ARTICLE

Is the warm glow actually warm? An experimental investigation into the nature and determinants of warm glow feelings

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Abstract: Giving money to others feels good. It is now standard to use the label 'warm glow feelings' to refer to the pleasure people take from giving. But what exactly are warm glow feelings? And why do people experience them? To answer these questions, we ran two studies: a recall task in which participants were asked to remember a donation they made, and a donation task in which participants were given the opportunity to make a donation before reporting their affective states. Correlational and experimental results converge towards the conclusion that, if the nature of the warm glow is straightforward, its source is multifaceted. Regarding the nature of the 'warm glow', the pleasure people took in giving was mainly predicted by one particular type of positive emotion and was indeed described by participants as 'warm'. Regarding the underlying psychological mechanisms, warm glow feelings were elicited by positive appraisals regarding the donor's moral character, positive appraisals regarding the actual impact of the donor's donation on the welfare of others and a feeling of communion with others. We discuss the theoretical implications of our findings.

Keywords: Warm glow; Charity; Donation; Giving; Prosocial spending; Emotions

1. Introduction

Toby Ord is an Australian philosopher who chose to give away everything he earns above £18,000, amounting to a total of £1 million over his lifetime. When interviewed about his decision, Ord answered: "I've made some simple material sacrifices but sufficiently small that I don't really care about them. In terms of emotional comfort, you feel more satisfied with what you're doing with your life."[1] As a matter of fact, Ord is not alone in reporting a feeling of satisfaction after giving: givers of all kinds readily acknowledge the joy they derive from being generous. In fact, numerous empirical works have investigated the multiple links between giving and happiness. Spending money on others, these studies show, leads to higher levels of happiness than spending money on oneself (see Aknin et al., 2013a; Aknin et al., 2013b; Borgonovi, 2008; Dunn, Aknin, & Norton, 2008). This suggests that giving does not only benefit recipients but also donors, at least under the form of a certain emotional satisfaction.

In economics, it has become standard to refer to the internal or emotional reward that prosocial behavior may elicit as a 'warm glow' (Andreoni, 1990, 1998, 2006; Harbaugh, 1998; Harbaugh et al., 2007). However, while 'warm glow' feelings have been used to explain a wide

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[1] Toby Ord, interview with BBC News, December, 13th, 2010, "Why I'm giving £1m to charity", BBC News Magazine, accessed on July, 5th, 2023, from the website https://www.bbc.com/news/magazine-11950843.

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array of phenomena, not much is known about their nature. As such, the current paper focuses on the nature and determinants of 'warm glow' feelings. More precisely, it aims to answer two questions: (1) what kind of affective states are warm glow feelings? And (2) what leads people to experience them? Additionally, we investigate a third, closely related question: (3) do warm glow feelings predict donation behavior?

To this aim, we ran two studies: one in which we asked participants to remember a time when they made a donation, and one in which participants were given the opportunity to make a donation. In both studies, we asked participants to report which emotions and bodily reactions they experienced, as well as their cognitive appraisals of the donation situation, and we tried to assess which ones best predicted the pleasure participants drew from their donation.

Our investigation focuses on warm glow feelings that arise in connection with donation behavior. Indeed, although 'warm glow' feelings have been used to explain phenomena that go beyond monetary donation,[2] they have mainly been discussed in this latter context. The expression 'warm glow feelings' was coined by economist James Andreoni (1989, 1990) to explain why people make apparently altruistic donations to privately provided public goods, such as charities. Andreoni's claim is that such donations do not necessarily reflect 'purely altruistic' motivations, but should rather be explained as reflecting a sort of 'impure altruism', in which people engage in seemingly altruistic behavior because they expect to gain personal utility from the act of giving (see Tieffenbach, 2021 for a discussion). Among the personal motives that might motivate people to give, Andreoni lists "social pressure, guilt, sympathy, or simply a desire for a *warm glow*" (Andreoni, 1990: 64). In another paper, Andreoni (1989) merely specifies the 'warm glow' as a "positive feeling" (Andreoni, 2006) that people 'experience' for 'having done their bit' (1989: 1448), without further elaboration.

Andreoni's hypothesis can be separated in two claims: (i) that people derive pleasure from the act of giving, and (ii) that the reason people make apparently altruistic donations is that they expect to derive such pleasure from their action. In this paper, we focus on the first claim. Although Andreoni originally put forward this hypothesis purely on economic bases, this claim can also be seen as a claim about human psychology. Fortunately, since Andreoni first formulated this hypothesis, a wealth of research in psychology and neuroscience has documented the fact that people do take pleasure from giving to others. Studies have found significant correlations between self-reported happiness or subjective well-being and prosocial spending in most countries (Aknin et al., 2013a; 2013b; 2018; Dunn et al., 2008; 2011; 2014), while fMRI studies have shown that participants who give money report experiencing pleasure and that their self-report is confirmed by the activation of brain areas related to reward and pleasure (Harbaugh et al., 2007; Park et al., 2017; see Aknin et al., 2020 for a summary).

However, although the fact that people do derive pleasure or 'happiness' from their generous behavior appears beyond question in the light of empirical evidence (see Andreoni, 2006; McAskill et al., 2018), the nature of this pleasure, that is the kind of affective phenomenon it consists in, remains a largely unexplored question. The 'warm glow' has been characterized in a very general way as "an hedonistic feeling—a good feeling or positive emotion" (Aknin et al., 2018: 55-57; Aknin et al., 2020: 2, Lichtenberg, 2014: 216), "the joy from giving" (Ribar et al., 2002:

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[2] While the warm glow was initially tailored for explaining why people give, it has been taken to be the solution to many other puzzling cooperative behaviors. The warm glow has been invoked to explain, for example, why people vote in spite of their contributions not being pivotal (Baros 2017), why they make costly pro-environmental choices (Menges et al., 2005; Steg, 2014; 2016; Tau, 2015; Taufik et al. 2015; Tutic & Liebe, 2018; van der Linden 2015), or why they inflict "altruistic punishments" in trust games (DeQuervain et al., 2004). In each case, the assumption has been that the choice to cooperate is valued intrinsically, and not just valued for the consequence it brings about.

429), "an emotional benefit or reward" (Aknin et al., 2013a: 636-40; Aknin et al., 2013b: 90; Dunn et al., 2014: 43) or "a purely internal satisfaction that comes from the act of giving" (Harbaugh, 1998: 272).

As one can see, such descriptions are not very informative about the kinds of emotional states experienced by those engaged in prosocial behavior; the warm glow is only defined in terms of its valence (positive) and its source (prosocial behavior). This is because the concept works merely as a placeholder (Andreoni et al., 2016)—that is: a functional term, used to describe any psychological or emotional state that may figure in an explanation of why donors give. However, it remains to be determined for which types of affective states the concept of warm glow can serve as a placeholder, that is what are the actual emotions and affective states prosocial behavior may elicit.

This lack of interest for the nature of the feelings and emotions constituting the 'warm glow' might be explained by the fact that the term was first coined and discussed in the context of economics, in which affective states (e.g. feelings, emotions, etc.) are relevant to choices as mere psychic costs or benefits (Rick & Loewenstein, 2008). However, it might also be explained by the fact that, at the time the term was coined, the scientific literature on positive emotions was very limited (Fredrickson, 1998): Ekman's first list of basic emotions only contained one positive emotion, "happiness" (Ekman et al., 1972; Ekman, 1992). However, in the past twenty years, the development of positive psychology led researchers to pay more attention to positive emotions, leading to a more fine-grained classification of positive affects (e.g. Weidman and Tracy, 2020).

In the context of this growing literature on positive emotions, it is reasonable to ask what kinds of positive emotions characterize feelings of warm glow. Though it is unlikely that feelings of 'warm glow' can be identified with one and only one particular positive emotion, it is reasonable to expect that certain families of positive emotions will be more characteristic of the experience of warm glow feelings than others. In a recent paper, Abatista and Cova (2023) used Principal Component Analysis to identify three main categories of positive emotions: hedonic states, social states, and epistemic states. Hedonic states (e.g. joy, happiness, contentment, pride) regroup positive emotions that are primarily concerned with one's well-being and elicited by the fact that one's goals are met. Social states (e.g. being moved, being touched, compassion, love, tenderness) regroup positive emotions that are concerned with the welfare of others, and motivate us to take care of them. Epistemic states (e.g. awe, curiosity, interest, wonder) regroup positive emotions that are elicited by novel and interesting objects. Accordingly, our primary goal was to investigate which of these families of positive emotions were more characteristic of 'warm glow feelings'. Doing so will help to provide a better understanding of the nature and determinants of these affective states, by connecting the literature on the 'warm glow' to the already vast psychological and neuroscientific literature on the nature and determinants of the various positive emotions.

Given that feelings of 'warm glow' have mainly been characterized in terms of pleasure and satisfaction, it would make sense to think that they fall mainly in the first category, hedonic states. However, social states (such as being moved, compassion, and elevation) have been found to motivate prosocial behaviors (Schnall, Roper & Fessler, 2010; Sparks et al., 2019). Moreover, they have often been described as involving a 'warm feeling in the heart' or 'a warm feeling in the chest', and their measurement often includes items referring to warm feelings (Algoe & Haidt, 2009; Cova & Boudesseul, 2023; Schnall, Roper & Fessler, 2010; Zickfeld et al., 2019). Thus, it might be that feelings of 'warm glow' fall into the social rather than in the hedonic category.

Secondly, we were also interested in what causes warm glow feelings, that is: why do people experience them? Indeed, the characterizations of warm glow feelings found throughout the

literature generally stipulates that they derive from the act of giving. This raises the following question: from which particular aspects of the act of giving does the warm glow stem from? As philosophical (Deonna & Teroni, 2012) and appraisal theories of emotions (Moors et al., 2013) emphasize, actions do not directly elicit emotions – rather, they do so via a certain interpretation (or 'appraisal') of the situation in which they are performed. For example: I am afraid of a dog to the extent that I perceive him as a threat, and another person faced with the same dog might not experience fear at all, if she knows that this dog in particular is a very nice dog. Thus, if the act of giving elicits positive emotions, it does so through a certain interpretation. But which interpretation is it?

There is no consensus on this point in the warm glow literature. On the one hand, some have emphasized an agent-centered perspective: donations elicit positive reactions because they allow agents to see themselves in a positive light, as virtuous or altruistic (Tonin & Vlassopoulos, 2013, 2014; Taufik et al., 2015). Thus, giving would elicit pleasure by enhancing the givers' self-esteem. On the other hand, an outcome-centered perspective would emphasize appraisals about the effect of giving on their beneficiaries. What elicits pleasure would then be the thought that one helped someone or contributed to make the world a better place (Fuhrer & Cova, 2023). The contrast between an agent-centered and an outcome-centered perspective has been shown to be crucial for other emotions. For example, on an influential account of guilt and shame, guilt is outcome-centered ("what I have done?") while shame is agent-centered ("what kind of person am I?") (Tangney, 1995).

Thirdly, we sought to investigate which emotions predicted participants' donation behavior. Indeed, as we mentioned earlier, economists who introduced the label 'warm glow' to describe the positive emotional experience triggered by donation behavior also made the hypothesis that people gave *because* they found this emotional experience desirable. This hypothesis can be summarized in the following ways: the emotions that constitute the pleasure of giving are the same ones that motivate people to give. We sought to verify this hypothesis and to investigate whether the emotions that predict the pleasure participants take in giving are also the same that predict the likelihood that they engage in donation behavior.

2. Study 1

In Study 1, we used a recall task to explore which emotions predict the pleasure people had when giving money to help someone else.

2.1 Materials and procedure

The study took the form of an online survey.

2.1.1 Participants

We aimed for a total of 250 participants, as it has been suggested that correlations stabilize towards N = 250 (Schönbrodt & Perugini, 2013). Foreseeing for exclusions, we aimed for a total of 300 participants. 298 US residents recruited on Prolific Academic and paid £2.00 for their participation completed our survey. 31 participants were excluded for providing lazy or irrelevant answers to the open-ended questions or for failing at least one of the two attention checks, leaving us with 261 participants (150 women, 106 men, 5 'other'; M_{age} = 34.14, SD_{age} = 13.60).

2.1.2 Recall task

Participants were first asked to remember a moment in their life when they made a donation:

> Please, take a few minutes and try to remember an episode of your life when you acted generously and made a donation to help someone you did not know or had very little chance to get to know.
>
> This includes the following situations:
>
> *A time when you gave money to a charity, a non-profit organization, a non-profit association, or a private or public institution (it comprehends donations to websites, YouTube channels, online funds, etc.). For instance, religious foundations, NGO, wildlife parks or funds, a monument or public institution such as an opera, a theater, or else an association for animals' protection, or that militates for certain rights, etc.
>
> *A time when you gave money to people who were not friends or part of families (for example, someone asking for money in the street).

Participants were then asked to describe in detail the episode they remembered:

> Take a few minutes to remember a particular time in your life when you acted in the above described way. Then describe in a few lines the situation you just remembered.
>
> Please describe only ONE situation. Possible situations include the following situations:
>
> *A time when you gave money to a charity, a non-profit organization, a non-profit association, or a private or public institution (it comprehends donations to websites, YouTube channels, online funds, etc.). For instance, religious foundations, NGO, wildlife parks or funds, a monument or public institution such as an opera, a theater, or else an association for animals' protection, or that militates for certain rights, etc.
>
> *A time when you gave money to people who were not friends or part of families (for example, someone asking for money in the street).

2.1.3 Categorization

Participants were then asked to indicate in which of the following categories their donation fell:
   o Gift to someone asking you for money
   o Gift to a charity/non-profit organization/non-profit association
   o Gift to a public or private institution (university, monument, school, church, mosque, etc.)
   o Gift to a website (or a YouTube channel)
   o Gift to an online fund (someone requesting help personally online through a fund)
   o Others:

2.1.4 Time

Participants were asked to indicate when the episode they described took place:

   o During the last 12 months
   o From one to 3 years ago
   o From 3 to 5 years ago
   o Between 5 and 10 years ago
   o More than 10 years ago

2.1.5 Open-ended questions

Participants were presented with two open-ended questions, asking them (i) to describe in a few lines the feelings and emotions they experienced directly after making their donation, and (ii) to enter five words describing the emotions they experienced directly after making their donation. Results are described in Supplementary Materials.

2.1.6 Positive affects

Participants were asked to indicate how pleasant was their state-of-mind after their donation (on a scale from -3="Very unpleasant" to 3="Very pleasant") and to which extent they felt gratified (on a scale from 0="It did not bring me any feelings of gratification" to 6 = "I felt an immediate and strong gratification").

2.1.7 Emotions

Participants were presented with 39 emotion labels and asked to indicate to which extent they felt each of them immediately after their donation (on a scale from 0="Not at all" to 6="Very strongly"). To compose this list, we drew on the list of positive emotions labels composed by Abatista and Cova (2023) through a survey of the positive emotions literature (Compassion, Contentment, Excitement, Exhilaration, Enthusiasm, Fascination, Feelings of elevation, Feelings of awe, Grateful, Guilt, Happiness, Inspiration, Joy, Love, Moved, Pride, Relief, Sadness, Tenderness, Thankful, Thrilled, Touched, Uplifted, and Curious). Because Abatista and Cova also added some negative emotion labels to add some variety, we also used a subset of their negative emotion labels (Anxiety, Contempt, Embarrassed, Fear, Feelings of injustice, Guilt, Hate, Indignation, Sadness). To this already existing list, we added several items that corresponded to different ways of describing or conceptualizing the feeling of "warm glow" we found throughout the literature or testimonies from philanthropists (Serenity, Lucky, Sympathy, Feeling of inner satisfaction, Self-esteem boost, Alleviation from guilt, Warm glow, and Comfort).

2.1.8 Physiological responses

Participants were presented with 19 physiological responses and asked to indicate to which extent they experienced each of them (on a scale from 0="Not at all" to 6="Very strongly"). The physiological responses were drawn from the list composed by Abatista and Cova (2023). The full list of items can be found in Supplementary Materials.

2.1.9 Cognitive appraisals

Participants were presented with 33 cognitive appraisals and asked tindicate whether they experienced the corresponding feeling or had the corresponding thoughts in the remembered situation (on a scale from 0="Not at all" to 6="Very strongly"). Appraisals were either (i) selected from previous research on positive emotions (Abatista & Cova, 2023), or (ii) created to mirror theories about the source of the warm glow feeling (e.g. "I felt like I helped someone in need").

2.1.10 Self-appraisals

Participants were presented with 25 items describing how they felt about themselves (e.g. "I felt admirable"), and asked to indicate to which they described how they felt about themselves immediately after their donation (on a scale from 0="Not at all" to 6="Completely").

2.1.11 Moral appraisals

Participants were asked a series of questions about their moral perception of their own behavior (on a scale from 0 = "Not at all" to 6 "Very strongly", unless specified otherwise):

- o Do you think what you did is something worthy of praise?
- o Do you think of your act as a duty?
- o Do you think telling others what you did could inspire them to do something similar?
- o Does thinking about your generous action make you proud of yourself?
- o Do you think of your action as morally good? (0 = "Not at all" to 6 = "Totally")
- o Do you think what you did is something worthy of merit?
- o Reflecting on what you did, how would you assess the impact of your donation on the person(s) you helped, or regarding the cause you helped? (0 = "Unfortunately, it had no impact at all" to 6 = "It really made a difference")

2.1.12 Appraisals about outcome

Participants were presented with 8 statements about the outcome of their donation (e.g. "It was efficient") and asked to indicate to which extent each statement applied to their case (on a scale from 0 = "Not at all" to 6 = "Totally"). The full list of items can be found in Supplementary Materials.

2.1.13 Later behavior

Participants were asked: "since you made the donation you remembered, did you make a lot of donations of the same kind?" and had to answer by selecting one of the following options:
- o No, never, and I don't intend to do it again.
- o No, never, though I intend to do it at some time.
- o Yes, once or twice.
- o Yes, regularly.

2.1.14 Anonymity

Participants were asked whether the recipient of their donation knew that they were the donator (YES/NO) and whether, apart from them, someone else knew that they made this donation (YES/NO).

2.1.15 Expectations about others' judgments

Participants were asked to imagine that other people learned about their decision, and were presented with 13 items describing what others might think about them (e.g. "They would think I am a good person", "They would think I just want to show off"). For each item, they were asked to indicate whether they thought others would think of their decision in this way (on a scale from 0="Not at all" to 6="Very strongly"). The full list of items can be found in Supplementary Materials.

2.1.16 3PMS

Participants were asked to fill the Pleasure and Pressure-based Prosocial Motivation Scale (Gebauer et al., 2007). The scale included two attention checks ("I am a human being" and "I can shoot lasers with my eyes").

2.1.17 Demographic information

Participants were asked to indicate their age, gender, nationality, education level, profession, religious orientation, and political orientation.

2.2 Results

2.2.1 Types of donations

Based on participants' own categorization of their donation, 98 gave to charity/non-profit organizations, 94 gave to people asking them for money, 18 gave to online funds, 15 gave to public or private institutions, 5 gave to a website, and 31 answered 'other'. Because participants' interpretation of the donation categories did not always fit our own interpretation, the first author on this manuscript manually coded the content of people's descriptions of their donation as participants' open-ended description of their donation did not always match the type of donation they had indicated. He classified donations in seven categories: direct donations to people (120), donations to charities (90), online donations to people (20), donations to institutions (13), donations to websites (5), fundraising (1), and descriptions involving multiple types of donations (12). The description of each category and of the full coding procedure can be found in Supplementary Materials.

2.2.2 Time of donation

120 participants answered that the episode they remembered took place "in the last 12 months", 80 "from one to three years ago", 27 "from three to five years ago", 21 "between five and ten years ago", and 13 "more than ten years ago".

2.2.3 Positive affects

Overall, participants rated their affective state after the donation as rather pleasant ($M = 1.90$, $SD = 1.25$) and gratifying ($M = 3.82$, $SD = 1.20$). To the pleasantness question, 88.5% gave an answer above the midpoint. This confirms the idea that most people experience a pleasant feeling after giving. Ratings of pleasantness and gratification were highly correlated ($r = .68$, $p < .001$) so we averaged them in a single 'positive affects' score ($M = 2.86$, $SD = 1.12$).

2.2.4 (Q1a) What kinds of bodily feelings characterize the warm glow?

We ran an exploratory factor analysis with Promax rotation on the 19 physiological responses. Observation of the Scree plot, Parallel analysis, Optimal and observation of Eigenvalues converged on a three-factor structure. However, all items loading on the third factor also loaded more strongly on at least one other factor. We thus chose a two-factor structure. For each factor, we excluded items with loadings equal or inferior to 0.3, or that loaded to comparable extent on different factors at the same time. We ended up with two factors: *cold and tearful responses* (Lump in the throat, Choked up, Muscles tensed, Increased heart rate, Moist eyes, Swollen chest, Chills, Gasping, Goosebumps, Cold and Blushing; $\alpha = .89$) and *warm and energetic responses* (Warm feelings in the body, Warm feelings in the chest, Warm feelings in the heart, Smiling, Feeling refreshed, Feeling energetic, Muscles relaxed and Laughing; $\alpha = .91$) (see Supplementary Materials for details on all factor analyses). For each factor, we computed an aggregate score by averaging participants' answers to all items. As shown in Table 1, participants reported more warm responses than cold responses, and positive affects were significantly correlated to warm responses but not to cold ones (see Table 1).

2.2.5 (Q1b) What kinds of emotional states characterize the warm glow?

We ran an exploratory factor analysis with Promax rotation on the 39 emotion labels. Observation of the Scree plot, Parallel analysis, and Optimal coordinates suggested four factors, while observation of Eigenvalues suggested six factors. However, on a six-factor analysis, the sixth factor did not make any theoretical sense, and the fifth was limited to three items. On the contrary, the factors captured by the four-factors analysis were coherent with previous studies (Abatista & Cova, 2023). We then opted for the four-factor structure: in line with Abatista and Cova's taxonomy of positive emotions, the first factor captured *hedonic* states (Comfort, Contentment, Enthusiasm, Elevation, Happines, Joy, Pride, Relief, Uplifted, Serenity, Satisfaction, Self-esteem boost, Warm Glow; α = .95), the second captured *social* states (Compassion, Grateful, Lucky, Moved, Sympathy, Tenderness, Thankful, Touched; α = .89), the third captured *epistemic* states (Awe, Exhilaration, Fascination, Thrilled; α = .86), and the fourth captured a mixture of *negative* states (Anxiety, Embarrassed, Fear, Guilt, Hate, Injustice, Sadness; α = .80). For each factor, we excluded items with loadings equal or inferior to 0.3, or that loaded to comparable extent on different factors at the same time.

For each emotion category, we computed an aggregate score. Means and standard deviations can be found in Table 1. As can be seen, social states were the highest, followed by hedonic states.

Table 1. Mean and standard deviations for bodily feelings (*Cold, Warm*), affective states (HEDONIC, SOCIAL, EPISTEMIC, NEGATIVE) and cognitive appraisals (Oneness, Agent, Action, Negative). Rightmost columns indicate Pearson correlations (*r*) between each category and pleasure and gratification scores.

	M (SD)	*r* with Pleasantness	*r* with Gratification
(a) Bodily Feelings:			
Cold	0.98 (1.05)	.05	.10
Warm	2.44 (1.51)	.57***	.51***
(b) Emotional States:			
HEDONIC	3.39 (1.52)	.71***	.70***
SOCIAL	3.88 (1.40)	.49***	.49***
EPISTEMIC	2.17 (1.64)	.49***	.48***
NEGATIVE	0.98 (1.02)	-.41***	-.32***
(c) Cognitive Appraisals:			
Oneness	3.03 (1.63)	.49***	.52***
Agent	2.74 (1.44)	.53***	.53***
Outcome	4.43 (1.33)	.58***	.62***
Negative	1.73 (1.14)	.12	.05

Note. * = *p* < 0.05, ** = *p* < 0.01, *** = *p* < 0.001.

To determine which affects predicted participants' pleasure to give, we ran a multiple regression analysis with the composite positive affects scores as dependent variable and our three categories of positive affective states (HEDONIC, SOCIAL, and EPISTEMIC) as predictors. We did not include NEGATIVE feelings, because there was no good theoretical reason to think that the warm glow might be a negative emotion. The results are presented in Table 2. As one can see, HEDONIC states were the main predictors of the pleasure participants experienced after giving.

Table 2. Results of three multiple regression analysis with positive affects as dependent variable and (a) bodily feelings (*Cold*, *Warm*), (b) positive emotion categories (HEDONIC, SOCIAL, EPISTEMIC) as predictors and (c) cognitive appraisals categories (Oneness, Agent-centered, Outcome-centered and Negative) as predictors (Study 1).

	r	B	β	SE	t	p
(a) With bodily feelings as predictors ($R^2 = 0.60$):						
(Intercept)	-	1.83	-	0.10	17.56	< .001***
Cold	.08	-0.26	-0.24	0.06	-4.47	< .001***
Warm	.59***	0.52	0.70	0.04	12.98	< .001***
(b) With positive emotion categories as predictors ($R^2 = 0.60$):						
(Intercept)	-	0.85	-	0.16	5.40	< .001***
HEDONIC	.77***	0.59	0.84	0.06	10.52	< .001***
SOCIAL	.56***	0.07	0.09	0.05	1.38	0.169
EPISTEMIC	.53***	-0.11	-0.17	0.05	-2.31	0.006**
(c) With cognitive appraisals categories as predictors ($R^2 = 0.48$):						
(Intercept)	-	0.65	-	0.19	3.44	< .001***
Oneness	.55***	0.05	0.08	0.06	0.97	0.34
Outcome	.64***	0.42	0.50	0.06	6.83	< .001***
Agent	.59***	0.17	0.22	0.06	3.01	.003**
Negative	.09	-0.18	-0.18	0.05	-3.69	< .001***

*Note. * = p < 0.05, ** = p < 0.01, *** = p < 0.001.*

2.2.6 (Q2) What kinds of cognitive appraisals predict the warm glow?

We ran an exploratory factor analysis with Promax rotation on the cognitive appraisals, self-appraisals, moral appraisals and appraisals about outcome (for a total of 73 items). Observation of the Scree plot, Parallel analysis, and Optimal coordinates suggested four factors, while observation of Eigenvalues suggested ten factors (which we considered too much for our purpose). A second exploratory factor analysis showed that the same four-factor structure could

be obtained by focusing only on cognitive and self-appraisals. Thus, to make our categories shorter and more convenient to use in further studies, we used only items from these two sets of questions. For each factor, we excluded items with loadings equal or inferior to 0.3, or that loaded to comparable extent on different factors at the same time. We also excluded some items on a conceptual basis (because they did not seem to measure the same construct as others in the same category). Sample items for the different cognitive appraisals categories can be found in Table 3.

Table 3. Sample items for the four categories of cognitive appraisals identified in Study 1.

Factor 1 Oneness (α = .96)	Factor 2 Agent-centered appraisals (α = .95)	Factor 3 Outcome-centered appraisals (α = 94)	Factor 4 Negative appraisals (α = .64)
*I felt like I was part of something bigger than myself *I felt a sense of oneness with others *I felt a close bond with others	*I felt like I was a better person *I felt like it made me a better person *I was proud of me for doing this	*I felt like what I did mattered *I felt like I was making a difference *I felt useful	*I felt like my life was meaningless *I felt my sense of self become somehow smaller *I felt useless

One factor (Oneness) captured the feeling of belonging to a greater whole that is characteristic of certain positive emotions such as being moved and elevation. The second factor (Agent) captures participants' positive evaluations of themselves as agents. By contrast, the third factor (Outcome) is more focused on the perception that one did the right thing and contributed to the common good. The fourth factor (Negative) brings together several negative appraisals and has low internal coherence.

To determine which cognitive appraisals predict participants' pleasure to give, we ran a multiple regression analysis with the composite positive affects scores as dependent variable and our four categories of appraisals as predictors. The results are presented in Table 2. Outcome-centered and Agent-centered appraisals both positively predicted positive affects, while Negative appraisals negatively predicted positive affects.

(Q3) What kinds of emotions predict donations? To find out whether experiencing pleasure after giving motivates people to give on other occasions, we numerically coded participants' answer to the question about their later behavior (0 = "No, never, and I don't intend to do it again", 3 = "Yes, regularly"). Participants' answers significantly correlated with the positive affects they experienced: r = .20, p = .001. To investigate which type of emotions predicted later donation behavior, we ran a multiple regression analysis with participants' answers about their later donation behavior as dependent variable and the HEDONIC, SOCIAL and EPISTEMIC categories as predictors. The results suggest that SOCIAL states were the only significant predictor of later donation behavior: B = 0.10, SE = 0.05, t = 2.18, p = .03. However, this relationship turned nonsignificant when restricted to participants who remembered episodes more than three-years old (see Supplementary Materials).

2.3 Discussion

The results of Study 1 suggest that so-called 'warm glow feelings' (i.e. the pleasure one takes in giving) are indeed experienced as warm by participants, and that they fall into the 'hedonic'

family of positive emotions, alongside joy, happiness and pride, rather than in the 'social' and 'epistemic' families. Our results also suggest that this pleasure is not only due to participants seeing themselves as good person but that the impact and consequences of their decisions also played a role.

Nevertheless, Study 1 suffers from several shortcomings. The first is that participants are asked to remember events that took place in the distant past. As such, it is not clear that their recollection of their bodily feelings, emotional reactions, and cognitive appraisals is reliable. The second is that our conclusions about the appraisals which drive the pleasure of giving were only correlational. In Study 2, we sought to address these limitations.

3. Study 2

In Study 2, we sought to confirm and extend the results of Study 1 by having people actually donate money, rather than rely on their memories.

Additionally, we wanted to determine to which extent the pleasure people draw from charitable donations is determined by the good image of themselves they derive from their action, and to which extent it is determined by the feeling that they actually contributed to help someone else. Both feelings can come apart, as it is possible to have a genuine intention to help others and still fail to make a positive difference for circumstances outside one's control. Our design in Study 2 allowed for this possibility: participants could make the decision to keep money for themselves or to give it to a charity, but whether their decision had the intended outcome was chosen randomly. Such random manipulations of decisions' outcomes have already been used in the study of emotions generated by decisions (see Study 2 in Rick et al., 2014) and allow to separate the effect of the decision itself from the impact of its outcome.

3.1 Materials and Procedure

The study took the form of an online survey.

3.1.1 Participants

For the reasons highlighted in Study 1, we aimed for a total of 250 participants in each condition (winning vs. losing the lottery. 500 US residents were recruited trough Prolific Academic and paid £1.80 for their participation. 488 completed our survey. 3 participants were excluded for failing at least one attention check, leaving us with 485 participants (241 women, 234 men, 10 'other'; M_{age} = 38.44, SD_{age} = 13.89).

3.1.2 Donation task

Participants were informed that some of them would be drawn at random to receive a £1 bonus but that (before knowing whether they would be part of the winners) they had to decide whether they wanted to keep this bonus for themselves or to give it to charities. Participants were presented with a selection of three charities (Americares, the Center for the Homeless, and Food for the Poor) and asked to select whether they wanted to give their bonus to the first charity, the second charity, the third charity, or to keep it for themselves. To show participants that we were not deceiving them, we provided them with a link to an OSF page in which we stored receipts from donations made to charities in previous studies.

3.1.3 Lottery

After that, half of the participants were drawn at random to receive the bonus. If they decided to keep it for themselves, they were told:

> Congratulations! You are one of the participants drawn at random to receive the 1 GBP bonus. You will receive the bonus a few days after finishing the study. If they chose to give it to a charity, they were told: "Congratulations! You are one of the participants drawn at random to receive the 1 GBP bonus. The bonus will be transferred to the charity you selected." The other half did not receive any bonus. If they decided to keep the bonus for themselves, they were told: "Sorry! You are not among the participants drawn at random to receive the 1 GBP bonus." If they chose to give it to a charity, they were told: "Sorry! You are not among the participants drawn at random to receive the 1 GBP bonus. The bonus will not be transferred to the charity you selected."

3.1.4 Open-ended questions

Participants were then asked to focus on their current emotional state and how they felt about their decision. They were asked to describe in a few lines how they felt about their decision, and to enter five separate words that would describe their emotions and how they felt about their decision.

3.1.5 Positive affects

Participants were asked to indicate how pleasant was their current state-of-mind (on a scale from -3 = "Very unpleasant" to 3 = "Very pleasant") and to which extent they felt gratified (on a scale from 0 = "It did not bring me any feelings of gratification" to 6 = "I felt an immediate and strong gratification").

3.1.6 Anticipation

Participants were asked: "Before making your decision, did you think about the way it would make you feel to help someone else?", and had to answer on a scale from 0 (= "Not at all") to 5 (= "A lot").

3.1.7 Emotions

Participants were asked to indicate to which extent they felt 39 emotions (on a scale from 0 = "Not at all" to 6 = "Very strongly"). The emotion labels were roughly the same as in Study 1, with the exception that we transformed adjectives (e.g. "grateful", "moved") in names (e.g. "gratitude", "feelings of being moved") so that all emotion labels were of the same kind.

3.1.8 Physiological responses

Participants were presented with the same 19 physiological responses as in Study 1 and asked to indicate to which extent they experienced each of them (on a scale from 0 = "Not at all" to 6 = "Very strongly").

3.1.9 Cognitive appraisals

Participants were presented with 13 items drawn from Study 1's appraisals and asked to rate to which extent they experienced the following feelings or had the following thought after making

their decision (on a scale from 0 = "Not at all" to 6 = "Very strongly"). For each of the four types of cognitive appraisals, we selected three appraisals with strong loading on the corresponding factor, while trying to keep them a bit diverse. One additional item was included by error.

3.1.10 Expectations about others' judgments

Participants were presented with 13 items describing what others might think about their decision. For each item, they were asked to indicate whether they thought others would think of their decision in this way (on a scale from 0 = "Not at all" to 6 = "Very strongly").

3.1.11 Expectations about others' behavior

Participants were asked to indicate their best guess about the percentage of participants who decided to give their bonus to charity. They had to choose between four options: "Between 0 and 25%", "Between 25 and 50%", "Between 50 and 75%", and "Between 75 and 100%".

3.1.12 Demographic information

Participants were asked to indicate their age, gender, nationality, education level, profession, religious orientation, and political orientation.

3.1.13 Debriefing

At the end of the study, participants were presented with a detailed explanation of the goals and methods of the study.

3.2 Results

3.2.1 Decisions

Out of 485 participants, 256 (52.8%) chose to keep their potential bonus and 229 (47.2%) chose to donate. For those who chose to keep ('keepers'), 130 won the lottery, and 126 lost. For those who chose to donate ('givers'), 117 won the lottery and 112 lost.

#### 3.2.2 Effect of decision and outcome on positive affects

Because participants' feelings of pleasure and gratification were highly correlated ($r = .68$, $p < .001$), we aggregated them in a composite measure of positive affects. We then ran an ANOVA with this measure of positive affects as dependent variable, participants' decision (keep vs. give) and outcome of the lottery (won vs. lost) as well as their interaction as factors. We found a significant effect of decision: $F(1,481) = 38.83$, $p < .001$, $\eta^2 = 0.075$, a significant effect of outcome: $F(1,481) = 63.89$, $p < .001$, $\eta^2 = 0.117$, and a significant interaction effect: $F(1,481) = 4.02$, $p < .05$, $\eta^2 = 0.008$. This means that both participants' decision and their outcome impacted positive affects, but the impact of outcome was greater when the decision was to keep the bonus for oneself. As shown in Figure 1 (below), participants who gave experienced significantly more positive affects when their donation was impactful (i.e. when they won the lottery), suggesting that the pleasure they took from giving did not come only from the self-perceived morality of their decision.

3.2.3 (Q1a) What kinds of bodily feelings characterize the warm glow?

In line with the results of Study 1, bodily feelings were distributed and aggregated in two categories: *Cold* ($\alpha = .93$) and *Warm* ($\alpha = .92$). Mean and standard deviations for each category and each condition are presented in Table 4.

To determine which bodily feelings predict participants' pleasure to give, we ran a multiple regression analysis with the composite positive affects scores as dependent variable and our two categories of bodily feelings (*Cold* and *Warm*) as predictors (only on participants who chose to give their bonus). The results are presented in Table 5. As one can see, *Cold* states negatively predicted positive affects, while *Warm* states positively predicted positive affects, suggesting that the warm glow is indeed experienced as warm.

Figure 1. Participants' positive affects in function of their decision (keep or give) and the outcome of the lottery (win or loss) (Study 2). Error bars indicate 95% CI.
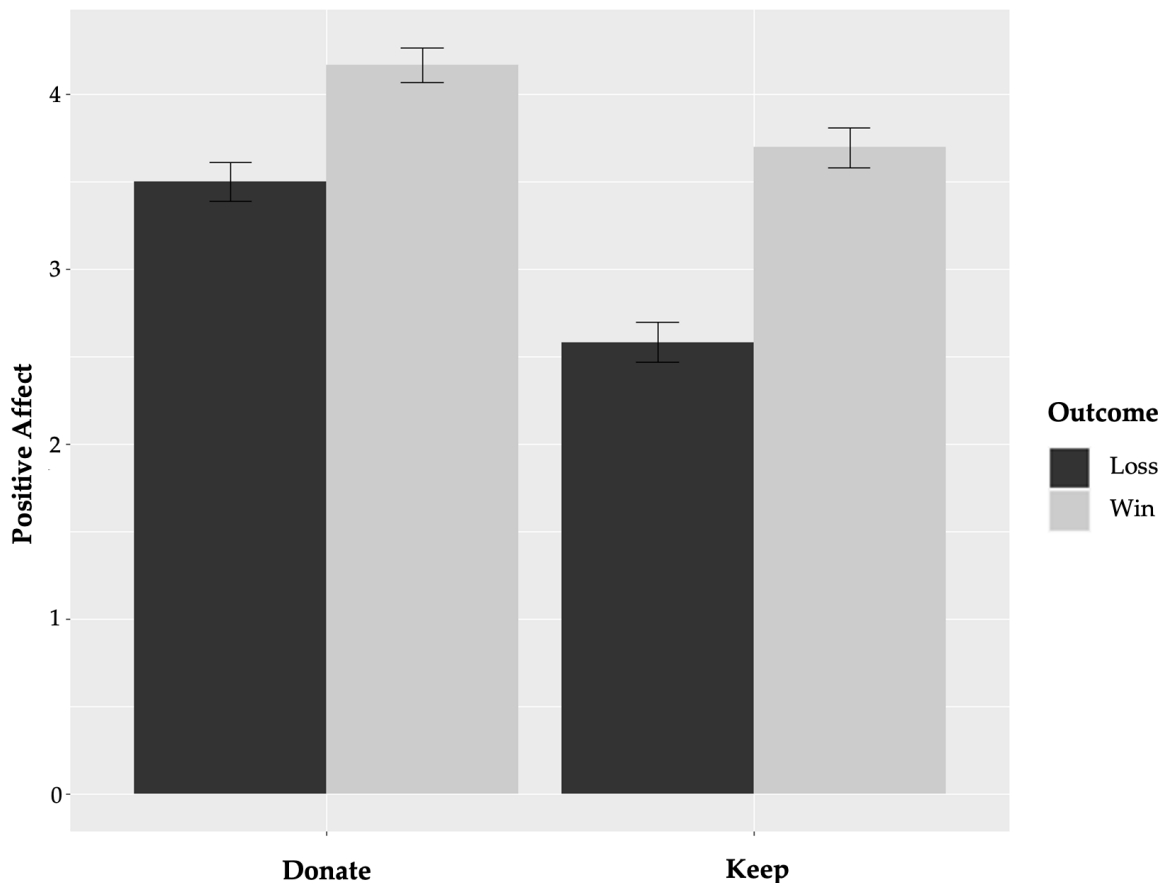
3.2.4 (Q1b) What kinds of emotional states characterize the warm glow?

In line with the results of Study 1, emotion labels were distributed and aggregated in four categories: *hedonic states* (α = .96), *social states* (α = .93), *epistemic states* (α = .88), and *negative states* (α = .86). Mean and standard deviations for each category and each condition are presented in Table 4.

To determine which emotional states predict participants' pleasure to give, we ran a multiple regression analysis with the composite positive affects scores as dependent variable and our three categories of positive emotional states (HEDONIC, SOCIAL, and EPISTEMIC) as predictors (only on participants who chose to give their bonus). The results are presented in Table 5. As one can see, HEDONIC states were the main and only significant predictor of positive affects.

3.2.5 (Q2) What kinds of cognitive appraisals predict the warm glow?

In line with the results of Study 1, cognitive appraisals were distributed and aggregated in four categories, with three items for each category: *oneness appraisals* ("I felt like I was part of

something bigger than myself", "I felt I was part of a greater whole", "I felt a sense of purpose", *α* = .92), *agent-centered appraisals* ("I felt like it made me a better person", "I was proud of me for doing this", "I felt closer to my ideals", *α* = .88), *outcome-centered appraisals* ("I felt like I helped someone in need", "I felt like I did the right thing", "I felt like I did something good", *α* = .87), and *negative appraisals* ("I felt bad about not doing this more frequently", "I felt like my daily concerns and issues weren't that important after all", "I felt my sense of self become somehow smaller", *α* = .69). Mean and standard deviations for each category and each condition are presented in Table 4.

Table 4. Mean and standard deviation for affective states (HEDONIC, SOCIAL, EPISTEMIC, NEGATIVE) and cognitive appraisals (Oneness, Agent, Outcome, Negative) in each condition. Rightmost columns indicate Pearson correlations (*r*) between each category and pleasure and gratification scores (only for participants who decided to give their bonus).

	Give		Keep		r (for givers only)	
	Win	**Lose**	**Win**	**Lose**	**Pleasure**	**Gratification**
(a) Bodily feelings						
Cold	0.69 (1.03)	0.74 (0.97)	0.49 (0.76)	0.60 (0.94)	.06	.15*
Warm	2.16 (1.60)	1.80 (1.35)	1.50 (1.41)	1.13 (1.25)	.52***	.56***
(b) Emotional states						
HEDONIC	3.33 (1.48)	2.62 (1.34)	2.29 (1.49)	1.74 (1.40)	.71***	.74***
SOCIAL	3.60 (1.41)	3.01 (1.37)	2.38 (1.39)	1.50 (1.46)	.65***	.67***
EPISTEMIC	2.10 (1.33)	1.53 (1.56)	1.39 (1.47)	1.04 (1.29)	.50***	.58***
NEGATIVE	0.71 (0.87)	1.12 (1.11)	0.94 (1.01)	1.08 (1.18)	-.28***	-.15*
(c) Cognitive appraisals						
Oneness	3.44 (1.75)	3.25 (1.62)	1.15 (1.48)	0.95 (1.38)	.55***	.61***
Agent	3.42 (1.63)	3.19 (1.56)	1.43 (1.47)	1.35 (1.51)	.46***	.53***
Outcome	4.46 (1.40)	3.98 (1.47)	2.07 (1.59)	1.60 (1.47)	.51***	.55**
Negative	2.19 (1.40)	2.11 (1.38)	1.10 (1.20)	1.03 (1.25)	.30***	.33***
(d) Positive affects						
Positive affects	4.17 (1.08)	3.50 (1.18)	3.70 (1.31)	2.58 (1.30)	-	-
N	117	112	130	126	229	229

Note. * = *p* < 0.05, ** = *p* < 0.01, *** = *p* < 0.001.

Table 5. Multiple regression analysis with positive affects as dependent variable and (a) bodily feelings (*Cold, Warm*), (b) positive emotion categories (HEDONIC, SOCIAL, EPISTEMIC), and (c) cognitive appraisals (Oneness, Agent, Outcome, Negative) as predictors (Study 2).

	B	β	SE	t	*p*
(a) With bodily feelings as predictors (R² = .41)					
(Intercept)	2.92	-	0.10	29.17	<.001***
Cold	-0.35	-0.30	0.07	-4.91	<.001***
Warm	0.59	0.75	0.05	12.24	<.001***
(b) With positive emotional states as predictors (R² = .63)					
(Intercept)	1.79	-	0.12	14.49	<.001***
HEDONIC	0.59	0.74	0.08	7.76	<.001***
SOCIAL	0.13	0.15	0.06	1.96	.051
EPISTEMIC	-0.08	-0.10	0.05	-1.53	.128
(c) With cognitive appraisals as predictors (R² = .42)					
(Intercept)	2.02	-	0.19	10.72	<.001***
Oneness	0.33	0.48	0.07	4.63	<.001***
Agent	0.00	0.00	0.07	-0.01	.996
Outcome	0.18	0.22	0.07	2.65	.009**
Negative	-0.02	-0.03	0.06	-0.41	.681

Note. * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$.

To determine which cognitive appraisals predict participants' pleasure to give, we ran a multiple regression analysis with the composite positive affects scores as dependent variable and our four categories of appraisals (Oneness, Agent-centered, Outcome-centered and Negative) as predictors (only on participants who chose to give their bonus). The results are presented in Table 5. As one can see, only Oneness and Outcome-centered appraisals significantly predicted participants' positive affects, with Oneness appraisals being the most important predictor.

3.2.6 (Q3) What kinds of emotions predict donations?

To investigate which emotions motivated participants to donate, we ran a multiple logistic regression with participants' decisions and the three categories of positive emotions (HEDONIC, SOCIAL and EPISTEMIC) as predictors. Results are presented in Table 6. SOCIAL states were significantly associated with a tendency to donate, while EPISTEMIC states were significantly associated with a tendency to keep the money for oneself. HEDONIC states were not significant

predictors of donation. This result held even when focusing only on participants who anticipated how helping someone else would make them feel.

Table 6. Logistic regression with participants' decision (0 = Donate, 1 = Keep) as dependent variable and positive emotions categories (HEDONIC, SOCIAL, EPISTEMIC) as predictors (Study 2).

	B	SE	z	p
(Intercept)	1.81	0.23	7.85	<.001***
HEDONIC	0.08	0.15	0.55	.585
SOCIAL	-0.93	0.14	-6.64	<.001***
EPISTEMIC	0.34	0.12	2.86	.004**

Note. AIC = 572.2.

4. General discussion

Through two studies, we sought to answer three questions: (1) What are the emotional states and feelings experienced by those who have 'warm glow feelings' when they engage in donation behavior? (2) What are the cognitive appraisals which elicit these warm glow feelings? And (3) are the emotional states constitutive of warm glow feelings the same as the emotional states that motivate people to engage in donation behavior?

4.1 Question 1: What kind of affect is the warm glow?

To answer our first question, we investigated which types of bodily feelings and emotional states predicted the pleasure participants took in giving. Regarding bodily feelings, results from both studies showed that the pleasure of giving was positively correlated to 'warm' bodily feelings (warm feelings in the body, warm feelings in the chest or in the heart, smiling, feeling refreshed, feeling energetic), but not to 'cold' ones, suggesting that the adjective 'warm' in the label 'warm glow' is an appropriate description. However, many positive emotions involve a 'warm' phenomenology (Abatista & Cova, 2023). Thus, we looked at which of the three broad families of positive emotions predicted participants' pleasure to give. In both studies, we found that participants' pleasure was more strongly predicted by hedonic states (contentment, happiness, joy, pride) than by social states (being moved, compassion, sympathy, tenderness) and epistemic states (awe, being thrilled, fascination). Exploratory factor analyses suggested that the label 'warm glow' was part of the hedonic feeling family, suggesting once again that the expression 'warm glow' is an apt description for the warm glow.

This is not to say that hedonic emotions are the only type of positive emotions people experience when they give. If epistemic emotions unsurprisingly tended to be absent, social emotions tended to be quite high – higher, in fact, than hedonic emotions. Thus, people do experience social emotions alongside hedonic emotions when they give. However, the social emotions are not the main source of pleasure. As we will see below, it is possible that they play a different role.

4.2 Question 2: What elicits warm glow feelings?

To answer our second question, we investigated the cognitive appraisals that predicted the extent to which participants took pleasure in giving. Against the idea that the pleasure one takes only come from one's positive self-image, we found that the pleasure of giving was tied to a wide array of determinants. In Study 1, pleasure was indeed predicted by agent-centered appraisals (e.g. "I felt a boost of self-esteem"), but it was also predicted (and to a greater extent) by outcome-centered appraisals (e.g. "I felt like what I did mattered"). In Study 2, agent-centered appraisals were not a significant predictor of the pleasure participants took in giving. Rather, pleasure was predicted by outcome-centered appraisals and (to greater extent) by oneness appraisals (e.g. "I felt a close bond with humanity"), suggesting that the pleasure of giving can also be a product of the sense of communion or belonging elicited by the act of giving. The fact that outcome-centered appraisals were the only stable predictor of the pleasure of giving (being significant in both studies and in a third pilot study available on the OSF registry) highlights the fact that people are not only concerned about how their donation makes them feel about themselves, but also take pleasure in the consequences of their donation.

This conclusion merely relies on correlational analyses. However, in Study 2, we put it to experimental test by having participants choose to give a £1 bonus to a charity and then randomly varying whether their donation was successful or not. This allowed us to tease apart the impact of agent-centered and outcome-centered appraisals. As can be seen in Figure 1, we found that participants who made the decision to give but did not win the lottery reported significantly more positive affects than participants who made the decision to keep the bonus for themselves but lost the lottery. This means that participants were able to derive pleasure from the mere fact of having decided to be generous, even if their gift was inconsequential. Thus, it seems that part of the pleasure of giving has nothing to do with the impact of one's gift. However, this was not the whole story: participants still reported even more pleasure when they won the lottery and their gift had a consequence. This means that another part of the pleasure participants experienced was not due to their awareness of themselves as being well-intentioned agents, but to the belief that their donation was effective and that they made a positive contribution to the common good. This result is consistent with earlier studies showing that a need to feel competent is a relevant dimension of warm-glow giving. For example, studies show that donors get an emotional benefit from giving when they believe their contribution will make a difference (Aknin, 2013b).

In sum, both correlational and experimental evidence converge towards the same conclusion: the pleasure people take from giving is not derived from a single source, but rather from a wide array of appraisals. When people give, they take pleasure both in the fact that their action is self-signaling, i.e. that it signals or reveals to themselves their own (moral) goodness, and in the fact that they contributed positively to the common good, as well as from a sense of communion with others. Of course, the fact that people take into account their action's outcome when deriving pleasure from their gift does not entail that one's pleasure will always be proportional to the actual good one produces. Psychological factors such as saliency and proximity to the persons who benefit from the gift are likely to impact the pleasure people derive from donating.

4.3 Question 3: Do warm glow feelings motivate donation behavior?

Finally, as an additional aim we sought to learn whether the emotional states and cognitive appraisals associated with participants' pleasure predicted the likelihood of giving. Interestingly, in both studies, hedonic states were not the best predictors of giving despite being the best predictors of pleasure as we saw. Rather, in Study 1, social emotions (but not hedonic emotions)

predicted the extent to which participants reported being likely to engage in similar a behavior at a later time (although this result disappeared when restricting analysis to participants who reported an event more than three-years old). In Study 2, social emotions (but not hedonic emotions) predicted participants' decision to give away their potential bonus to charity, even when we focused on participants who explicitly said that they anticipated the emotions they would experience when giving.

This suggests that, although the pleasure people experience when they give derives mainly from hedonic emotions, the motivation to give primarily results from social states. This conclusion turns out to be in line with the psychological literature, which has emphasized the prosocial role of social emotions (Sparks et al., 2019; Stellar et al., 2017), and has consistently found that social emotions are conducive to hedonic emotions such as amusement (Schnall et al., 2010).

This dissociation between motivation and pleasure might seem surprising, but psychological and neuroscientific research teaches us that the motivation and reward systems are two separate systems that can sometimes come apart (Berridge, 2009; Pool et al., 2016). Take the following example: your awareness of being in great danger elicits your fear, which in turns motivates you to act in order to escape this danger. You successfully escape the danger and this realization results in you experiencing relief, a positive affect. In this case, we have two affects: fear, that directly motivates you to flee the danger, and relief, that rewards you for having successfully escaped the danger. Maybe the same sort of mechanism is at work when people donate: while social emotions (such as compassion) motivate people to help, hedonic emotions (such as happiness or pride) reward them for their behavior. As such, further investigations in the role of emotions in donation behaviors should be careful to distinguish between emotions that motivate and emotions that reward such behaviors, without conflating the two.

Author contributions

All authors contributed to the general idea behind this project, to study design, and to writing the manuscript. Robin Bianchi and Florian Cova contributed to data collection and data analysis.

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