Cures That (Make You) Work

How a Treatment's Social Role Affects Health-Related Behavioral Intentions

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Abstract: Successful treatment not only depends on adhering to taking medication and attending therapy but also on behavioral changes. In two experiments (total $N = 256$), we investigated the hypothesis that the perceived social role of a treatment as partner (co-producer of a health-benefits) or servant (sole provider of health benefits) could promote or prevent intentions to engage in health-related behaviors. Specifically, we used headache treatment as an everyday example and found that participants were more inclined to engage in headache-reducing behaviors when painkillers were described as partners as compared to servants. Implications of these findings for the importance of anthropomorphic social perception in the clinical application are discussed.

Keywords: social cognition, health behavior, anthropomorphism, headache

Successful treatment not only depends on taking medication or attending therapy but also on changing health-related behaviors. Indeed, conscious dieting or exercising supports clinical intervention (Walsh, 2011), and alleviates mental and medical pathologies (Pischke et al., 2010). Consequently, interest in promoting health-related behaviors is growing (e.g., Sheeran et al., 2016). Drawing from social psychology, and using headaches as an everyday example, this study extends this line of research. Specifically, we investigated in a non-clinical sample how differences in a treatment's *social* perception affect health-related behavioral intentions.

Treatments as Partners or Servants

People tend to view technological devices, natural forces, or any inanimate object that acts with apparent independence as human-like agents (Epley et al., 2007). Because of this anthropomorphism, behavioral intentions toward objects partly depend on social perception processes. For example, describing objects in terms of social roles, like friends or opponents, activates social interaction intentions, like cooperation or competition (e.g., Cesario et al., 2006). Consistent with the idea that intentions guide behavior (Sheeran et al., 2016; but cf. Sheeran & Webb, 2016), people are less likely to replace cars described as likable (Chandler & Schwarz, 2010), and more likely to gamble with slot machines described as prudent opponents (Riva et al., 2015).

Notably, Aggarwal and McGill (2012) hypothesized that people also anthropomorphize treatments in terms of social roles and that these roles affect health-related intentions.

Specifically, treatments can be perceived as *servants*, that is, sole providers of health benefits, suggesting that individuals are hardly responsible for engaging in behaviors that foster recovery. However, treatments may also be perceived as *partners*, that is, co-producers of health benefits. Thus, individuals would have to cooperate with the treatment in order to recover, for example, by engaging in alleviating behavior. This suggests that a treatment's social role could be leveraged for promoting health-related behavioral intentions.

However, despite growing clinical interest in anthropomorphism for improving computer-assisted therapy (Langer et al., 2019) and the understanding of specific etiologies (Burgess et al., 2018), empirical evidence for social role-effects on health-related intentions remains limited. Admittedly, there is initial evidence that advertising for drugs compared to health supplements, which was likened to servant and partner roles, reduces health-related intentions (Bolton et al., 2008). However, the fact that different beliefs about health-compensating effects of drugs and supplements (Rabia et al., 2006) could alternatively explain this effect is troubling for a social role-account of behavioral intentions.

In the research reported here, we, therefore, investigated if differences in describing the social role of the same treatment affected health-related intentions. Specifically, in two experiments, we described headache medication either as partner (i.e., supporting the body in recovering) or servant (i.e., relieving the body of pain) and examined these description's effects on intentions to engage in headache-reducing behavior. Managing headaches was chosen specifically as

the subject of investigation because of (a) headaches' high 12-month prevalence in non-clinical populations (> 50%; Umwelt Bundesamt, 2019), (b) their frequent treatment with prescription-free painkillers (Göbel & Frisch, 2018), although (c) their most common type, tension headache, is highly susceptible to changes in behaviors (Göbel & Frisch, 2018), and (d) the regular use of painkillers increases headache frequency and severity (Diener et al., 2018). Thus, identifying whether describing painkillers as partners, compared to servants, promotes intentions to engage in headache-reducing behaviors in a non-clinical sample is both theoretically and practically relevant.

Experiment 1

Experiment 1 investigated the effect of describing headache medication as partner or servant on intentions to engage in headache-reducing behaviors. Specifically, in an online experiment, participants rated their intentions to engage in various headache-related behaviors, such as straining (e.g., studying for a test), resting (e.g., spending the day in bed), or (long-term) prevention (e.g., future regular exercising), after envisioning having headaches, and taking a painkiller described as a partner (i.e., supporting the body in recovering) or servant (i.e., relieving the body of pain). Based on the idea that partner roles promote cooperative intentions, we hypothesized that participants in the partner condition, compared to the servant condition, would report increased intentions to engage in headache-reducing behaviors.

Moreover, because social role-effects refer to a specific aspect of anthropomorphism, we also explored whether explicitly humanizing the painkillers further amplified the predicted effect. Thus, we manipulated whether partner and servant descriptions were given in the third person (low anthropomorphizing) or as the painkiller's direct speech in the first person (high anthropomorphizing). However, given that describing painkillers *socially* already implies human-like agency, we refrained from firm predictions.

Method

Participants and Design

One-hundred eighteen participants (90 women, 27 men, 1 transgender, $M_{\text{age}} = 23.7$; age range: 17–55 years) were randomly assigned to the conditions of a 2 (role: partner vs. servant) $\times$ 2 (anthropomorphizing: low vs. high) between-participants design (for further details, see Sample Compositions in the Electronic Supplementary Material, ESM 1). University students were offered course credit as compensation.

A priori power calculations were based on medium effect sizes ($f = .25$) observed for comparable manipulations of health-related intentions (Sheeran et al., 2016), which suggested $N = 128$ for a power of .80 at $\alpha = .05$. However, because the study ran as part of a student research project, the class's schedule limited data collection to 2 weeks in June 2018, resulting in a slight under-sampling and a power of .77. All analyses were conducted after terminating data collection. The study was not preregistered. Data and materials can be accessed at <https://doi.org/10.17605/OSF.IO/MNES5>.

Materials and Procedure

The study was implemented using jsPsych (de Leeuw, 2015). Participants were recruited for a study concerned with headaches and taking painkillers from the student population by on-campus and email advertisements. Participation links were also posted in student Facebook and WhatsApp groups. Upon assessing the study's website, participants were randomly assigned to the conditions and informed about the study's goals. After providing informed consent, a brief excerpt informed about the prevalence, symptoms, causes, and treatment of tension headaches, in order to ensure that participants had similar knowledge of the cause-effect relation between behaviors and headaches. As control measures, participants also rated the frequency of experiencing headaches generally, tension and chronic headaches specifically, and their daily levels of stress. However, measures were comparable across conditions and unrelated to the central findings (see Exploratory Analysis 1 in ESM 1), and thus not reported here.

Following the introduction, participants advanced to the primary manipulation, consisting of information on how painkillers work. Each description stressed that taking painkillers restores productivity and alleviates pain. However, across low anthropomorphizing conditions, participants assigned to the partner condition read that this is because "painkillers support the body in its fight against headaches using acetylsalicylic acid, paracetamol, and caffeine," whereas participants assigned to the servant condition read that "painkillers take away your headaches" using the same substances. In comparison, for participants assigned to the high anthropomorphizing conditions, the descriptions were presented as first-person speech in a text bubble originating from a picture of a pill. To emphasize the anthropomorphized nature, each description was preceded by the line "Hi, I am your painkiller."

Following the manipulation, the dependent variables were assessed. First, in order to control for the effectiveness of the partner/servant manipulation, participants rated whether the painkiller has a supportive or curative role on four questions using a 6-point scale (ranging from 0 = *supportive* to 5 = *curing*; Cronbach's $\alpha = .83$). Second, and most importantly, participants were then asked to imagine

having headaches, taking the described painkiller, and to rate their intentions to engage in different behaviors on a continuous scale from $-100 = \text{very unlikely}$ to $+100 = \text{very likely}$. In total, 18 behaviors were presented in random order (see Table E1 in ESM 1), which were constructed to represent three categories of six headache-related behaviors such as straining (reverse-coded, e.g., studying), resting (e.g., avoiding loud places), or (long-term) prevention (e.g., future regular exercising). The overall scale had acceptable reliability, Cronbach's $\alpha = .79$, with lower reliabilities of the sub-scales, .71, .58, and .68, respectively. Concluding the experiment, we assessed participants' age, sex, and native language.

Results and Discussion

To control for the effectiveness of the partner/servant manipulation, we examined participants' averaged ratings of the supportive versus curative role of painkillers. As expected, a 2 (role: partner vs. servant) $\times 2$ (anthropomorphizing: low vs. high) between-participants analysis of variance (ANOVA) revealed that participants in the partner conditions reported lower ratings than participants in the servant conditions ($M = 1.29$, $SD = 1.18$ vs. $M = 2.22$, $SD = 1.4$), $F(1, 114) = 14.44$, $p < .001$, $\eta_p^2 = .112$. In other words, participants in the partner condition perceived painkillers as less curative and more supportive than participants in the servant condition. No other effects were significant, $F_s < 0.4$, $p_s > .53$.

Given that the partner/servant description influenced participants' perceptions as intended, we next examined effects on intentions. Specifically, ratings for straining (reverse-coded), resting, and prevention intentions were averaged and submitted to a 2 (role: partner vs. servant) $\times 2$ (anthropomorphizing: low vs. high) $\times 3$ (type of intention: straining [reverse-coded] vs. resting vs. prevention) ANOVA with intention as repeated-measures factor. This analysis revealed, first, a main effect for type of intention, $F(2, 228) = 37.86$, $p < .001$, $\eta^2 = .249$. Likely reflecting perceived effort to engage in these behaviors, pairwise comparisons showed that participants were overall more inclined to avoid strain ($M = 25.59$, $SD = 37.31$) than to rest ($M = 9.15$, $SD = 32.88$), $p < .001$, and more inclined to rest than to engage in (long-term) prevention ($M = -5.34$, $SD = 32.27$), $p < .001$. Second, and more importantly, the analysis showed an effect for the partner/servant manipulation across intention types, $F(1, 114) = 5.08$, $p = .026$, $\eta^2 = .043$. As predicted, averaged across types of intentions, participants were more inclined to engage in headache-reducing behavior in the partner as opposed to the servant condition ($M = 15.14$, $SD = 25.37$ vs. $M = 4.45$, $SD = 26.14$). This effect did not vary by type of intention, $F = 0.19$, $p = .83$, or across anthropomorphizing conditions,

$F = 1.31$, $p = .25$. No other effects were significant, $F_s < 2$, $p_s > .16$. To summarize, we found that describing painkillers as a partner as opposed to a servant promoted intentions to engage in headache-reducing behavior (see Figure 1). This effect remained unqualified by explicit anthropomorphizing, suggesting that people could anthropomorphize treatments spontaneously (but see General Discussion).

Experiment 2

Consistent with the social role hypothesis, Experiment 1 found that referring to painkillers as partners versus servants increased headache-reducing behavioral intentions. However, given that Experiment 1 was slightly underpowered, we sought to replicate this effect using another sample and to examine possible consequences for real-life behavior. Therefore, we conducted a second online experiment that measured behavioral intentions after describing a painkiller as partner or servant, which was followed by a weekly diary of headache-related behaviors and the prevalence of headaches over 4 weeks. We hypothesized that participants in the partner condition, compared to the servant condition, would report increased intentions to engage in headache-reducing behaviors, and we explored possible effects of the manipulation and the reported intentions on actual behavior. Explicit anthropomorphizing was not further manipulated, as it was previously not found to qualify the predicted effect.

Method

Participants and Design

One-hundred thirty-eight participants (109 women, 29 men, $M_{\text{age}} = 24.27$; age range: 17–55 years) were randomly assigned to the conditions of a 1×2 (role: partner vs. servant) between-participants design (for further details and exclusions, see Sample Compositions in ESM 1). As many participants as possible were recruited during 4 weeks in January and February 2019, and follow-up data collection lasted until early March 2019. The collected sample had a power of .83 to detect a medium-sized effect on intentions (Sheeran et al., 2016) at $\alpha = .05$. The study was not pre-registered. Data and materials can be accessed at <https://doi.org/10.17605/OSF.IO/MNES5>.

Materials and Procedure

The materials and procedure remained largely identical to Experiment 1, with the following exceptions. First, because we noticed a high prevalence of individuals suffering from

Figure 1. Mean ratings of behavioral intentions obtained in Experiment 1 as a function of role of painkiller and type of intention. Error bars represent standard error of the mean.

migraines in Experiment 1 (12.7%), we created a second excerpt that informed about the prevalence, symptoms, causes, and behavioral treatment of migraines. Thus, individuals indicating that they suffered from migraines (23.2%, $n_s = 17$ and 15, for the partner and servant conditions, respectively) were displayed more useful information about migraines instead of tension headaches (migraine status did not qualify the reported results, see Exploratory Analysis 2 in ESM 1). Second, we only manipulated the description of the painkiller as partner or servant, without further manipulating explicit anthropomorphizing. Third, we adjusted the wording of 6 of the 18 items used to measure behavioral intentions (see Table E1 in ESM 1) in order to improve the reliabilities of the straining, resting, and prevention subscales (Cronbach's $\alpha = .63, .78$, and $.73$, respectively; $.84$ overall). Fourth, and finally, participants were asked to indicate once a week in an online diary over a period of 4 weeks how often they suffered from headaches on a 5-point scale (*none, on 1–2 days, on 3–4 days, on 5–6 days, on 7 days*, ranging from 0 to 4), how many and which painkillers they used on what occasion (open-ended questions), and on how many days of the week (from 0 to 7) they engaged in activities known to reduce the frequency of headaches (i.e., “endurance sports,” “relaxation exercises,”

“eating and drinking without agitation,” “sufficient sleep,” “sufficient drinking,” and “rests during the day”; Göbel & Frisch, 2018).

Results and Discussion

We first examined the effect of the partner/servant manipulation on participants' averaged ratings of the supportive versus curative role of painkillers. As expected, a 1×2 (role: partner vs. servant) between-participants ANOVA revealed that participants in the partner condition perceived painkillers as less curative (and thus more supportive) than participants in the servant condition ($M = 1.42$, $SD = 1.02$ vs. $M = 1.83$, $SD = 1.12$), $F(1, 136) = 4.80$, $p = .03$, $\eta_p^2 = .034$. Next, we examined the effects on behavioral intentions.

A 2 (description of painkiller: partner vs. servant) $\times$ 3 (type of intention: straining [reverse coded] vs. resting vs. prevention) mixed-measures ANOVA of the averaged intention ratings revealed again a main effect for type of intention, $F(2, 272) = 39.85$, $p < .001$, $\eta^2 = .227$. Participants were overall more inclined to avoid strain ($M = 28.33$, $SD = 30.37$) than to rest ($M = 14.61$, $SD = 37.42$), $p < .001$, and more inclined to rest than to engage in long-term prevention ($M = 2.15$, $SD = 33.61$), $p < .001$. Descriptively, participants were also more

Figure 2. Mean ratings of behavioral intentions obtained in Experiment 2 as a function of role of painkiller and type of intention. Error bars represent standard error of the mean.

inclined to engage in headache-reducing behavior in the partner as opposed to the servant condition ($M = 19.26$, $SD = 24.99$ vs. $M = 10.92$, $SD = 29.01$), but the effect did not reach significance, $F(1, 136) = 3.26$, $p = .07$, $\eta^2 = .023$. However, a significant two-way interaction suggested that the effect of partner/servant was qualified by type of intention, $F(2, 272) = 3.08$, $p = .04$, $\eta^2 = .022$. Specifically, pairwise comparisons showed that participants in the partner condition were more inclined to avoid strain and to rest than participants in the servant condition ($M = 33.84$, $SD = 30.60$ vs. $M = 22.97$, $SD = 29.39$, $p = .04$, and $M = 21.74$, $SD = 36.81$ vs. $M = 7.68$, $SD = 36.97$, $p = .03$, respectively), whereas preventive intentions did not differ ($M = 2.20$, $SD = 32.50$ vs. $M = 2.10$, $SD = 34.90$), $p = .99$. Thus, Experiment 2 provided further evidence that describing a painkiller as a partner increased intentions to engage in headache-reducing behavior, although only partially replicating the previous findings (see Figure 2).

Diary Exploration

Ninety-three participants ($n_{\text{partner}} = 48$, $n_{\text{servant}} = 45$) completed the diary at least once ($M_{\text{of weeks}} = 3.35$, $SD = 1.07$). Diary participation and the number of entries (see

Table E2 in ESM 1) were independent of partner/servant conditions, $\chi^2(1) = 0.62$, $p = .43$ and $t(91) = -0.39$, $p = .69$, respectively. On average, participants suffered from headaches 0.85 ($SD = 0.59$) times per week, took 0.44 ($SD = 1.07$) painkillers, and engaged on 3.47 ($SD = 0.87$) days in headache-reducing activities. Descriptively, participants in the servant condition suffered from fewer headaches ($M_{\text{partner}} = 0.77$, $SD = 0.53$ vs. $M_{\text{servant}} = 0.93$, $SD = 0.63$), engaged more often in headache-reducing activities ($M_{\text{partner}} = 3.56$, $SD = 0.95$ vs. $M_{\text{servant}} = 3.37$, $SD = 0.77$), and took more painkillers ($M_{\text{partner}} = 0.48$, $SD = 1.37$ vs. $M_{\text{servant}} = 0.39$, $SD = 0.63$). However, according to a one-way multivariate analysis of variance (MANOVA), these differences were not significant, $F(3, 85) = 1.14$, $p = .34$, Wilk's $\Lambda = 0.96$.

In addition to exploring group differences, we further investigated variable correlations. An average across behavioral intention subscales correlated positively with the frequency of engaging in headache-reducing behaviors, $r = .23$, $p = .03$, which in turn was associated with a decrease in the frequency of headaches, $r = -.27$, $p = .01$. Unsurprisingly, the frequency of headaches was associated with taking more painkillers, $r = .25$, $p = .02$. No other correlations were significant, all $|r| < .15$, all $ps > .17$. Thus, although the current study showed no evidence for a direct

effect of the partner/servant description on participants' behaviors, the correlational patterns corroborate the importance of intentions for predicting behavior, and of health-related behavior for reducing headaches.

General Discussion

As interest in promoting health-related behaviors is growing, this study investigated whether a treatment's social role could be leveraged for promoting behavioral intentions. Using headache management as an everyday example, two online experiments found that participants were more inclined to engage in headache-reducing behaviors when painkillers were described as partners, connoting that recovering requires cooperation, as compared to servants, connoting that painkillers are the sole provider of the health benefit. To the best of our knowledge, these findings represent the first evidence for a small and simple difference in describing the social role of a treatment affecting specific health-related intentions.

That subtle differences in describing a treatment *socially* had a measurable effect on specific health-related intentions appears noteworthy for at least two reasons. First, the findings corroborate that health-related behaviors not only follow from rational appraisal processes, but also an interplay of subjective beliefs (Rabia et al., 2006) and goal activation (Inauen et al., 2018). Adding to this line of research, our findings suggest these processes could be further situationally constrained and may depend on (modifiable) anthropomorphized cause-effect relations. Second, and relatedly, these situational constraints also suggest that social psychological theorizing on the determinants of anthropomorphic social perception could be leveraged for clinical application (Epley et al., 2007). For example, metaphors and figures of speech may be used to increase the accessibility and applicability of anthropomorphic knowledge towards specific aspects of treatment or disorder in a way that would promote treatment-supportive behaviors. Indeed, as mental health professionals are keenly aware of the therapeutic importance of relationships (Lambert & Barley, 2001), extending this social concept toward inanimate treatment aspects shows a promising avenue for integrating clinical and social psychological research.

Limitations and Conclusion

Of course, interpreting our findings in terms of social role-effects on health-related intentions is subject to limitations. First, future research will need to establish whether and under what conditions the effect generalizes to different (non-pharmacological) aspects of treatments, clinical popu-

lations, and more general health-related behavioral intentions. For example, as anthropomorphism is also involved in specific disorders (Burgess et al., 2018), social role-effects may be of limited utility in specific populations. Similarly, Experiment 2 found no evidence for social role-effects on preventive intentions, which arguably are most relevant and difficult to change. Although it cannot be excluded that the absence of effects relates to idiosyncrasies of our design (i.e., prevention questions may not have fit well with the headache scenario), the pattern could also hint at boundary conditions for the transfer of intentions from one domain to another (Inauen et al., 2018).

Second, future research will need to further establish the processes underlying the observed effect. Although our findings are consistent with a social role-account of behavioral intentions, the fact that explicit anthropomorphizing did not further amplify this effect requires further investigation. For example, its absence could suggest that people anthropomorphize treatments spontaneously (Aggarwal & McGill, 2012), but it could also suggest that the partner/servant-manipulation affected intentions via beliefs about the effectiveness of taking painkillers and/or their compensatory power for health-related behavior (Rabia et al., 2006).

Third, and most importantly, future research will also need to establish social role-effects on actual behaviors and treatment outcomes. Although in hindsight, it may have been simply too optimistic to expect effects on behavior of reading a single description over 4 weeks, intentions are well-known not to be sufficient for predicting behavior (Sheeran & Webb, 2016). Thus, it appears necessary to further specify conditions that promote or prevent social-role effects on actual health-related behavior, especially when seeking to leverage social role-effects for clinical application.

These limitations notwithstanding, however, our study links social and clinical psychology in two important ways. First, it highlights the utility of social psychology, which often focuses on the micro-processes of experiences and behavior, for clinical theorizing. And second, it suggests that behavioral and mental health issues should not be neglected as an area of social psychological investigation, as difficulties and opportunities for combating mental and medical pathologies appear closely intertwined with the fundamentals of social-cognitive functioning.

Electronic Supplementary Material

The electronic supplementary material is available with the online version of the article at <https://doi.org/10.1027/2151-2604/a000449>

ESM 1. Sample compositions and supplementary analyses. Table E1: Original items for the behavioral intention scales

used in Experiments 1 and 2. Table E2: Diary entries as a function of social role and migraine conditions in Experiment 2.

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Authorship

Jana S. Aengenheister and Renée Urban contributed equally to the article and share the first authorship. Georg Halbeisen supervised the study and provided critical revisions.

Open Data

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