

## Original Papers

*Polish Psychological Bulletin*

2022, vol. 53(1) 23–31

DOI: 10.24425/ppb.2022.140478

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## Does Hope in Mind Influence People's Problem-Solving Performance?

**Abstract:** Hope is often treated as a priceless human value anchored in goal-related cognitions. The experiment aimed to investigate whether current hopeful thinking is related to problem-solving performance and how induced goal-oriented thinking influences this problem-solving process. Participants ( $N = 410$ ) were asked to recall and describe their successful or unsuccessful goal pursuit and complete a scale assessing current hopeful thinking. Subsequently, participants were instructed to (1) think about actions that would be taken to solve the societal problem (i.e., an insufficient number of volunteers in Social Welfare Centers) and (2) describe these actions. In general, people who recalled successful events felt more hopeful than those who recalled unsuccessful events. State Hope was positively correlated with both the quantity (i.e., the total number of solutions) and quality (i.e., usefulness) of participants' offered solutions. No interaction between State Hope and type of conditions with solution quantity or solution quality was found. State hope, however, interacted with the type of recalled goal pursuit when sex differences were considered. More hopeful women had a better solution quality when they recalled an unsuccessful goal pursuit. For men, a similar pattern was found when they recalled a successful goal pursuit. Lastly, the findings were discussed in light of Snyder's Theory of Hope.

**Keywords:** *state hope; goal-oriented thinking; problem-solving performance, sex differences*

### INTRODUCTION

People who are hopeful can have successful experiences, as they may establish goals and successfully initiate plans to obtain them (Snyder, 2000). Hope thus encompasses a range of psychological benefits and even acts as a protective mechanism (Snyder et al., 2000). In previous works hopeful thinking was induced through recalling successful goal pursuit versus unsuccessful ones, which resulted – in increased or decreased state hope levels respectively (Snyder et al., 1996). Furthermore, research showed that hopeful people perceive themselves as effective problem solvers (Atik & Erkan Atik, 2017; Çam et al., 2020). In order to extend the prior findings, the present study investigated whether induced hopeful thinking is related to people's problem-solving performance. Therefore, the experiment tested a direct influence of hopeful thoughts on actual problem-solving performance.

Hope is defined as a positive cognitive state composed of two ways of thinking about goals: *agency* and *pathways* (Snyder, 2002). Agency includes thoughts related to a perceived ability to begin and continue to achieve the goal consistently. Pathways include thoughts about one's ability to employ and look for routes to desired goals. In this view, hope (Snyder, 2002) has many similarities to other motivation-related concepts, such as self-efficacy (Bandura, 1986; Luszczynska et al., 2005). Self-efficacy and hope, however, differ because self-efficacy is the belief that one *can* solve a current problem or goal, whereas hope reflects the *intention*—that is, the *will*—to undertake and continue the goal pursuit (Snyder, 2002). Hope can be operationalized as a disposition or a state (Snyder, 2002). Hope as a state may be useful as a mediational process between antecedent and consequent events, or it can be employed to study how the state hope is related to ongoing goal-related activities, such as copying strategies, academic performance, and problem-solving (e.g., Delas et al., 2017).

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Funding source with grant number

This work was supported by the Polish Society of Social Psychology as special prize for the best poster of the conference. The money won was aimed at supporting performance of the research in cooperation with Research Panel ARIADNA.

## HOPE AND GOAL-DIRECTED THINKING

Once people clarify their goals, they are often filled with empowering thoughts (Snyder, 1994). These thoughts may tap into the sense of potential for action that people generally bring to situations. Further, hopeful thinking is partially a function of prior success (Snyder, 2002). For example, feelings of hope were influenced by goal-oriented thinking (Snyder et al., 1996, Study 3). Participants either recalled a positive or negative event related to their goal achievement. Positive or negative memory induction produced—respectively—either an increase or decrease of hope. Hopeful people may be skilled in finding different ways to pursue a certain goal, whereas hopeless people may be rather rigid in how they reach their aims (Snyder, 2000). Moreover, when facing challenges, people who are hopeful may produce more adaptive coping strategies than people who feel hopeless (Irving et al., 1998). Additionally, hopelessness is linked to the perception of lower problem-solving skills (Cannon et al., 1999).

### Hope and Problem-Solving Skills

Problem-solving is a dynamic process, in which a person regulates cognitive, emotional, and behavioral responses to various types of problems (e.g., Nezu et al., 2013). Problem-solving is specified with *problem orientation* (i.e., a person's awareness of problems and perceived problem-solving skills) and a *problem-solving proper process* (i.e., specific styles that let a person solve a problem; see D'Zurilla & Maydeu-Olivares, 1995). The problem-solving process is also defined within the framework of *problem-solving confidence* (i.e., a belief in problem-solving skills), *approach-avoidance style* (i.e., a propensity to approach or avoid problem-solving activities), and *personal control* (i.e., a belief in emotional and behavioral control during problem-solving processes; see Heppner & Petersen, 1982).

Problem-solving and hope are closely related concepts (Snyder et al., 1999). Both can be described as iterative, meaning that by attributing goal attainment to increased problem-solving skills, confidence in one's ability to solve a future problem is enhanced (D'Zurilla & Maydeu-Olivares, 1995; Nezu et al., 2013; Snyder et al., 1991b). Hopeful people have a positive perception of their problem-solving skills (Atik & Erkan Atik, 2017; Bilge et al., 2001; Çam et al., 2020; Chang, 2003; Chang & Banks, 2007; Snyder et al., 1991a). There is an association between hopeful thoughts and a perception of oneself as an effective problem solver (Atik & Erkan Atik, 2017; Bilge et al., 2001; Çam et al., 2020). According to those findings, as one's dispositional or current hopeful thoughts increase, one's perceived problem-solving skills also increase. Consistently, when compared to hopeless people, hopeful people more often rated themselves as possessing adaptive problem-solving characteristics. Further, the perception of problem-solving was found to be a predictor of hopeful feelings (Atik & Erkan Atik, 2017; Çam et al., 2020).

While several studies indicate that more hope is related to better problem-solving skills, the relationship

between hope and problem-solving is not completely understood. Most of these studies measured hope as a disposition (e.g., Chang & Banks, 2007). Only a few studies measured actual hopeful thoughts (e.g., Atik & Erkan Atik, 2017). Indeed, most studies tested participants' perceptions of their own problem-solving *skills* but not their problem-solving *performance*. Thus, the aim of this study was to explore whether induced, actual hopeful thoughts are related to problem-solving performances (i.e., the process of finding and producing solutions to the problem). To manipulate hope, participants were asked to recall a successful versus an unsuccessful goal pursuit (Snyder et al., 1996, Study 3). Subsequently, participants were asked to generate solutions for a presented societal problem. Based on the literature review it was hypothesized that:

- Hypothesis 1. Higher state hope scores are found in people who recalled successful goal pursuit as opposed to those who recalled unsuccessful goal pursuit.
- Hypothesis 2. Higher state hope scores are associated with more solutions produced.
- Hypothesis 3. Higher state hope scores are associated with better solution quality (i.e., usefulness).

Problem-solving was explored in the specific context of goal-oriented thinking. Given that experience of success and failure may guide goal-relevant consequences (e.g., may affect mood, or self-esteem, Bargh et al., 2001; Baryła & Wojciszke, 2018) it was also hypothesized that:

- Hypothesis 4. When recalling a successful goal pursuit, people with higher state hope scores will produce more solutions than people recalling an unsuccessful goal pursuit.
- Hypothesis 5. When recalling a successful goal pursuit, people with higher state hope scores will produce solutions of better quality than people recalling an unsuccessful goal pursuit.

## METHOD

### Participants and Design

The whole sample consisted of 588 participants (372 women, aged from 18 to 70;  $M_{age} = 34.32$ ,  $SD = 12.53$ ; 216 men, aged from 18 to 71,  $M_{age} = 42.22$ ,  $SD = 13.52$ ). 120 participants were excluded from final analysis because they performed the recalled-induced task in less than 30 seconds, which seemed insufficient to successfully complete it. The cut-off based on the mean time of the whole sample ( $N = 588$ ,  $M_{time\ manipulation} = 132.12\ s$ ,  $SD = 171.02$ ,  $Mdn = 67.50$ ). Fifty-eight participants were excluded because they fail to follow instructions in the experimental manipulation. The final sample consisted of 410 participants (283 women aged from 18 to 70;  $M_{age} = 34.20$ ,  $SD = 12.53$ ; 127 men aged from 18 to 70,  $M_{age} = 42.06$ ,  $SD = 14.09$ ), who were randomly assigned to successful goal pursuit condition ( $n = 212$ ) or unsuccessful goal pursuit condition ( $n = 198$ ).<sup>1</sup> The participants had elementary education (2.4%), vocational education (7.6%), secondary

<sup>1</sup> Randomization was successful for age  $t(408) = -1.09$ ,  $p = .275$ , and gender  $\chi^2(1, N = 410) = .13$ ,  $p = .721$ .

education (36.1%), were still studying (9.3%), or completed a university education (44.6%). The participants were matched to the parameters of the general Polish population. The study was conducted according to the principles expressed in the ESOMAR (European Society for Opinion and Marketing Research), in line with the code of ethical standards, and according to the guidelines of the institutional review board (Ethics Committee Faculty of the University of Social Sciences and Humanities).

## Measures and Materials

### Recall-Induced Task

Participants recalled and described their successful or unsuccessful goal pursuit (inspired by Snyder et al., 1996, Study 3). The following instruction was given to the participants in the successful goal pursuit group: "Please, recall a situation when you tried hard to achieve a goal that was important to you, and that you were successful with goal pursuit. Remember how you felt at these moments. Feel the feelings again, and describe such an event in a few sentences". Participants in the unsuccessful goal pursuit group read the same instruction as the successful condition, except for the type of event.

### Control Questions of Recall-Induced Task

Three control questions were used to determine the participant's hardship, engagement and importance of the recall-induced task (inspired by Snyder et al., 1996, Study 3; for details see Appendix).

### State Hope

To measure the state hope scores, the Polish version (Łaguna et al., n.d.) of the Adult State Hope Scale (ASHS; Snyder et al., 1996) was used. The scale consisted of six items (e.g., "I can think of many ways to reach my current goals"). Each item was rated using an 8-point scale (1 = *definitely false*; 8 = *definitely true*). A mean state hope score was computed for all items (Cronbach's  $\alpha = .92$ ).

### Problem-Solving Task

Participants were familiarized with the author's description of Social Welfare Centers and were instructed to produce one or more solutions to the presented problem (i.e., an insufficient number of volunteers in these societal institutions, see Appendix). Produced solutions were scored for the quality (i.e., usefulness), defined as functionality of the solution, and for quantity (i.e., the total number of solutions). Two raters, blind to hypotheses and conditions, scored solution quality by rating each response on a 3-point scale (0 = *no solutions*; 3 = *solutions are highly useful*). Interrater reliability was high for the quality (Spearman-Brown's  $\rho = .82$ ) and the quantity ratings (Spearman-Brown's  $\rho = .80$ ).

All measures and materials in the current study were used in Polish (i.e., with the forward translated version, from English to Polish). Additional questionnaires were completed for exploratory reasons, but were not included in the analyses of this project.

## Procedure

Participants signed into the study by the research website Panel ARIADNA. By completing surveys, participants received award points that can be exchanged for in-kind prizes. Participants were invited via email, informed about voluntary participation and data confidentiality. They were randomly assigned to one of the two experimental conditions. First, participants were asked to perform the recall-induced task, answer control questions, and fill in a measure of individual differences in state hope. Subsequently, all participants completed the problem-solving task. Finally, they were debriefed, thanked, and received points for in-kind prizes.

## Data Analyses

The means and standard deviations of each variable were calculated and to show the relation between the investigated concepts the Spearman's rho correlations ( $r_s$ ) was performed on the variables. To test the influence of the recall condition, a  $2 \times 2$  ANCOVA was performed with recall-induced conditions (successful goal pursuit vs. unsuccessful goal pursuit) and sex differences (women vs. men) as between-subjects factors, state hope scores as covariate, solution quality and quantity as dependent variables. Levene's test showed that variances were homogeneous for both variables, respectively  $F_{quality}(3, 406) = 1.83, p = .410$ , and  $F_{quantity}(3, 406) = 1.13, p = .335$ . For additional check of effectiveness of the manipulation Linguistic Inquiry and Word Count (LIWC; Pennebaker et al., 2007) was conducted.

## RESULTS

### Differences of Experimental Conditions

The details about descriptive information (see Table S1) and control questions (see Table S2) can be found in Appendix. Participants who recalled successful goal pursuit used more words containing positive emotions, and fewer containing negative emotions in events descriptions compared to those who recalled unsuccessful goal (pursuit see Table S3).

As predicted, participants in the successful goal pursuit group reported a higher state hope than in the unsuccessful group (H1). Additionally, differences between the two dependent variables were not significant (see Table 1).

**Table 1.** Subgroup differences for experimental conditions and sex differences

	Unsuccessful (N = 198)		Successful (N = 212)		t(408)	p	d
	M	SD	M	SD			
State Hope	5.22	1.42	5.69	1.19	-3.62	< .001	0.37
Solutions quantity	1.07	0.80	1.08	0.80	-0.18	.856	0.02
Solutions quality	1.70	0.84	1.73	0.82	-0.41	.678	0.04

As predicted, state hope was weakly positively correlated with solution quantity (H2) and quantity (H3). Additionally, dependent variables positively correlated with each other (see Table 2).

**Table 2.** Summary of Spearman's rho correlations (N = 410)

	1	2	3
1. State Hope			
2. Solutions quantity	.17**		
3. Solution quality	.14**	.70**	

Note. \*  $p < .05$ , \*\*  $p < .01$

There were no sex differences when looking at state hope scores found. However, women and men differed on both dependent variables, with women scoring higher than men on both solution quality and quantity (see Table 3). For exploratory reasons, therefore, sex differences was included in the following data analyses.

**Table 3.** Study variables for sex differences

	Men (N = 127)		Women (N = 283)		t(408)	p	d
	M	SD	M	SD			
State Hope	5.57	1.16	5.41	1.39	1.21	.228	0.14
Solutions quantity	0.93	0.76	1.14	0.81	-2.43	.015	0.24
Solutions quality	1.45	0.89	1.83	0.78	-4.36	<.001	0.43

**Interactions Between Study Variables**

**Solution Quantity**

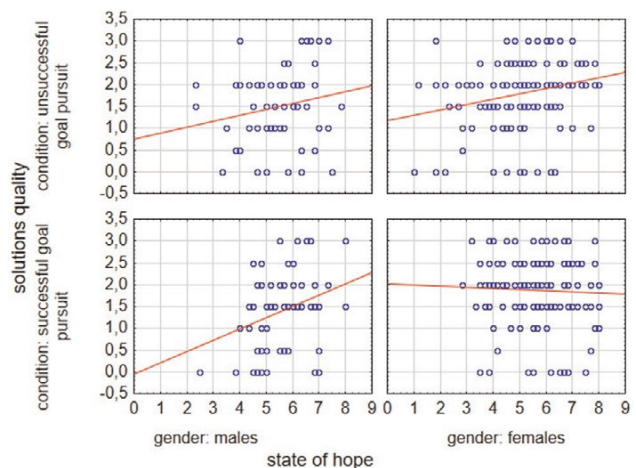
In line with the correlations, state hope influenced the number of solutions offered by participants,  $F(1, 402) = 12.74, p < .001, \eta^2 = .03$ . Participants with a higher level of state hope produced more solutions than participants with a lower level ( $b = .17, p < .001$ ). There were no significant sex differences found,  $F(1, 402) = 2.24, p = .135, \eta^2 = .01$ , no effect in the type of recalled-induced conditions,  $F(1, 402) = 0.00, p = .990, \eta^2 = .00$ , the interaction between participant's sex and the type of conditions,  $F(1, 402) = 0.51, p = .477, \eta^2 = .00$ , and also no effect between participant's sex and the state hope scores,  $F(1, 402) = 0.87, p = .351, \eta^2 = .00$ , the type of conditions and the state hope scores  $F(1, 402) = 0.01, p = .906, \eta^2 = .00$ , nor the three way interaction,  $F(1, 402) = 0.43, p = .515, \eta^2 = .00$ .

**Solution Quality**

Higher state hope scores were associated with higher ratings of the participant's solution quality,  $F(1, 402) = 11.88, p < .001, \eta^2 = .03$ . Participants with higher state hope scores received higher ratings of solution quality than

those with lower level ( $b = .138, p = .005$ ). Additionally, a significant effect for participant's sex was found,  $F(1, 402) = 9.35, p = .002, \eta^2 = .02$ . Solution quality of men were rated lower ( $M = 1.45, SD = 0.89$ ) than those of women ( $M = 1.83, SD = 0.78$ ).

The type of conditions had no effect on the solution quality,  $F(1, 402) = 0.00, p = .948, \eta^2 = .00$ . The interaction of participant's sex and type of recalled-induced conditions was significant,  $F(1, 402) = 4.12, p = .043, \eta^2 = .01$ . Women who recalled an successful goal pursuit had higher ratings for solution quality ( $M = 1.79, SD = 0.80$ ) than men ( $M = 1.41, SD = 0.88; p < .001$ ). Similarly, in the unsuccessful condition, solution quality ratings for women were higher ( $M = 1.87, SD = 0.76$ ) than for men ( $M = 1.50, SD = 0.90; p = .005$ ). There was no main effect for sex ( $p > .10$ ). There was also a significant interaction between participant's sex and state hope scores  $F(1, 402) = 4.32, p = .038, \eta^2 = .01$ , where hope scores were related to the ratings of solution quality in men ( $b = .250, p = .005$ ), and were marginally significant in women ( $b = .114, p = .055$ ). There were no interaction between type of recalled-induced conditions and state hope scores,  $F(1, 402) = 0.03, p = .867, \eta^2 = .00$ . Figure 1 shows the marginally significant interaction between type of recalled-induced conditions, participant's sex, and state hope scores,  $F(1, 402) = 3.62, p = .058, \eta^2 = .01$ , with state hope scores of men was related to solution quantity, but only when they recalled successful goal pursuit ( $b = .330, p = .008$ ), and not when they recalled unsuccessful goal pursuit ( $b = .180, p = .158$ ). In women, there was such a relationship only when they recalled unsuccessful goal pursuit ( $b = .228, p = .008$ ), but not when recalled successful one ( $b = -.040, p = .627$ ).



**Figure 1.** State hope influence on solutions quality by sex and condition subgroups – scatter plot for covariance interaction effect

**DISCUSSION**

The present study tested whether induced state hope, through goal-oriented thinking, is related to people's performance of solving societal problems. As expected, the manipulation of hope was effective. When people

recalled a successful event, they reported higher state hope than those who recalled an unsuccessful event. These findings are consistent with previous research by Snyder et al. (1996, Study 3), showing that positive or negative memory inductions in goal pursuit either increased or decreased state hope. The results obtained in this study can be explained by hope theory (Snyder et al., 1996); such hope is a cognitive construct that is anchored in goal-related cognitions. The experience of attaining one's goal pursuit—that is, a feeling of some kind of empowerment—should increase hopeful thinking. However, the experience of failure in ongoing goal pursuit—that is, a feeling of some kind of blockage—should decrease hopeful thinking. In future studies, it would be worth adding a pre- and post-test design. This would help to focus more on the process of state-influenced changes in goal-directed thinking.

Furthermore, state hope was correlated with the quantity and quality of the participants' offered solutions. This is consistent with hope theory and suggests that more hope may trigger people to formulate various solutions to a problem (Snyder, 2002). Obtained findings are also partially in line with correlational studies showing that when hope levels increase, perceived problem-solving skills also increase (Atik & Erkan Atik, 2017; Çam et al., 2020). There is likely a bidirectional relationship between hope and problem-solving skills, where a person's positive appraisal of his/her problem-solving skills leads to more hopeful thinking (e.g., Çam et al., 2020; Nezu et al., 2013). Therefore, the present research extends previous studies because it investigated the relationship between state hope and problem-solving skills by focusing on the performance of solving a real-life problem. In natural settings, however, people may have less time to analyze their problem-solving skills; thus, current hopeful thoughts could more automatically stimulate people to act upon or inhibit their problem-solving activities. In future research, it would be worth investigating, for example, whether people are aware of their actual condition (i.e., whether they are hopeful or not) and how it may affect their problem-solving skills.

Moreover, no interaction between state hope and types of recalled-induced conditions with solution quantity or solution quality was found. When sex differences were considered, however, state hope levels interacted with the type of recalled goal pursuit (i.e., successful or unsuccessful). Still, this was only true for solution quality, not quantity. Notably, solution quantity and solution quality are based on different processes (Runco & Charles, 1993). Solution quantity is more of an unqualified process and involves fewer constraints. Solution quality, on the other hand, requires stronger restrictions, as the solution must fit the problem. It may be that solution quality is more sensitive to hope's influence, as it requires a more specific focus on the precise goal. Further studies should verify these assumptions.

Interestingly, when looking at sex differences, solution quality was rated more highly among women than men, and type of recalled-induced conditions did not influence this result. The results are partially inconsistent

with previous works, where men had claimed to possess better perceived problem-solving skills than their female counterparts (Chang, 2003). In this study, however, problem-solving abilities were examined through subjective ratings. Therefore, results could reflect men's bias to exaggerate their problem-solving skills. Other research findings can explain the results obtained in this study (Bugler et al., 2015). It was found that during task performance, women may focus more on the process of the task (i.e., process orientation), whereas men may focus more on the results of the task (i.e., impact orientation). Moreover, within a competition, men tend to outperform women, but these effects disappear in non-competitive tasks (Shurchkov & Eckel, 2018). Perhaps the non-competitive nature of the current problem-solving task makes men, when compared to women, less focused on producing a solution. Present findings can be also related to prior assumptions, implying that measured sex gaps are sensitive to the item format on tests or topics (e.g., Reardon et al., 2018). This early study by Reardon et al. shows that men score higher than women on multiple-choice tests, whereas women score more highly than men on the written portions of tests. Importantly, in the present study, the solution quality was rated based on the participants' verbal statements. Additionally, the content's terms, such as the societal problem to solve, would activate sex roles and influence the problem-solving process because in traditional sex roles, women are expected to be more sensitive to others (Bem, 1974). Future research could use different tasks to test whether more competitive problem-solving situations lead to distinct sex effects.

There was an interaction between sex differences and state hope. Solution quality was rated more highly for men who were more hopeful than for those who were less hopeful. For women, this effect was marginally significant. These results are only partially consistent with prior research (Chang, 2003). In that study, both sexes rely on one of components of hopeful thinking (i.e., agentic thinking) when rating their problem-solving skills. Contrarily, in a study using only female participants, overall, hope did not predict women's self-perceptions of their problem-solving abilities (Bilge et al., 2001). In this study, for both sexes, state hope may be associated with a better problem-solving performance. As women's results were marginally significant, future research is necessary to replicate such findings.

Importantly, an interaction of type of recalled-induced conditions, sex difference, and state hope was found. Interestingly, state hope increased the solution quality in both men who recalled a successful goal pursuit and in women who recalled an unsuccessful goal pursuit. Speculating about this effect, it may be that recalling failures for women results in a lowered self-worth, leading to empowerment through problem-solving activities. Failure can reduce women's self-esteem because, for example, women tend to attribute failures to internal, stable causes (Lawner, 2017; Meece et al., 2006). Moreover, lowered hopeful thoughts were linked with depressive symptoms and women's perceptions of themselves as poor problem

solvers (Chang, 2003). In turn, hope could then stimulate women to increase their self-view by solving a societal problem—a goal that seems feasible because women often feel more effective when attaining social goals (Atkinson, 1964). For men, on the other hand, success would increase their self-view, and hope would help them to improve their self-worth through problem-solving activities. Men regularly report overconfidence in various areas, attributing successes to their abilities and failures to bad luck (Meece et al., 2006; Niederle et al., 2011; Yu & McLellan, 2019). When men link success to ability, they often tend to believe that they will do well in the future too (Lawner, 2017). Moreover, men's hopeful thinking was related to life satisfaction through their perception of themselves as effective problem solvers (Chang, 2003). Therefore, state hope could stimulate men to maintain their self-worth through solving societal problems. It seems reasonable that this maintenance approach and motivation may lead to engagement in simple tasks (Atkinson, 1964). It was found that hopeful people use fewer disengagement strategies when coping with stressful academic situations but do not employ more engagement strategies (Chang, 1998). In this study, however, sex differences were not tested. More research is needed to better understand these possible relationships.

This study had some limitations. It was carried out by Polish respondents and it is unclear whether results can be generalized. Online surveys bear some disadvantages too. A time lag between the manipulation of state hope and the measures following could not be fully controlled. That could have weakened study manipulation. Given that the descriptions of each event were compelling in content, it was assumed that the manipulation was reliable. It is important to use more diverse research designs to validate these findings. Moreover, this study did not measure an implementation of solutions, which refers to a process carrying out certain solutions in the actual situation (Nezu, 2004). As these concepts are not always correlated, it might be interesting to include solution implementation in future research. Furthermore, in the present study it was assumed that the presented societal problem would be defined by participants as a problem. However, whether something is perceived as a problem or not is quite subjective (Nezu et al., 2013). Therefore, in future research it should include control measures to investigate if a particular situation is truly a problem for participants. Finally, there were not considered separate analyses for agency and pathway components. It would be interesting to examine if these two are related differently to peoples' problem solving processing (see Chang, 2003).

## CONCLUSIONS

It seems easily possible to alter hopeful thoughts by thinking good thoughts and bad thoughts about past goal efforts and outcomes. In this study, a positive correlation between state hope and problem-solving performance was found. People who were highly hopeful being more

effective in producing solutions fitting a social problem, than those low in hopeful thought. The results might provide important insights for practitioners, suggesting that hopeful thinking may motivate people to engage in problem-solving situations for different reasons, depending on context or sex differences.

## ACKNOWLEDGMENTS

We thank Barbara, C. N. Müller and Mariusz Zięba, for their insightful comments on this work.

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## APPENDIX

**Measures**

**Recall-induced task.** The following instruction in successful goal pursuit was given:

“Please, recall a situation when you tried hard to achieve a goal that was important to you, and that you were successful with goal pursuit. Remember how you felt at these moments. Feel the feelings again, and describe such an event in a few sentences”. Participants in the unsuccessful condition recalled and described unsuccessful goal pursuit with the same instruction as given in successful condition, except for the type of event, i.e.: “Please, recall a situation when you tried hard to achieve a goal that was important to you, and that you were not successful with goal pursuit. Remember how you felt at these moments. Feel the feelings again, and describe such an event in a few sentences”.

**Control questions of recall-induced task.** There were used three control questions (inspired by Snyder et al., 1996, Study 3): 1. “How hard did you try to recall the event?” with answers on a 7-point scale ranging from 1 = *not at all*, 4 = *neutral* to 7 = *extremely hard*. 2. “How deep was your emotional engagement toward the event?” with answers on a 7-point scale ranging from 1 = *not at all*, 4 =

neutral to “7 = *extremely deep*. 3. “How important is the event to you?” with answers on a 7-point scale ranging from 1 = *not at all*, 4 = *neutral* to 7 = *extremely important*.

**Problem-solving task.** The participants produced the solutions they thought were appropriate for the problem of an insufficient number of volunteers in Social Welfare Centers. Participants were familiarized with the description of societal institutions and were instructed: “Please think how you can encourage people to become involved in volunteering in Social Welfare Centers. Try to come up with one or more solutions. Write them down below – we will forward them to representatives of societal institutions”.

**Results****Descriptive statistics**

The results of descriptive statistics of all variables for the total sample are reported (Table S1).

**Control questions**

Participants found it rather easy to recall and empathize with each recalled situation and rated both events as rather important. A Student’s *t*-test revealed differences between both experimental conditions. Parti-

**Table S1.** Descriptive statistics of all variables ( $N = 410$ )

	<i>R</i>	<i>M</i>	<i>SD</i>	<i>Sk</i>	<i>Kurt</i>	<i>D</i>
State hope	1-8.00	5.46	1.32	-0.42	0.22	0.06**
Solutions quantity	0-5.50	1.08	0.80	1.62	4.91	0.28**
Solutions quality	0-3.00	1.71	0.83	-0.53	-0.25	0.17**

Note. \*  $p < .05$ , \*\*  $p < .01$ ; D – Kolmogorov-Smirnov test

**Table S2.** Means and Standard Deviations for control questions

	Unsuccessful ( $N = 198$ )		Successful ( $N = 212$ )		<i>t</i> (408)	<i>p</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Hardship difficulty	2.91	1.71	2.50	1.49	2.59	.010	0.26
Engagement level	4.48	1.69	5.64	1.27	-7.79	< .001	0.81
Event importance	4.97	1.59	5.86	1.24	-6.25	< .001	0.65

**Table S3.** Means and Standard Deviations for control questions for experienced by participant’s emotions

	Unsuccessful ( $N = 198$ )		Successful ( $N = 212$ )		<i>p</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Positive emotions	2.78	8.83	8.59	11.26	< .001	0.57
Negative emotions	13.75	22.16	3.44	9.56	< .001	0.61
Anger	5.69	16.02	0.63	3.33	< .001	0.44
Sad	6.24	14.34	0.40	2.00	< .001	0.58



participants identified with success easier than with failure (on the recall hardship, engagement and importance level, Table S2).

Participants who recalled successful goal pursuit used a greater number of words that contained positive

emotions in descriptions of events compared to participants who recalled unsuccessful goal pursuit. Additionally, participants in "successful condition" used less number of words that contained negative emotion, anger and sadness feelings than those in "unsuccessful condition" (Table S3).