].

The present study set out to explore the importance of planning interventions in the context of sunscreen use. Participants were assigned to three stages of change (pre-intenders, intenders and actors) and differential effects were examined, that is which stage group would benefit from which...
treatment. The main question was in which group either a planning or a resource communication would raise the levels of planning for sunscreen use.

First, we hypothesized that individuals at higher stages of change would report higher levels of the two dependent variables: action and coping planning. There was a main effect of stage on the two dependent variables, which does not come as a surprise because action and coping planning reflect volitional readiness that has to be, by definition, higher in intenders than in pre-intenders, and higher in actors than in intenders.

Second, we expected to find a main effect of time reflecting changes in the dependent variables. Looking at within-subject analyses, time effects were documented, reflecting an increase in planning levels from T1 to T2. Time effects in the absence of an overall intervention effect point to the phenomenon that not only the two intervention groups, but also the control group had improved. This could be due to ‘mere measurement’, a well known outcome in research designs including a pre-test that might sensitize participants to the topic of the study [36].

Third, we expected that at T2 the treatment groups would be superior in planning compared with the control group. This was confirmed by a treatment by time interaction.

Fourth, this effect was expected to be of a different nature between stage groups, as demonstrated by a stage by treatment by time interaction. Pre-intenders were expected to benefit from the resource treatment, whereas intenders should benefit more from the planning treatment. Actors were not expected to benefit much from either type of treatment because their sunscreen use and intention levels were already high by stage definition.

No main effects of treatments were found, which may sound puzzling at first glance. However, based on the stages of change approach, such main effects are neither necessary nor desired for documenting the beneficial effects of an intervention. The focus is rather on interactions, which means that we need to look for different treatment effects within particular stages. If a Time × Treatment effect is found within one stage, but not in the other, we have identified a clientele toward whom a certain mode of treatment can be successfully tailored. The idea of developing stage-matched treatments is emphasized by such interactions.

The overall pattern of results as displayed in Figs. 1 and 2 are in line with the theory and hypotheses. In ‘pre-intenders’, a planning intervention seems to be less appropriate as they first need to be moved to the intentional stage, which could be achieved by resource communication. It might even be counterproductive to provide them with only the planning component. Someone who has no intention at all to change is not supposed to benefit from induced planning activities, as this would reflect a mismatch to the stage. Pre-intenders, however, benefit from the resource communication (cf. the steep increases in the left panels of Figs. 1 and 2).
because they become more aware of the health issue, and they become inclined to balance the pros and cons of sunscreen use.

‘Intenders’ benefit from the planning intervention, but not from the resource communication (cf. middle panels in Figs. 1 and 2). Adding a fear appeal, which is part of the resource communication, might even distract from planning. This needs to be further explored in future studies.

The present study has some limitations. The experimental research design did not include a segment with mere motivational communication (i.e. risk messages, self-efficacy, outcome expectancies), excluding a planning module. Future studies should test a full factorial design in which a pure risk–resource treatment is tested against a pure planning treatment to identify which one is best suited for which stage of change in the context of sunscreen use.

The hypothesized triple interaction was found for coping planning only, not for action planning. We used single-item measures whose internal consistency cannot be computed. However, there is a long history of single item use in psychology. An example is the measurement of intentions by single items as suggested by Fishbein and Ajzen [37] long ago. And there is a good reason not to add more items when one can assume that a single item is content valid in the sense that it perfectly reflects a narrow behavior or cognition, and when more items do not further contribute to the validity.

Moreover, there are several factors that may also have influenced the results. First, the staging algorithm might not have been well designed for this context, especially as behavior was measured with only a proxy. The validity of staging algorithms is a universal problem associated with all stage theories of health behavior change [38]. A well validated stage algorithm is lacking in the context of sunscreen use, a behavior that depends on weather conditions, general lifestyle and conflicting attitudes (e.g. that tanning is favorable; [17]). Second, the brief online treatments (10–15 min) might not be sufficient to yield more substantial outcomes as participants may not have been sufficiently engaged by the intervention. Further studies might test various levels of treatment intensity and explore the actual intervention engagement of the participants. Third, although the validity of self-reports is usually satisfactory, further studies applying objective measures of sunscreen use should also be considered. Fourth, the sample consisted mainly of women. They are known to value a tan [39, 40], but also to use more sun protection [3] and they might also engage in more planning toward sun protection. Future research should include larger samples with more men, behavioral outcomes and more refined measures.

Nevertheless, the present study is novel in comparison to other studies on planning interventions because it compares two kinds of theory-based interventions with a particular focus on stage-specific effects on planning in the context of sunscreen use. It provides evidence that encourages further testing of the stage-matched promotion of sunscreen use. Moreover, in practice, one might want to consider stage-matched interventions to improve volitional readiness for sunscreen use.

The particular benefit of the present study for practice is that it informs health promoters about how to design their interventions to encourage people to use sunscreen and thereby prevent skin cancer. Planning is an important ingredient of volitional behavior change in sunscreen use interventions [30], and therefore, it is of practical value to know how to design effective messages to stimulate sunscreen use. Furthermore, the present research suggests how to tailor interventions to the characteristics of people who reside at different stages of behavior change. Previous interventions relying on a one-size-fits-all approach [6–8] have proven to be limited, but staged–matched interventions tend to work well for skin cancer prevention [31, 32]. Data from the present study can strengthen the data base for the importance of designing volitional interventions for sunscreen use promotion. People who intend to use sunscreen while at the beach are often left only with their good intentions. Therefore, it is relevant to design interventions that help intenders to make action and coping plans to use sunscreen before exposing themselves to the sun.
Such a simple intervention could make a substantial difference to the practice of skin cancer prevention.

Conflict of interest statement

None declared.

References

33. Pagoto S, McChargue D, Fuchua RW. Effects of a multi-component intervention on motivation and sun


