



A Brief Mindfulness Meditation Intervention Could Increase Retention of Medical Health Information: An Analogue Study

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Foreword

Submitted in partial fulfilment of the requirements of the BSc psychology degree, Reykjavík University, this thesis is presented in the style of an article for submission to a peer-reviewed journal.

Abstract

This analogue study was conducted to examine the potential benefit of incorporating a brief mindfulness meditation exercise into patient-education interventions, such as decision aids (DAs). A sample of 41 undergraduate psychology students ($M_{age} = 24.0$) was randomly assigned to either a brief mindfulness condition or a control condition, whereby they either engaged in a brief mindfulness exercise or listened to an audio book. They were then exposed to visually and auditorily presented information about skin cancer designed to simulate a health education intervention and immediately tested on their retention of this material. The results provided support for the primary hypothesis of the study; subjects engaged in brief mindfulness scored higher than those in the control condition on a test covering information about skin cancer, controlling for prior level of mindfulness experience and knowledge about skin cancer ($p = .03$; $Partial \eta^2 = .13$). However, contrary to the secondary hypotheses, these beneficial effects were not mediated by changes in positive and negative affect, measured on the PANAS scale. This innovative approach suggests that brief mindfulness meditation could improve the effectiveness of patient-education interventions by increasing the amount of information processed and retained.

Keywords: health psychology, patient-education intervention, decision aid, brief mindfulness meditation

Útdráttur

Rannsóknin var framkvæmd til að kanna möguleg áhrif stuttrar núvitundaræfingar sem viðbót við sjúklingafræðslu, svo sem ákvörðunartæki. Úrtaki 41 sálfræðinema ($M_{aldur} = 24.0$) var skipt með slembiaðferð í tilraunahóp sem tók þátt í stuttri núvitundaræfingu og samanburðarhóp sem hlustaði á hljóðbók. Þeim var síðan sýnt upplýsingaefni um húðkrabbamein á hljóð- og myndrænu formi sem var hannað til að líkja eftir sjúklingafræðslu á borð við ákvörðunartæki. Því næst svöruðu þátttakendur prófi með spurningum úr efninu. Niðurstöður studdu megintilgátu rannsóknarinnar; þátttakendur í núvitundarhópnum svöruðu að meðaltali fleiri spurningum rétt á prófinu en samanburðarhópurinn, eftir að stjórnað hafði verið fyrir fyrri reynslu af núvitund og þekkingu um húðkrabbamein ($p = .03$; $Partial \eta^2 = .13$). Andstætt viðbótartilgátunum var þessum áhrifum ekki miðlað af breytingu á jákvæðum og neikvæðum tilfinningum á PANAS kvarðanum. Þessi nýstárlega nálgun bendir til þess að stuttar æfingar í núvitund gætu bætt árangur sjúklingafræðslu með því að auka magn upplýsinga sem einstaklingur vinnur úr og varðveitir.

A Brief Mindfulness Meditation Intervention Could Increase Retention of Medical Health Information: An Analogue Study

In recent years, there has been a pronounced trend in health care policy towards increased patient involvement in the selection of treatment and the implementation of self-care plans (Sepucha & Mulley, 2009). Theoretically guided by the Shared Decision-Making Model (see for example Charles, Gafni, & Whelan, 1997; Frosch & Kaplan, 1999; Makoul & Clayman, 2006) medical care has abandoned paternalistic physician-directed approaches and embraced patient autonomy (Quill & Brody, 1996). Presumably, this transition has been beneficial for patients and studies have found positive psychological and physical health outcomes as a function of active involvement in the treatment process (Hack, Degner, Watson, & Sinha, 2006; Stewart, 1995). Furthermore, most patients prefer to participate in shared decision-making with their practitioner (Deber, Kraetschmer, Urowitz, & Sharpe, 2007; Gaston & Mitchell, 2005) even though this varies somewhat with age, gender, and level of education (Levinson, Kao, Kuby, & Thisted, 2005; Say, Murtagh, & Thomson, 2006)

Despite this being a positive development on the whole, it makes the illogical assumption that people from diverse backgrounds can easily gather and analyze complex medical information to arrive at rational and personally appropriate decisions. Often, patients must select between two or more therapeutic options with scientific uncertainty regarding the relative effectiveness of each and varying consequences for patients' lives. Therefore, there is a need for interventions that effectively communicate information to patients, and various patient-education programs and decision aids have been developed to this end. In short, a decision aid (DA) is an intervention designed to support patients in selecting among health care options by providing detailed information about the relevant health state, options available and their consequences (O'Connor et al., 2009). Overall, DAs are practical and effective interventions for patients facing challenging health care decisions (Molenaar et al., 2000;

O'Connor et al., 1999). According to a recently updated review of 115 studies involving DAs, the most important of these benefits are increased knowledge, more accurate risk perception, reduced decision conflict, more involvement in decision making, and reduced proportion of people choosing invasive surgery in favor of conservative methods (Stacey et al., 2014).

Nonetheless, many patients are overwhelmed with distress when faced with difficult treatment decisions. For example, studies involving men newly diagnosed with localized prostate cancer have consistently found high levels of decision-related distress before and after treatment (Gwede et al., 2005; Steginga & Occhipinti, 2006). Furthermore, in spite of the overwhelming evidence for the efficacy of DAs at improving decision making outcomes, there is little evidence supporting an effect on psychological distress. Specifically, studies have failed to document a superior impact of DAs on anxiety and distress compared to usual care (Hooker et al., 2011; Murray et al., 2001; Tiller et al., 2006). Moreover, no DAs have been developed in combination with an intervention that directly and explicitly addresses psychological distress. This is surprising given that stress can impair memory retrieval (Kessels, 2003; Kuhlmann, Piel, & Wolf, 2005; Schwabe & Wolf, 2010; Smeets, 2011) and adversely affect decision making (Pabst, Schoofs, Pawlikowski, Brand, & Wolf, 2013; Starcke & Brand, 2012; Starcke, Wolf, Markowitsch, & Brand, 2008). Clearly, there is a need for more advanced patient-education interventions that simultaneously provide education and support along with a targeted intervention for psychological distress.

From the many interventions available, mindfulness could conceivably prove feasible and effective in this regard. Mindfulness has been defined as “the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment” (Kabat-Zinn, 2003, p. 145). According to Kabat-Zinn (1990; 1994), mindfulness is intended to cultivate continuous attention to the ongoing subjective experience along with an attitude of acceptance toward that experience,

through formal or informal sessions of meditation. Recently, mindfulness and its enhancement has become increasingly popular and it is gradually being recognized within clinical and empirical psychology (Baer, 2003). This interest has been driven by growing evidence of substantial beneficial effects of various mindfulness-based approaches on physical and mental well-being (Grossman, Niemann, Schmidt, & Walach, 2004; Hölzel et al., 2011; Keng, Smoski, & Robins, 2011).

Specifically, compelling evidence reviewed by Davis and Hayes (2011) suggests that mindfulness interventions can have a number of psychological effects. These comprise decreased psychological distress (Carlson, Speca, Faris, & Patel, 2007; Ostafin et al., 2006), increased emotional regulation (Goldin & Gross, 2010; Ortner, Kilner, & Zelazo, 2007), and improved cognitive facilities (Chiesa, Calati, & Serretti, 2011), including working memory capacity (Chambers, Chuen Yee Lo, & Allen, 2008; Jha, Stanley, Kiyonaga, Wong, & Gelfand, 2010; Mrazek, Franklin, Phillips, Baird, & Schooler, 2013) and attentional functions (Lutz et al., 2009; Moore & Malinowski, 2009). On the whole, these studies have investigated the effects of extensive mindfulness training or compared experienced meditators to novices.

However, increasing evidence suggests that shortened versions of mindfulness training are no less effective (Carmody & Baer, 2009) and a research literature is accruing on the positive effects of brief mindfulness meditation, ranging from several minutes to a few hours (see for example Tang et al., 2007; Zeidan, Johnson, Diamond, David, & Goolkasian, 2010; Zeidan, Johnson, Gordon, & Goolkasian, 2010). In a 2006 study, Arch and Craske found that participants allocated to a 15-minute mindfulness intervention displayed less affective reactivity to emotionally valenced slides compared to control conditions. Another recent study by Saunders, Barawi, and McHugh (2013) found that recall of self-threatening and other self-referent information was increased following a 15-minute brief mindfulness intervention. Based on this evidence for the positive effects of mindfulness, whether of short or long dura-

tion, one could easily argue for the potential application of a brief mindfulness intervention incorporated into DAs and other patient-education programs.

The current experiment was conducted as an analogue study to examine the potential effect of incorporating a brief mindfulness meditation intervention into health education material, such as DAs or other similar tools. Specifically, it was assessed whether a brief mindfulness intervention could increase retention of medical health information, which is essential for any education program to have an effect. In addition, it was examined whether any observed intervention effect could be attributed to changes in positive affect (PA) and negative affect (NA), as existing studies have found affective measures to be responsive to mindfulness meditation (Collard, Avny, & Boniwelly, 2008; Erisman & Roemer, 2010; Ortner & Zelazo, 2014; Tanay, Lotan, & Bernstein, 2012). Based on the above literature it was hypothesized that: 1) Participants in the mindfulness condition would retain more information from health education material presented, thereby scoring higher on a test covering skin cancer information compared to the control condition; 2) The mindfulness group would display an increase in PA and decrease in NA from pre- to post-intervention, whereas the control group would remain unchanged; 3) Increases in PA and decreases in NA would predict higher scores on the test covering skin cancer information; 4) Changes in positive and negative affect will mediate the effect of the brief mindfulness intervention on information retention.

Method

Participants

This experiment was conducted on a convenience sample drawn from a participant pool of undergraduate psychology students at Reykjavik University in Iceland. Students enrolled in two compulsory courses were offered course credit by making themselves available as subjects in BSc projects. A total of 5 hours of research participation could earn stu-

dents a maximum of 10% toward their final course grade, whereby participation in the current study was worth 2 hours. Information about this study along with contact information was posted on course websites and student body Facebook pages and participants volunteered by expressing their interest in participation through an email to one of the researchers.

Through these means, a total of 51 students enrolled in the study. Four students were not included based on exclusion criteria; one had an untreated panic disorder or specific phobia and three had significant visual or hearing impairment. One participant was dropped from the analyses as he did not answer any of the standardized measures administered on day 2. Lastly, five students were absent on day 2 of the experiment and were excluded from the study. Thus, the final sample consisted of 41 students. Of these, 6 were male and 35 were female, and therefore, there were considerably more females than males. The youngest participant was 19 years old, the oldest 38 years old, and the mean age of the sample was 24.0 years ($SD = 4.3$). Subjects were randomly assigned to one of two unevenly sized groups, either a control condition ($n = 15$) or an intervention condition ($n = 26$). This was done to allow for moderation analyses, which were an important part of another enquiry, not described here.

Before participation in the experiment, students received an information sheet via email covering all information relevant to the study and its potential risks and benefits and signed an informed consent form prior to participation on day 1. Therein, participants' right to withdraw their consent at any time was emphasized. Beside the aforementioned course credit, no other incentives were offered for participation in the study. Upon completion of the study and data analysis, a summary report of the results was sent to all participants (Appendix A).

Instruments and Measures

Background information was assessed with questions considering demographic information (i.e. gender, age, first language) as well as information on exclusion criteria such as whether the student had finished a Bachelor's degree or higher in medicine or nursing, had an

untreated panic disorder or specific phobia, or had significant visual or hearing impairment (Appendix B). An item measuring prior mindfulness experience was also included here.

Prior knowledge about skin cancer was assessed with a short test devised by the researchers (Appendix C). This test covered basic information about skin cancer, such as different diagnostic types, epidemiology, etiology, and preventive methods. It consisted of 5 multiple choice items, each with 5 response categories where only one was considered correct. The number of correct responses were summed to yield a total score with a range from 0 to 5. Beside an evaluation by the supervisors of this study, no formal analysis of the reliability and validity of this test was conducted.

Positive and negative affect were measured using the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), a widely used affect scale translated to Icelandic by Ragna B. Garðarsdóttir (Appendix D). The PANAS has two 10-item scales presented as a list of 20 adjectives that describe different feelings and emotions. Examples of items on the positive affect (PA) scale include *interested*, *enthusiastic*, and *active* whereas items on the negative affect (NA) scale include *distressed*, *irritable*, and *nervous*. The testtaker indicates to what extent he or she has experienced these emotions given a specific timeframe using a five point Likert scale from 1 (*very slightly or not at all*) to 5 (*extremely*). Here, the time frame of reference used was the present moment (i.e. “you feel this way right now”), which Watson et al. found to be primarily a measure of affective states as opposed to traits. The responses to each item were then added to yield a total score of positive and negative affect ranging from 10 (weakly endorsed) to 50 (strongly endorsed). Overall, studies have provided support for the reliability and validity of the PANAS (Carvalho et al., 2013; Crawford & Henry, 2004; Merz et al., 2013) and in this study, coefficients alpha indicated good internal consistency for both the PA and NA scale on both days of the study. For the PA scale, $\alpha_{day\ 1} = .91$ and $\alpha_{day\ 2} = .87$ and for the NA scale, $\alpha_{day\ 1} = .87$ and $\alpha_{day\ 2} = .91$.

Skin cancer information retention was assessed using a test constructed by the researchers (Appendix E). Conceptually, the test covered the information about skin cancer presented to subjects on day 2 of the study, described below. It consisted of 10 multiple choice items and 20 binary choice (true/false) items, summed to yield a total score ranging from 0 to 30. Therefore, this measure of skin cancer information retention primarily addressed recognition memory. The test was reviewed by two professors in Reykjavik University, but no further psychometric analyses were conducted on this test prior to administration.

Procedure

The experiment was conducted over the course of two weeks in early March 2015. Administration took place in small groups of 7 to 15 participants on two consecutive days in a computer room in Reykjavik University. During the experiment, each student was seated at a partially enclosed work station, in front of a desk with a computer monitor, a keyboard, stereo headphones, printed questionnaires, and a pen. The procedure was entirely computer directed, whereby standardized instructions were presented on the computer screen along with auditory and visual material. However, participants were able to ask the researchers for explanation of ambiguous items and further assistance if required.

On day 1, participants were greeted at the door and shown to their assigned station. First, students responded to a questionnaire booklet containing items covering background information, prior knowledge about skin cancer, and the PANAS scale. Then, depending on the condition assigned, participants listened to either an audio book or a guided mindfulness meditation. The audio book section used in the control condition was a 07:29 minute long chapter from a recent Icelandic novel. The brief mindfulness meditation used in the intervention condition was a 09:00 minute long guided meditation exercise for beginners in Icelandic, dictated by clinical psychologist Margrét Bárðardóttir. The exercise first provided instructions on how best to position oneself and then guided listeners through brief versions of body scan

and focused breathing meditation. Overall, the duration of the procedure on day 1 was around 45 minutes.

On day 2, participants began by either listening to the audio book chapter or engaging in the guided mindfulness meditation, again depending on their assigned condition. Then, participants were exposed to information about skin cancer, including its causes, risk factors, prevalence, prospects, diagnosis, treatment, and prevention (see example screen shots in Appendix F). Skin cancer was specifically chosen because of its probable relevance to people of this age demographic (i.e. young adults). Information text and graphical illustrations were displayed on the computer screen and the material was also presented auditorily through the headphones. This information material and its presentation was intended to simulate a DA or a comparable patient-education program, by being complex and graphically illustrated to increase the affective impact of the experience. Last of all, students responded to a questionnaire booklet containing a test of the amount of information retained about skin cancer along with a follow-up measure of PANAS. Overall, the duration of the procedure on day 2 was around 1 hour and 15 minutes. This procedure was outlined to and approved by the ethics committee at Reykjavik University and declared to the Data Protection Authority.

Design and Data Analysis

This was an analogue study designed to test the conceivable benefits of incorporating a brief mindfulness meditation intervention into DAs and other health related education material, under simulated conditions with an independent groups experimental design. Skin cancer information retention was operationally defined as the total score on a test covering skin cancer information, described above. Positive and negative affect change were defined as the total scores on the PA and NA scales on the PANAS on day 2 minus day 1.

An analysis of covariance (ANCOVA) was used for testing of the primary hypothesis (hypothesis 1), with two covariates included in the model; prior level of mindfulness experi-

ence and prior knowledge about skin cancer. The assumptions of the ANCOVA analysis were tested in appropriate ways; one-way ANOVAs were used to assess the independence of the covariates and independent variable, the Kolmogorov-Smirnov test assessed the assumption of normality and the Levene's test examined the assumption of homogeneity of variance. A criterion of $\alpha = .05$ was used in significance tests.

The evaluation of possible mediation effects (hypotheses 2 through 4) was conducted in several steps, based on the frequently cited thesis by Baron and Kenny (1986). First, the relation between the brief mindfulness intervention and changes in PA and NA was assessed using two comparisons. Independent samples t-test were used to compare PANAS scores between the experimental groups at baseline. Then, independent t-tests were used to compare the PA and NA change scores between the comparison and mindfulness group. Second, the Pearson product-moment correlation coefficient was used to evaluate the association between PA and NA change and scores on the test covering skin cancer information. Finally, the two mediation models were tested using the *PROCESS* tool written by Andrew Hayes (2012) for doing moderation and mediation in SPSS. For these models, indirect effects were assessed using BCa bootstrapped confidence intervals based on 1000 samples and further substantiated by results from the Sobel test (Sobel, 1982).

Results

Descriptive Statistics

Figure 1 below illustrates the distribution of the total scores on the test covering skin cancer information, which was assumed to indicate how much medical health information each participant retained. Although the possible range was from 0 to 30, the minimum value obtained was 15, the maximum was 28, and the mean value was 21.7 ($SD = 3.0$) corresponding to about 72% correct on the test. The distribution observed was approximately normal, as

evident by a calculated value of skewness at -0.1 ($SE = 0.4$) and supported by a non-significant Kolmogorov-Smirnov test, $D(41) = 0.10, p = .20$.

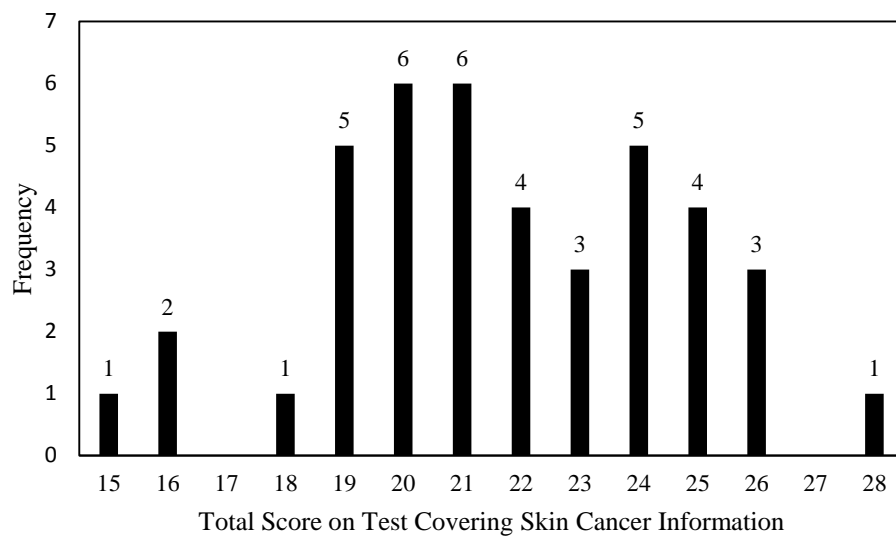


Figure 1. Distribution of the total scores on the test covering skin cancer information.

As expected, PA and NA change scores took on both positive and negative values in this sample. For PA, the mean was -0.7 ($SD = 5.5$) indicating that, on the whole, there was a slight decrease in positive affect between day 1 and day 2. In contrast for NA, the mean was 1.9 ($SD = 7.9$) indicating that overall, there was an increase in negative affect from day 1 to day 2. However, the size of the standard deviations obtained indicate great variances around these means, whereby some participants increased or decreased substantially on both these measures. The distributions observed did not differ significantly from normal, according to Kolmogorov-Smirnov tests, $D(41) = 0.10, p = .20$ and $D(41) = 0.12, p = .16$ for PA and NA change respectively.

Direct Effects of Brief Mindfulness on Information Retention

The bar chart in Figure 2 below shows the mean values of total scores on the test covering skin cancer information for participants in the comparison and mindfulness groups, controlling for their prior level of experience with mindfulness or other meditative practices and their prior knowledge about skin cancer. There was a significant effect of brief mindfulness

on the total scores obtained on the skin cancer test, $F(1, 37) = 5.50, p = .03, \text{Partial } \eta^2 = .13$. The corrected mean value of total scores was higher for participants in the mindfulness group ($M = 22.5, SE = 0.7$) compared to those in the comparison group ($M = 20.3, SE = 0.6$). In addition, it should be noted that even without controlling for the influence of these two covariates, the difference between group means remained significant at the .05 level, $F(1, 39) = 4.32, p = .04$.

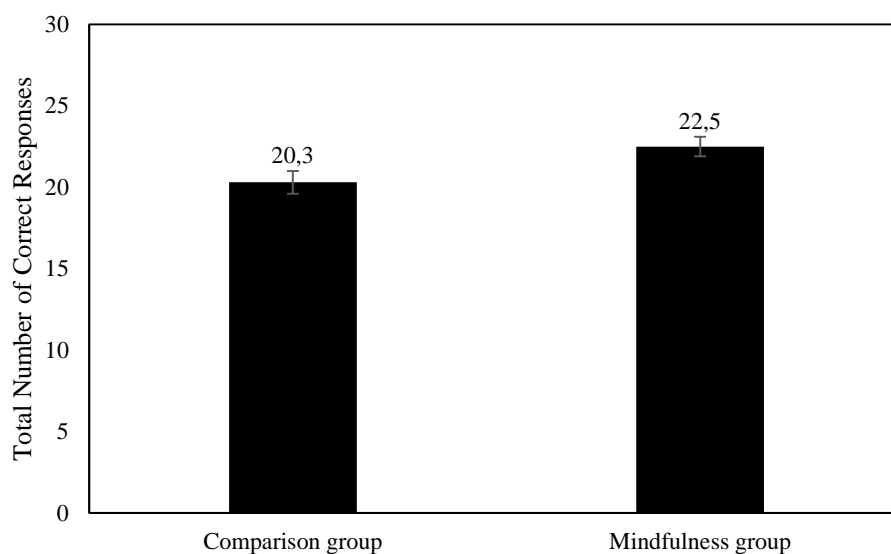


Figure 2. Mean values of total scores on the test covering skin cancer information for participants in the comparison and mindfulness groups, controlling for prior mindfulness experience and knowledge about skin cancer. Error bars represent standard error.

Overall, the necessary assumptions for these statistical analyses were tested and met. Analyses using one-way ANOVAs indicated that both covariates were independent of the intervention. The average level of prior mindfulness experience was the same in the control and mindfulness groups, $F(1, 39) = 0.00, p = 1.00$, and so was average prior knowledge about skin cancer, $F(1, 39) = 3.45, p = .14$. Moreover, there was a non-significant interaction between the intervention and prior mindfulness experience, $F(1, 35) = 0.41, p = .53$, and the intervention and prior knowledge about skin cancer, $F(1, 35) = 0.13, p = .73$, on

total scores on the skin cancer test, supporting the assumption of homogeneity of regression slopes.

Mediation Analysis

Relation between brief mindfulness and PA/NA change.

Both the comparison and the mindfulness group scored equally high on the PANAS scales on day 1, $t(39) = 0.60, p = .55$ and $t(39) = 0.73, p = .47$, for the PA and NA scale respectively. Looking at affective change scores, there was a significant difference between the comparison group and the mindfulness group on PA change, $t(39) = 2.15, p = 0.04$, but not on NA change, $t(39) = -0.28, p = .79$. On average, the comparison group increased in positive affect between day 1 and 2 ($M = 1.7$) whereas the mindfulness group decreased ($M = -2.0$). For negative affect, both groups increased between day 1 and 2, with the mindfulness group increasing insignificantly more ($M = 2.1$) than the comparison group ($M = 1.4$).

Relation between PA/NA change and skin cancer test scores.

A marginally significant negative association was observed between PA change and total scores on the test covering skin cancer information ($r = -.29, p = .07$); the larger the decrease in PA between day 1 and 2, the higher the participant scored on the test. Conversely, there was no correlation between NA change and total scores on the test ($r = -.00, p = .98$). Therefore, there was a trend toward an association between test scores and changes in positive affect but not negative affect.

Mediation model.

Figure 3 depicts the two mediation models tested, whereby the brief mindfulness intervention was set up as a predictor of skin cancer information retention, mediated by changes in positive affect (part A of the figure) or negative affect (part B of the figure). The indirect effect of brief mindfulness on information retention was neither significant through PA change,

$b = 0.42$, $BCa\ CI [-0.14, 1.65]$, nor through NA change, $b = 0.04$, $BCa\ CI [-0.26, 0.68]$.

These results were substantiated by the Sobel test, $z' = 1.05$, $p = .29$ and $z' = 0.18$, $p = .86$.

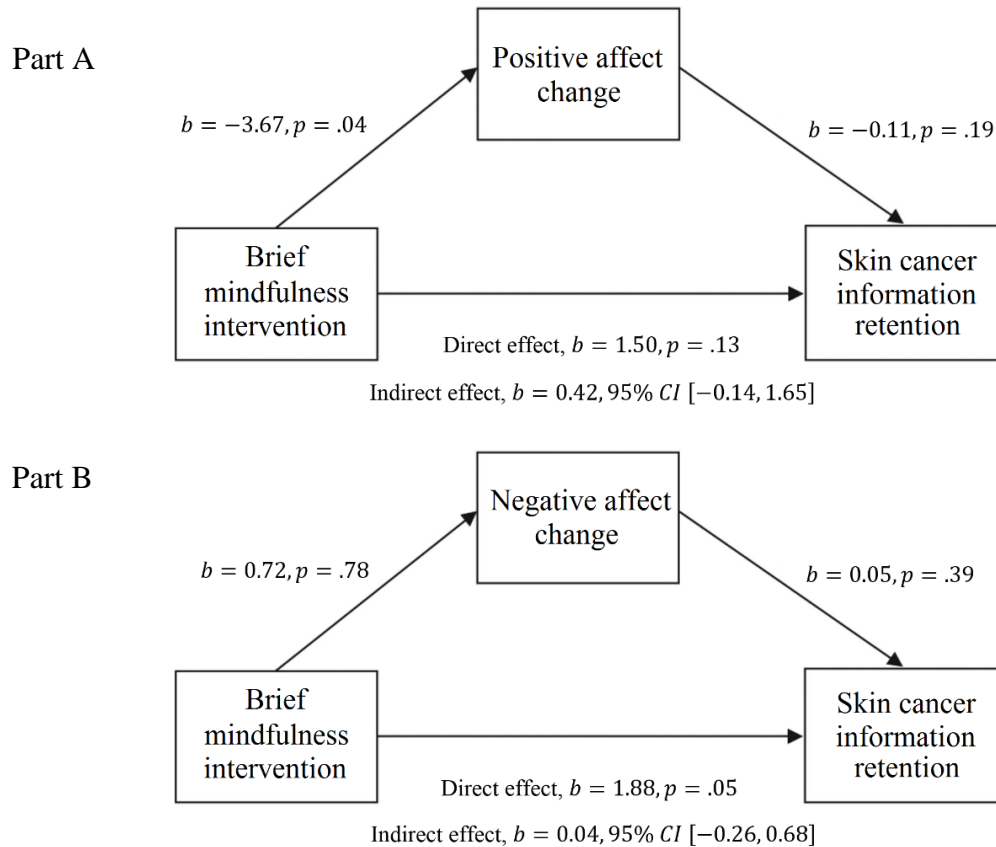


Figure 3. Model of brief mindfulness intervention as a predictor of skin cancer information retention, mediated by positive affect change (part A) or negative affect change (part B). The confidence interval for the indirect effect is a BCa bootstrapped CI based on 1000 samples.

Discussion

The results of the current study supported the primary hypothesis that the participants exposed to a brief mindfulness meditation intervention retained more information from the health education material presented and scored significantly higher on the test covering skin cancer information compared to those in the control condition. Moreover, partial η^2 was calculated at .13 which represents a medium effect size whereby the intervention accounted for 17% of the between subjects variance in scores on the skin cancer test. Evidently, the brief

mindfulness meditation exercise introduced to participants in the experimental condition had a positive effect on their ability to process and recall the information presented about skin cancer.

These outcomes are in line with the ever-growing research literature supporting the robust effects of mindfulness on psychological distress, emotional regulation, and cognitive abilities (Davis & Hayes, 2011; Hölzel et al., 2011). Conceivably, the 9-minute long mindfulness intervention used in this study engaged these processes and facilitated greater information retention for participants in the mindfulness condition, but the current study design did not address these mechanisms and does not sustain any such interpretations. Similar these results, Saunders and colleagues (2013) found that a 15-minute long mindfulness exercise could significantly improve participants' recall of self-threatening information, which is often impaired due to mnemonic neglect. However, mindfulness interventions have not been previously studied as an addition to DAs or other patient-education programs and for that reason, these results cannot be directly compared to other research findings.

Despite these effects of brief mindfulness meditation on information retention, the results did not support the hypotheses put forth regarding the potential mediating effects of PA and NA (hypotheses 2 through 4). Starting with NA, both groups maintained stable levels of negative affect from day 1 to day 2 of the study and NA change scores did not correlate with scores on the test covering skin cancer information. Accordingly, there were no indicators of an indirect effect of changes in negative affect in the mediation model tested. Moving on to PA, the mindfulness group decreased on average in PA from day 1 to day 2 whereas the comparison group increased over this period. Furthermore, PA change and scores on the skin cancer test were negatively correlated, albeit only marginally significantly. The larger the decrease in PA between day 1 and 2, the higher the participant scored on the test. Hence, there was a trend toward an indirect effect of brief mindfulness on information retention, through

positive affect change. The associations found were, however, in stark contrast to previous expectations and opposite to every hypothesis tested.

Previous studies have found that mindfulness exercises can increase emotional regulation (Goldin & Gross, 2010; Ortner et al., 2007) and improve mood (Zeidan, Johnson, Diamond, et al., 2010; Zeidan, Johnson, Gordon, et al., 2010). Furthermore, in a study by Arch and Craske (2006), participants who underwent a 15-minute focused breathing induction responded more positively and less negatively to emotionally valenced slides, measured with a single item Affect Scale and a 10-item short PANAS. In general, studies that have employed the PANAS scale as a measure of positive and negative affect in mindfulness studies have found changes in the predicted directions, especially for negative affect (Collard et al., 2008; Erisman & Roemer, 2010; Ortner & Zelazo, 2014; Tanay et al., 2012).

The results from the mediation analyses in the current study are hard to reconcile with findings from previously published studies. Nevertheless, two cautious interpretations seem plausible. First, because the latter PANAS measurement was administered after exposure to the skin cancer information, these results could be an artifact of a somewhat faulty research design. For a proper mediation analysis, the proposed mediating variable should be measured immediately post-intervention and before the dependent variable is assessed. Here, it was decided not to administer any questionnaires immediately after the mindfulness exercise to reduce potential interference after the intervention and keep participants in a mindful state during the skin cancer information presentation. Instead, affective change scores were used to address the trade-off between accurate mediation analysis and proper examination of the effects of brief mindfulness. Second and more speculatively, it could be that mindfulness meditation does not increase PA and decrease NA irrespective of the immediate environment, but rather makes subjects more attentive to the experiences of the present moment (Kabat-Zinn, 1990). Because the information presented about skin cancer was inherently negative and

self-threatening, the mindfulness group might have experienced less positive emotions and more negative ones and still be superior in their ability to process and recall the information.

This study had some limitations, the most important of which had to do with the sample studied, the research setting, and measurement procedures. First, the sample was rather small and conveniently comprised of students drawn from a participant pool of undergraduate psychology students and therefore, cannot be considered representative for students or any larger population. Also, the gender distribution was far from equal and five participants were absent on day 2 of the experiment. This greatly limited the external validity of this experiment. Second, the research setting interacted with group allocation to produce some likely errors. The experiment was conducted on the comparison groups early in the week and the mindfulness groups late in the week leaving open the possibility of differing motivational, cognitive, and physical states between the groups. In addition, the mindfulness groups were much larger than the control groups, which might have introduced more crowding and tension in the limited computer room space. Third, the measurement procedures used can also be criticized. The flawed timing of the second PANAS measure has already been discussed and in addition, both the test of prior knowledge about skin cancer and the test covering skin cancer information lacked all proper psychometric analyses prior to their use. Afterward, it became obvious that some items used were much too easy and others needlessly hard.

This study also had some important strengths, the most pronounced of which were structured research conditions and good simulation of a DA or a comparable patient-education program. The procedure was computer directed step-by-step with written instructions on a screen and communication between researchers and participants was limited to greetings at the door and responding to queries. Also, besides the effects due to variable group sizes tested, the physical surroundings and material faced by participants was almost identical between subjects. This contributed to arguably high internal validity of the current study. Lastly,

all things considered, the information presentation used delivered excellent simulation of a decision aid or patient-education program for skin cancer.

In conclusion, this analogue study found that participants who engaged in a brief mindfulness exercise and were then exposed to information about skin cancer, retained more of the information presented than a comparison group of participants who listened to an audio book. This is preliminary evidence supporting the potential value of incorporating a brief mindfulness intervention into health education material, thereby increasing the proportion of medical health information retained by the user. In a way, this study treads an untrodden path, as existing studies have not examined whether a comparable intervention could improve outcomes of DAs or health education interventions. Future studies along these lines should initially test mindfulness exercises incorporated into elaborate decision tools and directly examine its effect on decision outcomes, eventually involving patient samples. Moreover, methodologically sound mediation studies should be conducted to assess the potential mediating effects of psychological distress, cognitive processes, cardiovascular reactions, galvanic skin response, and cortisol blood levels. This ancient meditative technique may prove valuable for patient-education interventions and decision aids in the years to come.

References

- Arch, J., & Craske, M. (2006). Mechanisms of mindfulness: Emotion regulation following a focused breathing induction. *Behaviour Research and Therapy*, 44(12), 1849–1858. doi:10.1016/j.brat.2005.12.007
- Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice*, 10(2), 125–143. doi:10.1093/clipsy.bpg015
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173–1182. doi:10.1037/0022-3514.51.6.1173
- Carlson, L. E., Speca, M., Faris, P., & Patel, K. D. (2007). One year pre–post intervention follow-up of psychological, immune, endocrine and blood pressure outcomes of mindfulness-based stress reduction (MBSR) in breast and prostate cancer outpatients. *Brain, Behavior, and Immunity*, 21(8), 1038–1049. doi:10.1016/j.bbi.2007.04.002
- Carmody, J., & Baer, R. A. (2009). How long does a mindfulness-based stress reduction program need to be? A review of class contact hours and effect sizes for psychological distress. *Journal of Clinical Psychology*, 65(6), 627–638. doi:10.1002/jclp.20555
- Carvalho, H. W. de, Andreoli, S. B., Lara, D. R., Patrick, C. J., Quintana, M. I., Bressan, R. A., ... Jorge, M. R. (2013). Structural validity and reliability of the Positive and Negative Affect Schedule (PANAS): Evidence from a large Brazilian community sample. *Revista Brasileira de Psiquiatria*, 35(2), 169–172. doi:10.1590/1516-4446-2012-0957

- Chambers, R., Chuen Yee Lo, B., & Allen, N. B. (2008). The impact of intensive mindfulness training on attentional control, cognitive style, and affect. *Cognitive Therapy & Research*, 32(3), 303–322. doi:10.1007/s10608-007-9119-0
- Charles, C., Gafni, A., & Whelan, T. (1997). Shared decision-making in the medical encounter: What does it mean? (or it takes at least two to tango). *Social Science & Medicine*, 44(5), 681–692. doi:10.1016/S0277-9536(96)00221-3
- Chiesa, A., Calati, R., & Serretti, A. (2011). Does mindfulness training improve cognitive abilities? A systematic review of neuropsychological findings. *Clinical Psychology Review*, 31(3), 449–464. doi:10.1016/j.cpr.2010.11.003
- Collard, P., Avny, N., & Boniwelly, I. (2008). Teaching Mindfulness Based Cognitive Therapy (MBCT) to students: The effects of MBCT on the levels of mindfulness and subjective well-being. *Counselling Psychology Quarterly*, 21(4), 323–336. doi:10.1080/09515070802602112
- Crawford, J. R., & Henry, J. D. (2004). The Positive and Negative Affect Schedule (PANAS): Construct validity, measurement properties and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, 43(3), 245–265. doi:10.1348/0144665031752934
- Davis, D. M., & Hayes, J. A. (2011). What are the benefits of mindfulness? A practice review of psychotherapy-related research. *Psychotherapy*, 48(2), 198–208. doi:10.1037/a0022062
- Deber, R. B., Kraetschmer, N., Urowitz, S., & Sharpe, N. (2007). Do people want to be autonomous patients? Preferred roles in treatment decision-making in several patient populations. *Health Expectations*, 10(3), 248–258. doi:10.1111/j.1369-7625.2007.00441.x

- Erisman, S. M., & Roemer, L. (2010). A preliminary investigation of the effects of experimentally induced mindfulness on emotional responding to film clips. *Emotion, 10*(1), 72–82. doi:10.1037/a0017162
- Frosch, D. L., & Kaplan, R. M. (1999). Shared decision making in clinical medicine: Past research and future directions. *American Journal of Preventive Medicine, 17*(4), 285–294. doi:10.1016/S0749-3797(99)00097-5
- Gaston, C. M., & Mitchell, G. (2005). Information giving and decision-making in patients with advanced cancer: A systematic review. *Social Science & Medicine, 61*(10), 2252–2264. doi:10.1016/j.socscimed.2005.04.015
- Goldin, P. R., & Gross, J. J. (2010). Effects of mindfulness-based stress reduction (MBSR) on emotion regulation in social anxiety disorder. *Emotion, 10*(1), 83–91. doi:10.1037/a0018441
- Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57*(1), 35–43. doi:10.1016/S0022-3999(03)00573-7
- Gwede, C. K., Pow-Sang, J., Seigne, J., Heysek, R., Helal, M., Shade, K., ... Jacobsen, P. B. (2005). Treatment decision-making strategies and influences in patients with localized prostate carcinoma. *Cancer, 104*(7), 1381–1390. doi:10.1002/cncr.21330
- Hack, T. F., Degner, L. F., Watson, P., & Sinha, L. (2006). Do patients benefit from participating in medical decision making? Longitudinal follow-up of women with breast cancer. *Psycho-Oncology, 15*(1), 9–19. doi:10.1002/pon.907
- Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling. Retrieved from <http://www.afhayes.com/public/process2012.pdf>

Hölzel, B. K., Lazar, S. W., Gard, T., Schuman-Olivier, Z., Vago, D. R., & Ott, U. (2011).

How does mindfulness meditation work? Proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Science*, 6(6), 537–559. doi:10.1177/1745691611419671

Hooker, G. W., Leventhal, K.-G., DeMarco, T., Peshkin, B. N., Finch, C., Wahl, E., ...

Schwartz, M. D. (2011). Longitudinal changes in patient distress following interactive decision aid use among BRCA1/2 carriers: A randomized trial. *Medical Decision Making*, 31(3), 412–421. doi:10.1177/0272989X10381283

Jha, A. P., Stanley, E. A., Kiyonaga, A., Wong, L., & Gelfand, L. (2010). Examining the protective effects of mindfulness training on working memory capacity and affective experience. *Emotion*, 10(1), 54–64. doi:10.1037/a0018438

Kabat-Zinn, J. (1990). *Full catastrophe living: How to cope with stress, pain and illness using mindfulness meditation*. London: Piatkus.

Kabat-Zinn, J. (1994). *Wherever you go, there you are*. London: Piatkus.

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice*, 10(2), 144–156. doi:10.1093/clipsy.bpg016

Keng, S.-L., Smoski, M. J., & Robins, C. J. (2011). Effects of mindfulness on psychological health: A review of empirical studies. *Clinical Psychology Review*, 31(6), 1041–1056. doi:10.1016/j.cpr.2011.04.006

Kessels, R. P. C. (2003). Patients' memory for medical information. *Journal of the Royal Society of Medicine*, 96(5), 219–222.

Kuhlmann, S., Piel, M., & Wolf, O. T. (2005). Impaired memory retrieval after psychosocial stress in healthy young men. *The Journal of Neuroscience*, 25(11), 2977–2982. doi:10.1523/JNEUROSCI.5139-04.2005

- Levinson, W., Kao, A., Kuby, A., & Thisted, R. A. (2005). Not all patients want to participate in decision making. *Journal of General Internal Medicine*, 20(6), 531–535. doi:10.1111/j.1525-1497.2005.04101.x
- Lutz, A., Slagter, H. A., Rawlings, N. B., Francis, A. D., Greischar, L. L., & Davidson, R. J. (2009). Mental training enhances attentional stability: Neural and behavioral evidence. *The Journal of Neuroscience*, 29(42), 13418–13427. doi:10.1523/JNEUROSCI.1614-09.2009
- Makoul, G., & Clayman, M. L. (2006). An integrative model of shared decision making in medical encounters. *Patient Education and Counseling*, 60(3), 301–312. doi:10.1016/j.pec.2005.06.010
- Merz, E. L., Malcarne, V. L., Roesch, S. C., Ko, C. M., Emerson, M., Roma, V. G., & Sadler, G. R. (2013). Psychometric properties of Positive and Negative Affect Schedule (PANAS) original and short forms in an African American community sample. *Journal of Affective Disorders*, 151(3), 942–949. doi:10.1016/j.jad.2013.08.011
- Molenaar, S., Sprangers, M. A. G., Postma-Schuit, F. C. E., Rutgers, E. J. T., Noorlander, J., Hendriks, J., & Haes, H. C. J. M. D. (2000). Interpretive review : Feasibility and effects of decision aids. *Medical Decision Making*, 20(1), 112–127. doi:10.1177/0272989X0002000114
- Moore, A., & Malinowski, P. (2009). Meditation, mindfulness and cognitive flexibility. *Consciousness and Cognition*, 18(1), 176–186. doi:10.1016/j.concog.2008.12.008
- Mrazek, M. D., Franklin, M. S., Phillips, D. T., Baird, B., & Schooler, J. W. (2013). Mindfulness training improves working memory capacity and GRE performance while reducing mind wandering. *Psychological Science*, 24, 776-781. doi:10.1177/0956797612459659

- Murray, E., Davis, H., Tai, S. S., Coulter, A., Gray, A., & Haines, A. (2001). Randomised controlled trial of an interactive multimedia decision aid on benign prostatic hypertrophy in primary care. *BMJ: British Medical Journal*, 323(7311), 493.
- O'Connor, A. M., Bennett, C. L., Stacey, D., Barry, M., Col, N. F., Eden, K. B., ... Rovner, D. (2009). Decision aids for people facing health treatment or screening decisions. In *Cochrane Database of Systematic Reviews*. John Wiley & Sons, Ltd. Retrieved from <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD001431.pub2/abstract>
- O'Connor, A. M., Rostom, A., Fiset, V., Tetroe, J., Entwistle, V., Llewellyn-Thomas, H., ... Jones, J. (1999). Decision aids for patients facing health treatment or screening decisions: Systematic review. *BMJ*, 319(7212), 731–734. doi:10.1136/bmj.319.7212.731
- Ortner, C. N. M., & Zelazo, P. D. (2014). Responsiveness to a mindfulness manipulation predicts affect regarding an anger-provoking situation. *Canadian Journal of Behavioural Science / Revue Canadienne Des Sciences Du Comportement*, 46(2), 117–124. doi:10.1037/a0029664
- Ortner, C. N. M., Kilner, S. J., & Zelazo, P. D. (2007). Mindfulness meditation and reduced emotional interference on a cognitive task. *Motivation & Emotion*, 31(4), 271–283. doi:10.1007/s11031-007-9076-7
- Ostafin, B. D., Chawla, N., Bowen, S., Dillworth, T. M., Witkiewitz, K., & Marlatt, G. A. (2006). Intensive mindfulness training and the reduction of psychological distress: A preliminary study. *Cognitive and Behavioral Practice*, 13(3), 191–197. doi:10.1016/j.cbpra.2005.12.001
- Pabst, S., Schoofs, D., Pawlikowski, M., Brand, M., & Wolf, O. T. (2013). Paradoxical effects of stress and an executive task on decisions under risk. *Behavioral Neuroscience*, 127(3), 369–379. doi:10.1037/a0032334

- Quill, T. E., & Brody, H. (1996). Physician recommendations and patient autonomy: Finding a balance between physician power and patient choice. *Annals of Internal Medicine*, 125(9), 763–769. doi:10.7326/0003-4819-125-9-199611010-00010
- Saunders, J., Barawi, K., & McHugh, L. (2013). Mindfulness increases recall of self-threatening information. *Consciousness and Cognition*, 22(4), 1375–1383. doi:10.1016/j.concog.2013.09.001
- Say, R., Murtagh, M., & Thomson, R. (2006). Patients' preference for involvement in medical decision making: A narrative review. *Patient Education and Counseling*, 60(2), 102–114. doi:10.1016/j.pec.2005.02.003
- Schwabe, L., & Wolf, O. T. (2010). Learning under stress impairs memory formation. *Neurobiology of Learning and Memory*, 93(2), 183–188. doi:10.1016/j.nlm.2009.09.009
- Sepucha, K., & Mulley, A. G. (2009). A perspective on the patient's role in treatment decisions. *Medical Care Research and Review*, 66(1), 53S–74S. doi:10.1177/1077558708325511
- Smeets, T. (2011). Acute stress impairs memory retrieval independent of time of day. *Psychoneuroendocrinology*, 36(4), 495–501. doi:10.1016/j.psyneuen.2010.08.001
- Sobel, M. E. (1982). Asymptotic confidence intervals for indirect effects in structural equation models. *Sociological Methodology*, 13, 290–312. doi:10.2307/270723
- Stacey, D., Bennett, C. L., Barry, M. J., Col, N. F., Eden, K. B., Holmes-Rovner, M., ... Thomson, R. (2014). Decision aids for people facing health treatment or screening decisions. In *Cochrane Database of Systematic Reviews*. John Wiley & Sons, Ltd. Retrieved from <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD001431.pub3/abstract>

- Starcke, K., & Brand, M. (2012). Decision making under stress: A selective review. *Neuroscience & Biobehavioral Reviews*, 36(4), 1228–1248. doi:10.1016/j.neubiorev.2012.02.003
- Starcke, K., Wolf, O. T., Markowitsch, H. J., & Brand, M. (2008). Anticipatory stress influences decision making under explicit risk conditions. *Behavioral Neuroscience*, 122(6), 1352–1360. doi:10.1037/a0013281
- Steginga, S. K., & Occhipinti, S. (2006). Dispositional optimism as a predictor of men's decision-related distress after localized prostate cancer. *Health Psychology*, 25(2), 135–143. doi:10.1037/0278-6133.25.2.135
- Stewart, M. A. (1995). Effective physician-patient communication and health outcomes: A review. *CMAJ: Canadian Medical Association Journal*, 152(9), 1423–1433.
- Tanay, G., Lotan, G., & Bernstein, A. (2012). Salutary proximal processes and distal mood and anxiety vulnerability outcomes of mindfulness training: A pilot preventive intervention. *Behavior Therapy*, 43(3), 492–505. doi:10.1016/j.beth.2011.06.003
- Tang, Y.-Y., Ma, Y., Wang, J., Fan, Y., Feng, S., Lu, Q., ... Posner, M. I. (2007). Short-term meditation training improves attention and self-regulation. *Proceedings of the National Academy of Sciences*, 104(43), 17152–17156. doi:10.1073/pnas.0707678104
- Tiller, K., Meiser, B., Gaff, C., Kirk, J., Dudding, T., Phillips, K.-A., ... Tucker, K. (2006). A randomized controlled trial of a decision aid for women at increased risk of ovarian cancer. *Medical Decision Making*, 26(4), 360–372. doi:10.1177/0272989X06290486
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063.

Zeidan, F., Johnson, S. K., Diamond, B. J., David, Z., & Goolkasian, P. (2010). Mindfulness meditation improves cognition: Evidence of brief mental training. *Consciousness and Cognition*, 19(2), 597–605. doi:10.1016/j.concog.2010.03.014

Zeidan, F., Johnson, S. K., Gordon, N. S., & Goolkasian, P. (2010). Effects of brief and sham mindfulness meditation on mood and cardiovascular variables. *Journal of Alternative & Complementary Medicine*, 16(8), 867–873. doi:10.1089/acm.2009.0321

Appendix A

Summary Report

Aðstandendur rannsóknarinnar vilja byrja á að þakka þér fyrir að hafa gefið þér tíma að taka þátt í rannsókninni.

Inngangur

Rannsóknin er forrannsókn á sviði heilsusálfræði og kannar notagildi núvitundaræfinga við eftirtekt og úrvinnslu heilsutengds efnis í sjúklingafræðslu, svo sem gagnvirkum ákvörðunar-tækjum (*interactive decision aids, IDAs*). Gagnvirk ákvörðunartól hafa mikið verið notuð að undanfögnu til að aðstoða sjúklinga við að læra um sjúkdóm sinn og taka ákvörðun um næstu skref meðferðar. Rannsóknir hafa hins vegar sýnt að margir notendur slíkra tóla finna til kvíða og streitu sem skerðir gagnsemi þeirra við upplýsingamiðlun og aðstoð við ákvörðun.

Núvitund hefur verið mikið rannsökuð að undanfögnu og hafa niðurstöður þeirrar vinnu sýnt að núvitund hefur víðtæk jákvæð áhrif á líðan og virkni fólks. Sér í lagi eykur núvitund tilfinningastjórn og styrkir hugræna úrvinnslu, t.d. athygli og vinnsluminni. Hugsanlega mætti nýta þessi jákvæðu áhrif núvitundar sem hluta af gagnvirkum ákvörðunartólum og þannig auka gagnsemi þeirra.

Tilgangur og niðurstöður

Tilgangur þessarar rannsóknar var að gera forprófun á því hvort núvitund geti aukið eftirtekt og úrvinnslu heilsutengdra upplýsinga. Þar sem rannsakendur höfðu aðeins aðgang að úrtaki háskólanema var reynt að velja heilsutengd efni sem gæti höfðað til þessa hóps og varð húðkrabbamein fyrir valinu. Tilraunahópurinn hlustaði á 9 mínútna núvitundaræfingu hvorn daginn og samanburðarhópurinn hlustaði á jafnlangan hluta úr hljóðbók.

Spurningalistar voru lagðir fyrir sem mældu þekkingu þátttakenda um húðkrabbamein bæði fyrir og eftir áhorf upplýsingatexta sem og tilfinningar og viðhorf þátttakenda til þessa sjúkdóms. Þá voru ýmis önnur mælitæki notuð; Depression Anxiety Stress Scales (DASS), Positive and Negative Affect Schedule (PANAS), Mindful Attention Awareness Scale (MAAS) og Toronto Mindfulness Scale (TMS). Í grófum dráttum voru niðurstöðurnar þessar:

- Tilraunahópurinn skoraði að meðaltali hærra á spurningalistanum sem mældi þekkingu um húðkrabbamein eftir áhorf upplýsingatexta en samanburðarhópurinn.
- Þessum áhrifum var ekki miðlað af breytingum í jákvæðum og neikvæðum tilfinningum sem áttu sér stað yfir rannsóknartímabilið.

Að lokum

Hafir þú verið í samanburðarhópi og hefur áhuga því að kynnast núpvitundaræfingunni sem notuð var í rannsókninni stendur þér til boða að hafa samband við aðstandendur rannsóknarinnar og fá hana senda.

Með einlægum þökkum,

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Appendix B

Questions on Background Information

Leiðbeiningar: Vinsamlega svaraðu eftirfarandi spurningum eftir bestu getu með því að KROSSA í viðeigandi reit eða SKRIFA á línurnar. Krossaðu aðeins í EINN REIT við hverri spurningu.

- a) Hvert er kyn þitt?
- ☐ Karlkyn
 - ☐ Kvenkyn
 - ☐ Annað
- b) Hver er aldur þinn? _____
- c) Hvert er þitt fyrsta tungumál? _____
- d) Hefur þú stundað nám í læknisfræði eða hjúkrunarfræði á háskólastigi?
- ☐ Já
 - ☐ Nei
 - ☐ Veit ekki
- e) Ert þú greind(ur) með felmtursröskun (*panic disorder*), sértæka fælni (*specific phobia*) við sjúkdóma eða nálar eða aðra geðröskun sem gæti haft áhrif á þátttöku þína í rannsókninni?
- ☐ Já
 - ☐ Nei
 - ☐ Veit ekki
- f) Ert þú greind(ur) með sjón- eða heyrnarskerðingu sem gæti haft áhrif á þátttöku þína í rannsókninni?
- ☐ Já
 - ☐ Nei
 - ☐ Veit ekki
- g) Hversu litla eða mikla reynslu hefur þú af núvitund (*mindfulness*) og/eða öðrum hugleiðsluaðferðum?
- ☐ Mjög litla eða enga
 - ☐ Frekar litla
 - ☐ Í meðallagi
 - ☐ Frekar mikla
 - ☐ Mjög mikla

- h) Hversu oft telur þú þig hafa sólbrunnið á barns- og unglingsaldri, þ.e. fyrir 18 ára aldur?
- ☐ 0-2 sinnum
 - ☐ 3-5 sinnum
 - ☐ 6-8 sinnum
 - ☐ 9 sinnum eða oftar
- i) Hversu oft hefur þú stundað sólböð í ljósabekkjum undanfarna 6 mánuði?
- ☐ 0-2 sinnum
 - ☐ 3-5 sinnum
 - ☐ 6-8 sinnum
 - ☐ 9 sinnum eða oftar
- j) Hversu oft hefur þú stundað sólböð í ljósabekkjum þegar þú notaðir þá sem mest?
- ☐ Aldrei eða nær aldrei
 - ☐ Einu sinni á ári
 - ☐ Nokkrum sinnum á ári
 - ☐ 1-2 sinnum í mánuði
 - ☐ Einu sinni í viku eða oftar
- k) Hversu ólíklegt eða líklegt finnst þér að þú munir greinast með húðkrabbamein síðar á ævinni, samanborið við jafnaldra þína?
- ☐ Mjög ólíklegt
 - ☐ Frekar ólíklegt
 - ☐ Í meðallagi
 - ☐ Frekar líklegt
 - ☐ Mjög líklegt
- l) Hefur þú eða einhver þér nákominn(n) greinst með krabbamein?
- ☐ Já
 - ☐ Nei
 - ☐ Veit ekki
- m) Hefur þú eða einhver þér nákominn(n) greinst með húðkrabbamein?
- ☐ Já
 - ☐ Nei
 - ☐ Veit ekki

Appendix C

Test of Prior Knowledge about Skin Cancer

Leiðbeiningar: Hér fyrir neðan eru 5 fjölvalsspurningar um húðkrabbamein. Svaraðu hverri þeirra með því að DRAGA HRING um bókstafinn við hlið svarsins. AÐEINS EINN svarmöguleiki er réttur við hverri spurningu.

1. Hvað af neðangreindu eru tegundir húðkrabbameina:
 - A. Sortuæxli
 - B. Flöguþekjukrabbamein
 - C. Grunnþekjukrabbamein
 - D. A og B er bæði rétt
 - E. A, B og C er allt rétt
2. Nýlega hefur komið í ljós að húðkrabbamein er hættulegt fyrir:
 - A. Ung börn
 - B. Unglinga
 - C. Þá sem eldri eru
 - D. A og B er bæði rétt
 - E. A, B og C er allt rétt
3. Forvarnir gagnvart húðkrabbameini felast aðallega í að:
 - A. Minnka geislunaráhrif frá sól
 - B. Notað hatt, bol eða skyggni í miklu sólskyni
 - C. Minnka áhrif útfjólublárra geislagjafa
 - D. A og C er bæði rétt
 - E. A, B og C er allt rétt
4. Tíðni húðkrabbameina á Íslandi er:
 - A. Meiri á meðal karla en kvenna
 - B. Meiri á meðal kvenna en karla
 - C. Minni á meðal fullorðinna en barna
 - D. Minni nú en fyrir 20 árum síðan
 - E. A og D er bæði rétt
5. Hversu margir deyja að meðaltali á ári af völdum sortuæxla á Íslandi?
 - A. 0 til 5
 - B. 6 til 10
 - C. 11 til 15
 - D. 16 til 20
 - E. 21 til 25

Appendix D

The Positive and Negative Affect Schedule (PANAS)

Leiðbeiningar: Eftirfarandi listi samanstendur af 20 orðum sem lýsa ólíkri líðan eða tilfinningum. Vinsamlegast lestu hvert atriði og gefðu til kynna hvernig þér líður í AUGNABLIKINU með því að DRAGA HRING um eina tölu á kvarðanum 1 til 5 í hverjum lið. Vertu hreinskilin(n) í svörum þínum og reyndu að dvelja ekki of lengi við hvert atriði.

	Mjög lítið eða ekkert	Lítið	Nokkuð	Mikið	Mjög mikið
a) Áhugasamur/áhugasöm	1	2	3	4	5
b) Stessaður/stressuð	1	2	3	4	5
c) Eftirvæntingarfull(ur)	1	2	3	4	5
d) Í uppnámi	1	2	3	4	5
e) Kraftmikil(l)	1	2	3	4	5
f) Sakbitin(n)	1	2	3	4	5
g) Hrædd(ur)	1	2	3	4	5
h) Óvinveitt(ur) (<i>e. hostile</i>)	1	2	3	4	5
i) Full(ur) af eldmóði	1	2	3	4	5
j) Stolt(ur)	1	2	3	4	5
k) Pirraður/pirruð	1	2	3	4	5
l) Vökul(l) (<i>e. alert</i>)	1	2	3	4	5
m) Skömmustuleg(ur)	1	2	3	4	5
n) Innblásin(n)	1	2	3	4	5
o) Taugaóstyrk(ur)	1	2	3	4	5
p) Ákveðin(n)	1	2	3	4	5
q) Athugul(l)	1	2	3	4	5
r) Óróleg(ur)	1	2	3	4	5
s) Virk(ur)	1	2	3	4	5
t) Óttaslegin(n)	1	2	3	4	5

Appendix E

Test Covering Skin Cancer Information

Leiðbeiningar: Próf þetta byggir á efni upplýsingatextans um húðkrabbamein og er í tveimur hlutum. Hluti I inniheldur fjölvalsspurningar og hluti II inniheldur satt/ósatt spurningar. Vinsamlegast svaraðu prófinu eftir bestu getu en ekki dvelja of lengi við hverja spurningu.

HLUTI I: Fjölvalsspurningar.

Hér fyrir neðan eru 10 fjölvalsspurningar um húðkrabbamein. Svaraðu hverri þeirra með því að DRAGA HRING um bókstafinn við hlið svarsins. AÐEINS EINN svarmöguleiki er réttur við hverri spurningu.

- 1) Hversu margir sólbrunar í æsku auka áhættuna á húðkrabbameini síðar meir um 80%?
 - A. 5
 - B. 7
 - C. 8
 - D. 10
- 2) Hvað af eftirtöldu var nefnt sem forvörn við því að fá húðkrabbamein?
 - A. Forðast sjó eða sundlaugar í sólskini
 - B. Nota lítið af sólarolíu við sólböð
 - C. Forðast sól um miðjan daginn
 - D. Nota sólarvörn að styrkleika 15
- 3) Hjá hvaða hópi hefur orðið mest aukning í tíðni sortuæxla undanfarin ár?
 - A. Ungum konum
 - B. Börnum
 - C. Eldri konum
 - D. Eldri körlum
- 4) Hversu margir greinast með sortuæxli að meðaltali á ári samkvæmt Krabbameinsskrá Íslands?
 - A. 40 manns
 - B. 45 manns
 - C. 50 manns
 - D. Enginn svarkostur er réttur
- 5) Hver eftirtalinna staðhæfinga um sortuæxli er rétt?
 - A. Sortuæxli getur dreift sér í önnur líffæri og valdið dauða
 - B. Því dýpra sem krabbameinið vex, því verri eru horfurnar
 - C. Lækningartíðni grunnfrumukrabbameina er 95%
 - D. Allir svarkostir eru réttir

- 6) Mikil útfjólublá geislun í skamman tíma getur orsakað:
- A. Grunnfrumukrabbamein
 - B. Flöguþekjukrabbamein
 - C. Sortuæxli
 - D. Bæði A og C er rétt
- 7) Húðkrabbamein eru algengari hjá fólki sem er með:
- A. Blá, grá eða græn augu
 - B. Ljósa húð
 - C. Bæði A og B er rétt
 - D. Hvorki A né B er rétt
- 8) Hver eftirtalinna staðhæfinga er rétt varðandi tíðni sortuæxla undarfarna fimm áratugi?
- A. Nýgengi og dánartíðni meðal kvenna hefur aukist
 - B. Nýgengi og dánartíðni meðal karla hefur aukist
 - C. Nýgengi hefur aukist en dánartíðni haldist stöðug
 - D. Enginn svarkostur er réttur
- 9) Á hverju byggist greining húðkrabbameina og óreglulegra fæðingarbletta?
- A. Læknisskoðun
 - B. Sjálfsskoðun
 - C. Blóðrannsókn
 - D. Bæði A og C eru réttir
- 10) Hvert eftirtalinna húðkrabbameina myndar ekki meinvörp?
- A. Flöguþekjukrabbamein
 - B. Sortuæxli
 - C. Grunnfrumukrabbamein
 - D. Enginn svarkostur er réttur

HLUTI II: Satt/ósatt spurningar

Hér fyrir neðan eru 20 fullyrðingar um húðkrabbamein. Lestu hverja fullyrðingu vandlega og gefðu til kynna hvort þær eru SANNAR eða ÓSANNAR með því að merkja í viðeigandi reit fyrir aftan hverja spurningu.

	Satt	Ósatt
1) Sólbruni eykur áhættuna á húðkrabbameini, en aðeins meðal barna og unglinga.	<input type="checkbox"/>	<input type="checkbox"/>
2) Jöfn og stöðug útfjólublá geislun yfir langan tíma getur orsakað flöguþekjukrabbamein.	<input type="checkbox"/>	<input type="checkbox"/>
3) Sólurvörn með UVB og UVA að styrk 15 minnkar áhættu á sortuæxlum um 50%.	<input type="checkbox"/>	<input type="checkbox"/>
4) Einstaklingar með óreglulega fæðingarbletti eru í áhættuhópi fyrir því að greinast með sortuæxli, en aðeins ef fjölskyldusaga um sortuæxli er til staðar.	<input type="checkbox"/>	<input type="checkbox"/>
5) Óreglulegir fæðingarblettir hafa alla jafna óreglulegar og óljósar brúnir og eru oft stærri en 5 mm að þvermáli.	<input type="checkbox"/>	<input type="checkbox"/>
6) Fullorðið fólk hefur að meðaltali yfir 100 fæðingarbletti dreifða um allan líkamann.	<input type="checkbox"/>	<input type="checkbox"/>
7) Algengast er að óreglulegir fæðingarblettir séu staðsettir á bakinu en þá má einnig finna fyrir neðan mitti og í hársverði.	<input type="checkbox"/>	<input type="checkbox"/>
8) Tíðni sortuæxla á Íslandi hefur þrefaldast undanfarinn áratug.	<input type="checkbox"/>	<input type="checkbox"/>
9) Sortuæxli er næstalgengasta krabbameinið hjá ungum konum á Íslandi.	<input type="checkbox"/>	<input type="checkbox"/>
10) Á Íslandi greinast að meðaltali 60 manns með illkynja húðæxli önnur en sortuæxli.	<input type="checkbox"/>	<input type="checkbox"/>
11) Á Íslandi deyja að meðaltali 9 Íslendingar á ári af völdum sortuæxla, þar af fleiri konur en karlar.	<input type="checkbox"/>	<input type="checkbox"/>
12) Lækningartíðni sortuæxla er ávallt um 95%, jafnvel þegar það hefur vaxið djúpt niður húðina eða í fituvef.	<input type="checkbox"/>	<input type="checkbox"/>
13) Ef vefjarannsókn leiðir í ljós að um sortuæxli er að ræða þarf oftast að framkvæma útvíkkaða skurðaðgerð til að fjarlægja allt meinið.	<input type="checkbox"/>	<input type="checkbox"/>
14) Flöguþekjukrabbamein er algengasta húðkrabbameinið í hvítu fólki á Vesturlöndum.	<input type="checkbox"/>	<input type="checkbox"/>

Appendix F

Example Screen Shots from the Information Presentation about Skin Cancer

