

**The Timing of Help: Receiving Help Toward the End (vs. Beginning) Undermines
Psychological Ownership and Subjective Well-Being**

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Abstract

Giving help is a generous act, but it can cause psychological distress for the recipients by inducing feelings of dependency, incompetence, or indebtedness. The current research identifies a novel factor—the *timing* of help in the course of an activity—that modulates the negative effect of help on the recipient’s subjective well-being. Across nine studies, we show that people experience less happiness and satisfaction when they receive help in a later (vs. earlier) stage of an activity. We attribute this *timing effect* to the recipient’s loss of psychological ownership of the activity; help causes a temporary, perceived shift of ownership from the recipient to the helper, and the recipient perceives a greater loss of ownership after receiving help in a later (vs. earlier) stage. We also identify two theoretical moderators: The effect holds when the activity is pursued for intrinsic reasons (e.g., for enjoyment) but *not* when the activity is pursued for extrinsic reasons (e.g., out of obligation), and the effect holds when help is dependency-oriented (e.g., providing full solutions) but *not* when help is autonomy-oriented (e.g., providing tools). Our findings advance the current understanding of how the provision of help can hurt a recipient’s well-being, and we offer practical insight into *when* help should be given to minimize such harmful effects.

Keywords: receiving help, timing of help, subjective well-being, psychological ownership, motivation

The Timing of Help: Receiving Help Toward the End (vs. Beginning) Undermines Psychological Ownership and Subjective Well-Being

Help exchanges are ubiquitous in our everyday lives. People receive help from others not only in the face of stressors but also when pursuing activities that are intrinsically motivating (e.g., fun activities). For example, most computer games are equipped with a help system (Clanton, 1998; Kim et al., 2016), Lego fans may receive help from friends when assembling new kits, and an architect may receive help from a colleague when designing a new building. How does help affect the help recipient's happiness and satisfaction in pursuit of an intrinsically-motivating activity?

Although help efforts usually appear beneficial, a large body of literature has documented negative consequences for recipients (Bolger et al., 2000; Coyne et al., 1988; Deelstra et al., 2003; Halabi et al., 2011; Lee, 1997; Martire et al., 2002; Nadler, 2002; Schneider et al., 1996). Receiving help is associated with negative affect and poor adjustment to stress (Bolger et al., 2000; Bolger & Amarel, 2007; Coyne & Bolger, 1990) and can harm the recipient's health and well-being (Deelstra et al., 2003; Halabi et al., 2011; Kim et al., 2016; Schneider et al., 1996). Identified mechanisms include threatening the recipient's self-esteem (Fisher et al., 1982; Nadler, 2015) and inducing feelings of indebtedness or inequity (Gleason et al., 2003; Tsang, 2006; Watkins et al., 2006).

Does help have a negative impact on recipients who are pursuing intrinsically-motivating activities? More importantly, does the *timing of help* matter for recipients' subjective well-being? Across nine studies ($N = 2,853$), we show that receiving help in a later stage of an activity is more detrimental for recipients' subjective well-being than receiving help in an earlier stage of the activity. We identify a novel mechanism for the timing effect: Help causes a temporary shift

in perceived ownership of the activity from the recipient to the helper, and the shift is larger, causing more damage to the recipient's sense of ownership, when help is given in a later (vs. earlier) stage. Finally, we suggest two theoretically relevant moderators: The timing effect holds 1) when recipients are intrinsically motivated to do an activity, in which psychological ownership matters for one's well-being, but *not* when they are extrinsically motivated; and 2) when help is dependency-oriented, such that it harms the recipient's psychological ownership, but *not* when help is autonomy-oriented. The current research is the first to document the timing effect of help, and it offers novel contributions to the existing literature on social support, interpersonal goal pursuit, helping, and psychological ownership.

Negative Consequences of Receiving Help

Giving help is a generous act that can benefit the recipient, who not only gains instrumental benefits from the helper (Lee, 1997; Newman & Goldin, 1990; Tsai et al., 2007) but also may experience social belongingness and social support through help exchanges (Brewer, 1991; Fowler et al., 2013; Nadler, 2020; Roberts et al., 1999; Solomon, 2004). Help also may instill a feeling of gratitude in the recipient (Klein, 1957), thereby motivating reciprocation (Wood et al., 2008) and serving as an emotional glue that connects people in relationships (Bohns & Flynn, 2021; Komter, 2004). There is ample evidence from the literature on social support that people with larger social networks and the perception of more available social support are less reactive to stressors and experience greater physical and psychological well-being (Cohen, 1992; Cohen & Wills, 1985; House et al., 1988; Stroebe & Stroebe, 1996).

Despite these benefits of help, its impact on recipients may not always be positive. In fact, many studies have documented that although the *perception* of available social support is beneficial, actually *receiving* social support can hurt health and well-being (Barrera, 1986;

Bolger et al., 2000; Bolger & Amarel, 2007; Coyne et al., 1988; Coyne & Bolger 1990; Deelstra et al., 2003; Martire et al., 2002). For example, support from significant others impedes the recipient's adjustment to a cardiac event (Helgeson, 1993). Social support at work correlates positively with negative affect (Buunk et al., 1993), emotional exhaustion and burnout (Ray & Miller, 1994), and job dissatisfaction (Ducharme & Martin, 2000; Yang & Carayon, 1995). Also, in the common problem of "miscarried helping," the helper's well-intentioned efforts fail to be helpful or contribute to negative helper-recipient interactions, ultimately hurting the recipient's well-being (Anderson & Coyne, 1991; Coyne et al., 1988; Martire et al., 2002; Newsom & Schultz, 1998).

The aforementioned literature on social support has identified important mechanisms by which help can harm the recipient. First, help threatens the recipient's self-esteem, leading to negative affect and distress (Fisher et al., 1982; Gleason et al., 2008; Nadler, 2015; Shapiro, 1978). Help usually comes from people with superior resources (Halabi et al., 2011), so help providers seem competent and powerful, while recipients seem dependent and incompetent (Gilbert & Silvera, 1996; Lee, 1997; Nadler, 2002). Dependency conflicts with the recipient's basic needs for independence and self-reliance (Ryan & Deci, 2000), so help can seem threatening to self-esteem. Second, receiving help can induce a sense of indebtedness or inequity, which causes psychological distress (Gleason et al., 2003; Tsang, 2006; Watkins et al., 2006). Equity theory and reciprocity research suggest that people are most satisfied when they perceive their relationships as equitable or reciprocal; an imbalance between receiving and providing help is psychologically distressing, and people often feel obligated to reciprocate (Buunk et al., 1993; Buunk & Schaufeli, 1999; Uehara, 1995; Walster et al., 1973). Recipients who cannot

reciprocate feel more distress (Buunk et al., 1993; Hatfield & Sprecher, 1983) and even form more negative evaluations of the helper (Gross & Latane, 1974).

Based on these mechanisms, prior research identified important moderators of the impact of help on the recipient. First, certain characteristics of the task and helper matter: The recipient's self-esteem is more negatively affected by help on an ego-relevant task (i.e., central to one's self-concept) than on an ego-irrelevant task (Nadler & Fisher, 1986; Tesser & Campbell, 1982), by help on difficult (vs. easy) goals (Righetti et al., 2014), or by help from someone who seems similar (vs. dissimilar) to the recipient (Fisher & Nadler, 1974). Second, the type of help matters: Autonomy-oriented help (i.e., providing tools or hints) enables recipients to maintain independence, so it is less distressing than dependency-oriented help (i.e., providing a full solution to the problem; Nadler, 1997, 1998, 2002). Similarly, the recipient is less likely to experience a threat to self-esteem and sense of indebtedness when the help is "invisible": occurring outside of the recipient's awareness (e.g., doing housework without telling the spouse) or appearing to be something other than support (Bolger et al., 2000; Bolger & Amarel, 2007).

In sum, a vast literature on social support and helping has documented the detrimental effects of help on recipients and has identified important mechanisms and moderators involving the task, helper, and type of help. The current research builds on but is distinct from the prior findings in two ways. First, while prior literature has been silent about whether the timing of help matters, we identify the timing of help as a novel situational factor that modulates the effect of help on recipients' well-being, holding characteristics of the task, helper, and help constant. Second, while most prior literature on social support examines how support influences a recipient's ability to cope with stressors, we examine a different context: The recipient is pursuing an intrinsically-motivating (and often enjoyable) activity. We examine whether

receiving help produces a similarly negative effect when the recipient is enjoying (vs. feeling stressed about) the activity and, more importantly, whether the magnitude of the negative effect depends on when the help is given.

The Timing of Help, Psychological Ownership, and Subjective Well-Being

In the course of an activity, people may receive help at different points in time. Although no research to date has explicitly examined how the timing of help influences recipients, there is some evidence that a recipient's reaction to the helper depends on the recipient's goal progress. For instance, recipients appreciate helpers more during a task than after the task is completed because the helper is perceived as more instrumental during the task (Converse & Fishbach, 2012). Also, people feel closer to significant others who are instrumental in goal completion (e.g., a spouse who helps with your work) when the goal is in an early rather than a late stage (Fitzsimons & Fishbach, 2010).

Building on this line of work, the current research explores how the timing of help—when the help is given in the course of an activity—influences the recipient's subjective well-being. We hypothesize that people will experience lower subjective well-being if they receive help in a later stage than if they receive equivalent help in an earlier stage of the activity. For example, when solving a puzzle, people likely will feel less happy and satisfied if they receive help with the last few puzzle pieces than with the first few pieces.

We propose that the timing effect is driven by psychological ownership: the perception that the activity belongs to oneself and no one else (Pierce et al., 2003; Shu & Peck, 2011). Specifically, we suggest that the timing of help affects the degree to which the recipient loses psychological ownership of the activity. Individuals develop psychological ownership toward not only tangible objects (Peck et al., 2013), but also intangible ones, including ideas (Baer &

Brown, 2012), jobs (Brown et al., 2014), and achievements and goals (Ames, 1992; Deci & Ryan, 1985; Zimmerman et al., 1996). When individuals are intrinsically motivated to pursue an activity, their psychological ownership of the process is pivotal for both their motivation to pursue the activity and their happiness and satisfaction—that is, their subjective well-being (Deci & Ryan, 1985, 2000). We predict that help causes a temporary shift in ownership from the recipient to the helper because the helper is taking some control over the activity, and control is a major antecedent of ownership (Furby, 1978; McClelland, 1951; Rudmin & Berry, 1987). The temporary shift causes the recipient to perceive a loss of ownership, which subsequently decreases the recipient's satisfaction and happiness (Avey et al., 2009; Fan et al., 2019; Mayhew et al., 2007; Van Dyne & Pierce, 2004).

Importantly, we argue that the temporary loss of ownership is larger and more damaging when help is received in a later (vs. earlier) stage of the activity. Two streams of research support our reasoning. First, previous research suggests that individuals perceive more ownership of a target as they invest themselves in it; the investment might involve time or physical, psychological, or intellectual effort (Csikszentmihalyi & Rochberg-Halton, 1981; Locke, 1690; Pierce et al., 2003). As individuals invest more effort in an activity over time, we expect their psychological ownership to increase. Then, receiving help should cause a loss of ownership that is proportional to the recipient's ownership prior to receiving help, so the loss should be greater in later (vs. earlier) stages of the activity. In support of this theorization, prior research has shown that people perceive territorial infringement when another individual wrongfully claims ownership of a target (Brown, 2009), and the perception of infringement increases with the level of psychological ownership of the target (Kirk et al., 2018). For example, when someone touches another customer's item in a check-out line, the customer gets upset and responds by using a

separator bar, and the strength of this reaction increases with the customer's psychological ownership.

The second support for our reasoning comes from the literature on goal pursuit. Several studies have found that the perceived impact of an action on the end state of a goal increases over the course of goal pursuit (Brendl & Higgins, 1996; Förster et al., 1998; Koo & Fishbach, 2012). For example, completing the first step out of 10 steps reduces the distance to completion by 10% (1 out of 10 remaining steps), whereas completing the tenth step reduces the distance by 100% (1 out of 1 remaining step). Thus, the same action can be perceived as more impactful when the action occurs in a later (vs. earlier) stage of an activity. Following this logic, we hypothesize that help given in a later (vs. earlier) stage should cause more damage to the recipient's psychological ownership of the activity, thereby leading to decreased subjective well-being.

H1 (the timing effect): Help given in a later (vs. earlier) stage of an activity is more harmful to the recipient's subjective well-being.

H2: The effect of the timing of help on the recipient's subjective well-being is mediated by a decrease in the recipient's psychological ownership of the activity.

As discussed in the previous section, prior literature has shown that social support can hurt the recipient's well-being by threatening the recipient's self-esteem (Fisher et al., 1982; Nadler, 2015) and by instilling a sense of indebtedness or inequity (Buunk et al., 1993; Gleason et al., 2003; Tsang, 2006; Watkins et al., 2006). Most of these mechanisms were examined in the context of stressors, while we focus on intrinsically-motivating activities. We explore self-esteem and indebtedness as alternative mechanisms in some of our empirical studies, but we predict that our new mechanism (psychological ownership) is a more parsimonious and compelling account for the timing effect.

Further, we propose that the hypothesized effect of the timing of help will be qualified by two important factors. First, we predict that the effect holds only when the recipient is intrinsically motivated to pursue an activity (e.g., for pure enjoyment), as psychological ownership is positively related to intrinsic motivation (Pierce & Jussila, 2011). When motivation is extrinsic, the timing effect should not hold because the recipient's perceived ownership of the activity is not relevant to their satisfaction and happiness (Deci & Ryan, 1985, 2000). For example, the timing of help should not matter if an individual is working on a puzzle to get a prize or is folding origami to decorate a room rather than to have fun.

H3: The effect of the timing of help holds only when the recipient is intrinsically motivated but *not* when the recipient is extrinsically motivated.

Second, our theorization of the timing effect supposes that help elicits feelings of dependency and thus infringes upon the recipient's psychological ownership of the activity. As discussed in the previous section, however, help may be dependency-oriented or autonomy-oriented (Nadler, 1997, 1998, 2002). Since autonomy-oriented help allows the recipient to maintain a degree of independence, it is less likely to infringe upon the recipient's psychological ownership and thus should not produce a negative effect on the recipient's well-being.

H4: The effect of the timing of help holds only for dependency-oriented help but *not* for autonomy-oriented help.

Overview of Studies

We present nine studies that test our predictions with diverse intrinsically-motivating activities (e.g., Rubik's Cube, Lego blocks, minesweeper game, jigsaw puzzle, flower arranging, card decorating, architecture) and diverse helpers who vary in their closeness to the help recipient (e.g., roommate, another participant, instructor, artificial intelligence, unknown helper,

colleague). In Studies 2, 3a, and 3b, participants engaged in a real activity and received real help; the other studies involved hypothetical scenarios. In Study 1, we examined the effect of help in four stages of an activity, ranging from near the beginning to near the end, to test whether the negative relationship between the timing of help and subjective well-being exists. In Studies 2-7, we compared the effect of help in an earlier versus a later stage and examined the mediating role of psychological ownership. We also tested the moderating roles of the type of motivation (intrinsic vs. extrinsic motivation; Studies 4a and 4b) and the type of help (autonomy- vs. dependency-oriented; Study 7).

In all studies, we predetermined a sample size of at least 100 per cell. We increased the planned sample size when the nature of the task required a larger sample (Study 3a), and we relaxed this criterion only when participant availability was limited (Study 2; lab study). Studies 3a, 3b, 4a, 4b, and 5 were pre-registered. We report all details about sample size determination and exclusions in Table S1 in the Web Appendix. All data, materials, and syntax are available in an online repository: https://osf.io/tk4dx/?view_only=840dfb78313d483fab9a5a4d2e21ec5b. We also report a meta-analysis of the results of all studies (Web Appendix Part 3).

To maximize diversity in our online samples (Studies 1 and 3–7), we recruited US participants via Mechanical Turk and Prolific, which are more diverse in age, gender, race, education, and employment than undergraduate participant pools (Difallah et al., 2018; Levay et al., 2016). For the lab study (Study 2), we recruited East Asian university participants to verify that our hypotheses are applicable to both Western and East Asian participants.

STUDY 1: RECEIVING HELP IN FOUR DIFFERENT STAGES

In Study 1, we examined whether the impact of help on the recipient's subjective well-being becomes more negative as the timing of help approaches the end of an activity. We tested

four timings: the beginning, early-middle, late-middle, and end of the activity; we also included a no-help control condition. We tested both solicited help and unsolicited help as a within-subjects factor to test the generalizability of the timing effect. Lastly, we measured the perceived difficulty of the helper's work to address an alternative account: If the helper's work seems more difficult toward the end than toward the beginning (Leary & Dorans, 1985; Nagy et al., 2018), it could cause more damage to the recipient's subjective well-being.

Method

Participants. We recruited 499 participants on Prolific (no country restriction) to complete the study in exchange for 0.25 euros. We obtained 495 valid responses after excluding four responses from duplicate IP addresses ($M_{age} = 29.85$, $SD = 10.00$, 56% male).

Procedure. This study used a 5 (timing of help: beginning vs. early-middle vs. late-middle vs. end vs. no help; between-subjects factor) \times 2 (activity: Rubik's Cube vs. Lego blocks; within-subjects factor) mixed design. Participants read two independent scenarios in which they imagined engaging in two activities with pre-determined steps: solving a Rubik's Cube (15 steps) and assembling Lego blocks (12 steps), in the same order for all participants.

The Rubik's Cube scenario read, "Imagine that you play with a Rubik's Cube in your free time as a hobby. One day, you want to play a new cube that you recently bought. You read its instruction indicating a set of 15 steps to be performed to solve it." Participants were presented with an image of the actual instructions (Web Appendix Part 4). In all four help conditions, participants imagined that they struggled to solve the cube and asked for help from a roommate, who completed step 3 (beginning), 6 (early-middle), 10 (late-middle), or 13 (end):

You begin to solve the cube but struggle with *Step [3/6/10/13]* of 15. You ask for help from your roommate who also enjoys playing a cube. Your roommate gets the cube from you and does *Step [3/6/10/13]* for you. After this, you continue to work on it and complete the remaining steps without any help.

In the no-help (control) condition, participants imagined that they completed all steps by themselves. After reading the scenario, all participants indicated their subjective well-being on three items (“How would you feel when it is done?”; 1 = *Negative*, 7 = *Positive*; 1 = *Unsatisfied*, 7 = *Satisfied*; 1 = *Unhappy*, 7 = *Happy*; $\alpha = .91$), adapted from Etkin and Mogilner (2016).

Participants in the four help conditions also indicated the perceived difficulty of the helper’s work (“How difficult do you think the step performed by your roommate was?”; 1 = *not at all*, 7 = *very difficult*). All participants reported their own proficiency at the activity (1 = *very bad*, 7 = *very good*) and indicated whether they had done the activity before (1 = *yes*, 2 = *no*).

Next, the Lego blocks scenario read, “Imagine that you enjoy assembling Legos in your free time. One day, you decide to assemble a Mr. Incredible Lego that you recently bought. You read the instruction and find that there are 12 steps to completion.” As before, participants were presented with an image of the instructions (Web Appendix Part 4) and imagined receiving help from a friend at a specific stage of the activity:

You begin to assemble the Lego. Right after you finish *Step [1/4/7/10]* and move to *Step [2/5/8/11]* of 12, Sam, your roommate, walks by and asks you to send him photos you took during your summer vacation. While you are doing that, Sam helps you by assembling *Step [2/5/8/11]* instead of you. You complete the remaining steps on your own and finish assembling the Lego.

Participants in the no-help condition imagined that they completed all steps by themselves. We used the same dependent measures as in the Rubik’s Cube scenario (subjective well-being: $\alpha = .96$). Finally, participants reported their gender and age.

Results

Subjective Well-Being. We present our results in Figure 1 (see Table S2 in the Web Appendix for descriptive statistics). To test our hypothesis that help becomes more detrimental to the recipient’s subjective well-being as the timing of help approaches the end of the activity

(H1), we regressed subjective well-being on the timing of help (1 = beginning, 2 = early-middle, 3 = late-middle, 4 = end) for each activity. In support of our hypothesis, we found a negative effect of the timing of help in both the Cube task, $b = -0.15$, $CI_{95\%} [-0.28, -0.02]$, $SE = 0.07$, $t(394) = -2.24$, $p = .026$ (beginning ($N = 100$): $M = 5.20$, $SD = 1.39$; early-middle ($N = 101$): $M = 5.11$, $SD = 1.43$; late-middle ($N = 98$): $M = 4.92$, $SD = 1.60$; end ($N = 97$): $M = 4.77$, $SD = 1.44$), and the Lego task, $b = -0.17$, $CI_{95\%} [-0.31, -0.03]$, $SE = 0.07$, $t(394) = -2.40$, $p = .017$ (beginning ($N = 100$): $M = 5.54$, $SD = 1.53$; early-middle ($N = 101$): $M = 5.32$, $SD = 1.39$; late-middle ($N = 98$): $M = 5.10$, $SD = 1.78$; end ($N = 97$): $M = 5.05$, $SD = 1.66$). Since the timing of help is an ordinal variable, we also conducted the Jonckheere-Terpstra test, a rank-based nonparametric test of the statistical significance of a trend between an ordinal independent variable and a continuous or ordinal dependent variable. We replicated the significant negative trend in both the Cube task, $z = -2.13$, $p = .033$, and the Lego task, $z = -2.32$, $p = .020$.

The perceived difficulty of the helper's work (see Table S2 in the Web Appendix for descriptive statistics) did not vary with the timing of help in the Lego task, $b = 0.04$, $SE = 0.07$, $t(394) = 0.54$, $p = .59$, but increased toward the end in the Cube task, $b = 0.25$, $CI_{95\%} [0.13, 0.36]$, $SE = 0.06$, $t(394) = 4.26$, $p < .001$. We repeated the original regression for the Cube task while controlling for perceived difficulty; perceived difficulty was no longer significant, $b = 0.06$, $SE = 0.06$, $t(393) = 1.08$, $p = .28$, while the effect of the timing of help remained significant, $b = -0.16$, $CI_{95\%} [-0.30, -0.03]$, $SE = 0.07$, $t(393) = -2.42$, $p = .016$.

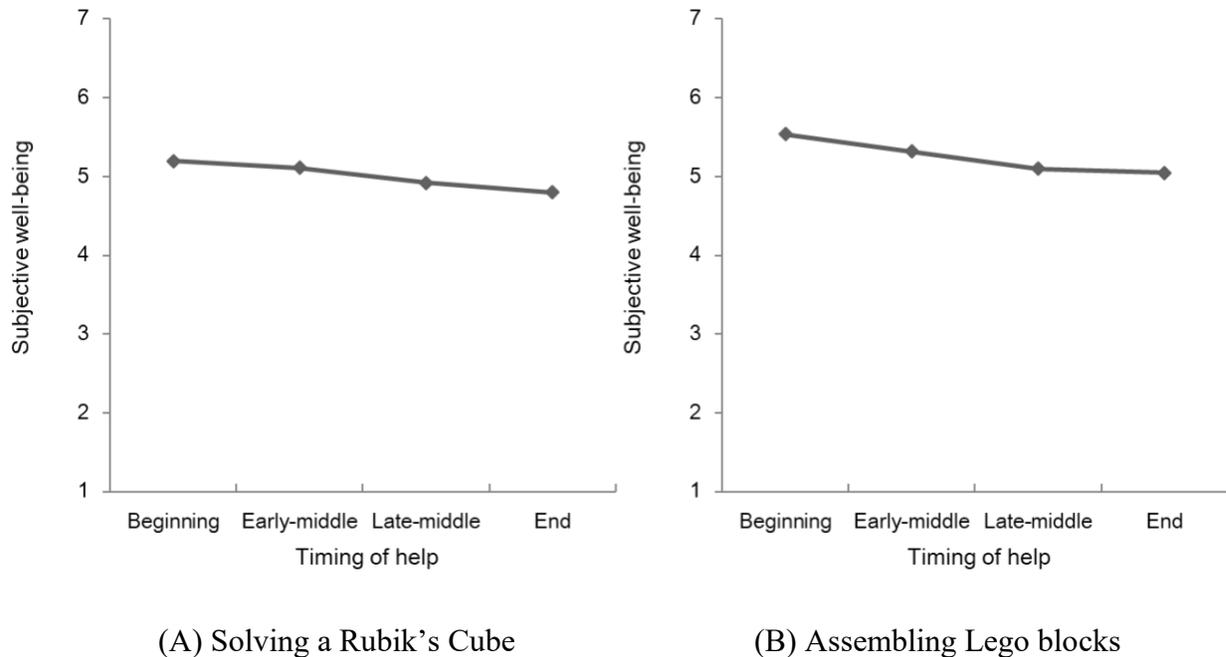


Figure 1. The impact of help on the recipient's subjective well-being became more negative as the timing of help approached the end of the activity (Study 1).

We conducted pairwise t-tests to compare subjective well-being in each pair of conditions (see details in Table S2 in the Web Appendix). Subjective well-being differed significantly between the no-help condition ($N = 99$) and each of the help conditions for both the Cube task, $p_s < .001$, and the Lego task, $p_s < .05$, suggesting that help was indeed detrimental to the recipient's well-being. For the Cube task, there was also a significant difference between the beginning and end conditions, $t(490) = -2.09$, $p = .037$, $d = 0.30$, $CI_{95\%} [0.02, 0.58]$. For the Lego task, there were significant differences between the beginning and late-middle conditions, $t(490) = -2.12$, $p = .035$, $d = 0.30$, $CI_{95\%} [0.02, 0.58]$, and between the beginning and end conditions, $t(490) = -2.33$, $p = .020$, $d = 0.33$, $CI_{95\%} [0.05, 0.61]$. All other pairs did not reach significance.

Other Measures. There were no significant differences in self-reported proficiency at the Cube (no help: $M = 2.80$, $SD = 1.66$; beginning: $M = 2.76$, $SD = 1.76$; early-middle: $M = 2.58$, $SD = 1.47$; late-middle: $M = 2.66$, $SD = 1.61$; end: $M = 2.56$, $SD = 1.41$), $F(4, 490) = 0.44$, p

= .78, proficiency at Legos (no help: $M = 5.28$, $SD = 1.30$; beginning: $M = 5.45$, $SD = 1.35$; early-middle: $M = 5.43$, $SD = 1.51$; late-middle: $M = 5.48$, $SD = 1.36$; end: $M = 5.77$, $SD = 1.12$), $F(4, 490) = 1.76$, $p = .14$, prior experience with the Cube (no help: 90.9%; beginning: 91.0%; early-middle: 88.1%; late-middle: 88.8%; end: 92.8%), $\chi^2(4) = 1.59$, $p = .81$, or prior experience with Legos (no help: 94.9%; beginning: 95.0%; early-middle: 91.1%; late-middle: 91.8%; end: 95.9%), $\chi^2(4) = 3.09$, $p = .54$.

Discussion

The results of the two scenarios revealed similar patterns. In line with prior research, we found that receiving help (vs. not receiving help) decreased the subjective well-being of recipients. More importantly, in support of H1, we found that the negative effect of help increased linearly as the timing of help approached the end of the activity. The results held for both solicited help (Rubik's Cube task) and unsolicited help (Lego task). Also, the perceived difficulty of the helper's work did not drive the effect. We acknowledge that many of the pairwise comparisons among the four help conditions revealed insignificant differences in subjective well-being, likely because of the small absolute size of the helper's contribution (i.e., one of 15 steps or 12 steps) and the similarity in the timing of help between adjacent pairs (e.g., step 3 versus step 6). Despite the limitation, we believe that the significance of the overall trend provides compelling initial evidence for H1.

STUDY 2: RECEIVING HELP ON AN ACTUAL ACTIVITY

The purpose of Study 2 was two-fold. First, we tested our main hypothesis with participants who engaged in a real activity and received real help; participants assembled plastic blocks to create a puppy, and we manipulated whether they received help in an earlier or a later

stage. Second, we sought evidence for our mechanism by testing whether psychological ownership mediates the effect of the timing of help on subjective well-being (H2).

Method

Participants. For two weeks, we ran an online advertisement on the portal of a large University in South Korea to recruit as many undergraduate students as possible (with a goal of at least 50 per cell) for a study in a campus research lab. We received 161 participants and provided a Starbucks coffee coupon (4,100 won \approx \$4) as compensation. We obtained 150 valid responses ($M_{\text{age}} = 21.93$, $SD = 2.13$, 33% male) after excluding 11 participants (5 in the earlier-stage condition and 6 in the later-stage condition) who did not finish the task and had incomplete responses.

Procedure. This study used a 2 (timing of help: earlier stage vs. later stage) between-subjects design. Upon arrival, each participant was seated in front of a personal computer and read a cover story, which explained that the experimenters were studying how people feel about performing certain activities. Participants then read that they were going to assemble toy blocks to create a pet, which would be donated to a children's hospital and orphanage. To increase their intrinsic motivation, we asked participants to choose their most preferred set of blocks among three options (Dalmatian, Schnauzer, and Spotted Dog; see Figure 2) and to give a nice name to the toy puppy they would make.



Figure 2. Three sets of pet blocks (Dalmatian, Schnauzer, and Spotted Dog)

Participants were informed that the assembly process had five steps. The instruction for each step appeared sequentially on the computer screen (see the Web Appendix Part 4), and participants began to assemble the blocks. Help occurred on either Step 2 (earlier-stage condition) or Step 5 (later-stage condition). Specifically, when participants finished either Step 1 or Step 4 (depending on the condition), they were asked to pause their activity briefly and complete a short survey (a filler task; evaluating landscape images). They were told that while they were completing the survey, another participant (a confederate) in the other room would complete the next step (Step 2 or Step 5) to help them out. The experimenter moved the blocks to the other room, and the confederate assembled the corresponding step. Notably, in both conditions, the actual work completed by the confederate was identical: assembling the four legs of the puppy. After completing the filler survey, participants in the earlier-stage condition received their blocks from the experimenter and resumed the assembly from Step 3; participants in the later-stage condition received the finished version of the blocks.

After completing the assembly, participants indicated their subjective well-being on two items (“How did you feel about the block assembling activity that you did?” 1 = *Bad*, 7 = *Good*; 1 = *Unsatisfied*, 7 = *Satisfied*; $\alpha = .90$) and psychological ownership of their creation (“I felt a sense of ownership of the final outcome”; 1 = *not at all*, 7 = *very much*). They also rated the significance of the helper’s work (“How important do you think the portion that the other participant assembled was?”; 1 = *not important at all*, 7 = *very important*), difficulty of the helper’s work (“How difficult do you think the portion that the other participant assembled was?”; 1 = *easy*, 7 = *difficult*), and difficulty of the whole activity (1 = *easy*, 7 = *difficult*). Last, they indicated whether they had assembled any toy blocks before, whether they had assembled the same pet blocks before (1 = *yes*, 2 = *no*), and their liking of assembling toy blocks in general

(1 = *not at all*, 7 = *very much*). Finally, participants reported demographic information and were compensated.

Results

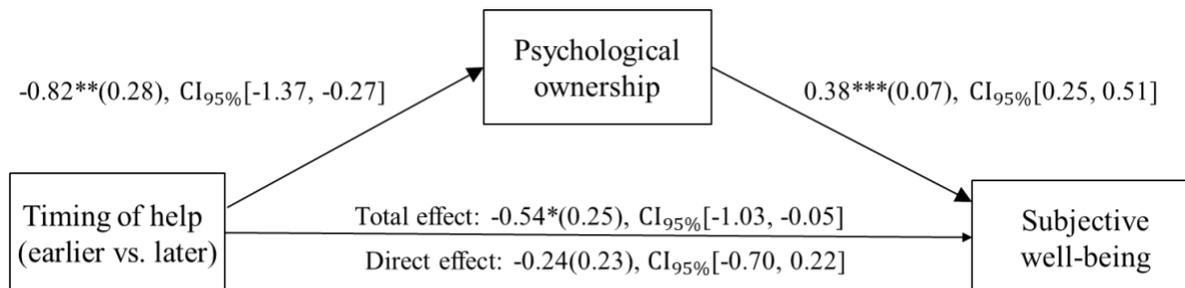
Subjective Well-Being. In support of H1, participants who received help in the later stage reported lower subjective well-being ($N = 68$; $M = 4.95$, $SD = 1.65$) than participants who received help in the earlier stage ($N = 82$; $M = 5.49$, $SD = 1.38$), $t(148) = 2.18$, $p = .031$, $d = 0.36$, $CI_{95\%} [0.03, 0.68]$.

Psychological Ownership and Mediation. Participants who received help in the later stage reported less psychological ownership of their creation ($M = 4.13$, $SD = 1.74$) than those who received help in the earlier stage ($M = 4.95$, $SD = 1.63$), $t(148) = 2.97$, $p = .004$, $d = 0.49$, $CI_{95\%} [0.16, 0.81]$.

For the mediation analysis (in this and subsequent studies), we used the mediation package in R (Tingley et al., 2019) to test for both mediation and the robustness of our conclusions to the potential violation of sequential ignorability (“sensitivity test”; Imai et al., 2010).¹ If sequential ignorability holds, then there is evidence that psychological ownership mediated the effect of the timing of help (earlier = -0.5, later = 0.5) on subjective well-being, indirect effect = -0.30, $SE = 0.12$, $CI_{95\%} [-0.58, -0.09]$ (Figure 3), supporting H2. The sensitivity test revealed that the direction of the indirect effect remains as long as the correlation between the residuals of psychological ownership and subjective well-being is less than 0.45; the indirect effect would not exist if the residual correlation equaled 0.45, and direction of the indirect effect

¹ Sequential ignorability assumes that no unmeasured confounding variables affect the examined relationships (1: independent variable → mediator; 2: mediator → dependent variable). A sensitivity analysis using the procedure “medsens” (Tingley et al., 2019) determines the extent to which the assumption can be violated without nullifying the causal mediation conclusion. The sensitivity analysis calculates the p value (that is, the sensitivity parameter) as the correlation between the error for the mediation model and the error for the outcome model (Imai et al., 2010).

would reverse if the correlation were greater than 0.45. In the Web Appendix, for this and subsequent mediation studies, we also plot contour lines that represent “the proportion of original variances explained by the unobserved confounder for the mediator and the outcome” (Imai et al., 2010, p.16).²



Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Figure 3. Psychological ownership mediated the effect of the timing of help on subjective well-being (Study 2).

Other Measures. There were no significant differences between conditions in the perceived significance of the helper’s work ($M_{\text{earlier}} = 4.67$, $SD = 1.36$ vs. $M_{\text{later}} = 4.49$, $SD = 1.52$), $t(148) = 0.79$, $p = .43$, perceived difficulty of the whole activity ($M_{\text{earlier}} = 3.56$, $SD = 1.49$ vs. $M_{\text{later}} = 3.71$, $SD = 1.48$), $t(148) = -0.60$, $p = .55$, prior experience with assembling toy blocks ($M_{\text{earlier}} = 62.2\%$ vs. $M_{\text{later}} = 67.6\%$), $\chi^2(1) = 0.48$, $p = .49$, prior experience with assembling the same pet blocks ($M_{\text{earlier}} = 4.9\%$ vs. $M_{\text{later}} = 7.4\%$), $\chi^2(1) = 0.40$, $p = .53$, or liking of assembling toy blocks in general ($M_{\text{earlier}} = 3.35$, $SD = 1.84$ vs. $M_{\text{later}} = 3.81$, $SD = 1.85$), $t(148) = -1.51$, $p = .13$. Although the helper performed the same task in both conditions, participants in the later-stage condition perceived that the helper’s work was easier ($M_{\text{earlier}} = 3.35$, $SD = 1.32$ vs. $M_{\text{later}} = 2.53$, $SD = 1.23$), $t(148) = 3.93$, $p < .001$, $d = 0.65$, $CI_{95\%} [0.31, 0.97]$, which makes sense as

² To illustrate, if unobserved confounders explain about 40% of the variance in psychological ownership and about 30% of the variance in subjective well-being, then the causal effect is zero. Note that these coefficients imply relatively high correlations ($r = .55$ and $r = .44$), indicating the omission of a powerful confounder.

there were fewer pieces remaining. Controlling for this variable did not change our results for subjective well-being, $F(1, 147) = 8.03, p = .005, d = 0.46, CI_{95\%} [0.14, 0.79]$, psychological ownership, $F(1, 147) = 11.77, p < .001, d = 0.56, CI_{95\%} [0.23, 0.89]$, or the mediation, indirect effect = -0.34, $SE = 0.13, CI_{95\%} [-0.61, -0.12]$.

Discussion

The results of Study 2 provide converging support for H1 using a real activity: Participants who received help in a later stage felt less satisfied with the activity than those who received help in an earlier stage. Further, our mediation analyses showed that if we assume that sequential ignorability holds, then the timing effect was mediated by a reduction in psychological ownership of the outcome of the activity, as predicted by H2.

STUDIES 3A AND 3B: ONLINE GAMES

In Studies 3a and 3b, our main goal was to test our hypotheses using another type of real activity: online games, specifically, a modified version of Minesweeper in Study 3a and a simple online jigsaw puzzle in Study 3b. We also aimed to address two alternative mechanisms identified by prior literature as mechanisms of the negative effect of help on the recipient's well-being: a threat to self-esteem (Bolger & Amarel, 2007; Fisher et al., 1982) and sense of indebtedness (Gleason et al., 2003; Tsang, 2006). In Study 3a, we employed a non-human artificial intelligence (AI) helper because the two mechanisms are relevant to human relationships and seem unlikely to apply to an AI helper. In both Studies 3a and 3b, we included measures for the two mechanisms and tested whether they contribute to the timing effect in our context. We preregistered both studies: https://aspredicted.org/blind.php?x=YKK_4XR (Study 3a) and https://aspredicted.org/blind.php?x=XXH_8NT (Study 3b).

Method of Study 3a

Participants. We doubled the sample size of this study because Minesweeper does not have pre-determined steps (unlike the tasks in the prior studies); players can take millions of different paths to complete the game. We recruited 401 participants on Prolific (U.S. residents) to complete the study in exchange for 0.80 euros ($M_{age} = 31.73$, $SD = 9.57$, 60% male).

Procedure. This study used a 2 (timing of help: earlier stage vs. later stage) between-subjects design. Participants played a modified version of Minesweeper, a popular online game (see the Web Appendix Part 4 for instructions and other details) featuring a rectangular board (8 × 10 cells) with 20 hidden mines. Players use clues about the number of neighboring mines in each field; they can open each cell without a mine by left-clicking and can flag each cell with a mine by right-clicking. Every time they make a mistake, they receive immediate feedback (e.g., “This was a mine” after left-clicking on a cell with a mine). The objective is to open or flag all cells on the board. There were no time constraints.

Participants received instructions and played a short trial game. We then measured participants’ intrinsic versus extrinsic motivation on two-items: “How enjoyable is playing Minesweeper in general?” (1 = *not at all*, 7 = *very much*) and “To what extent does playing Minesweeper feel more like work versus more like fun?” (-3 = *more like work*, 3 = *more like fun*; Woolley & Fishbach, 2018). We converted the second item into a 1–7 scale and then collapsed the two items ($\alpha = .75$; higher values indicate stronger intrinsic motivation).

Participants started playing the main game. They received help after opening either 5 cells out of 80 (in the earlier-stage condition) or 65 cells out of 80 (in the later-stage condition), at which point participants were asked to pause their game so that they could receive help from an AI assistant. Participants watched as the next 15 cells were revealed by the AI helper, which

seemed to be a good player (i.e., sensible decisions with no mistakes). Then, participants in the earlier-stage condition resumed their game while those in the later-stage condition were done.

Upon finishing the game, all participants responded to our dependent measures. They rated their subjective well-being on three items (“How do you feel about your game experience?”; 1 = *Very Negative*, 9 = *Very Positive*; 1 = *Very Unsatisfied*, 9 = *Very Satisfied*; 1 = *Very Unhappy*, 9 = *Very Happy*; $\alpha = .95$) and psychological ownership of game completion on two items (“I thought to myself, ‘I did it!’” and “I feel a sense of ownership for completing the game”; 1 = *strongly disagree*, 7 = *strongly agree*; $\alpha = .89$). To address alternative accounts, we measured the perceived threat to self-esteem (adapted from Bolger & Amarel, 2007; “The AI helper seemed to think that I was having a hard time”; 1 = *strongly disagree*, 7 = *strongly agree*) and sense of indebtedness (adapted from Converse & Fishbach, 2012; “How much do you feel you owe the AI helper?”; 1 = *I owe nothing*, 7 = *I owe a lot*). Last, participants rated the difficulty of the game (1 = *easy*, 7 = *difficult*), indicated whether they had played Minesweeper before (1 = *yes*, 2 = *no*), and rated their proficiency at playing Minesweeper (1 = *very bad*, 7 = *very good*). Finally, they reported their gender and age.

Results of Study 3a

Subjective Well-Being. In support of H1, participants who received help in the later stage reported lower subjective well-being ($N = 200$; $M = 5.86$, $SD = 1.91$) than those who received help in the earlier stage ($N = 201$; $M = 6.24$, $SD = 2.03$), $t(399) = 1.89$, $p = .059$, $d = 0.19$, $CI_{95\%} [-0.01, 0.39]$. Although this result is only marginally significant, the 95% confidence interval includes effects that are consistent with the predicted effect.

Psychological Ownership and Mediation. Participants who received help in the later stage also reported less psychological ownership of game completion ($M = 3.73$, $SD = 1.71$) than

those who received help in the earlier stage ($M = 4.61$, $SD = 1.75$), $t(399) = 5.11$, $p < .001$, $d = 0.51$, $CI_{95\%} [0.31, 0.71]$. We conducted a mediation analysis using the mediation package in R (Tingley et al., 2019). If sequential ignorability holds, then there is evidence that psychological ownership mediated the effect of the timing of help (earlier = -0.5, later = 0.5) on subjective well-being, indirect effect = -0.72, $SE = 0.15$, $CI_{95\%} [-1.01, -0.44]$ (Figure 4). A sensitivity test revealed that the direction of the indirect effect remains as long as the correlation between the residuals of psychological ownership and subjective well-being is less than 0.70 (explanation in Study 2; graphs in the Web Appendix).

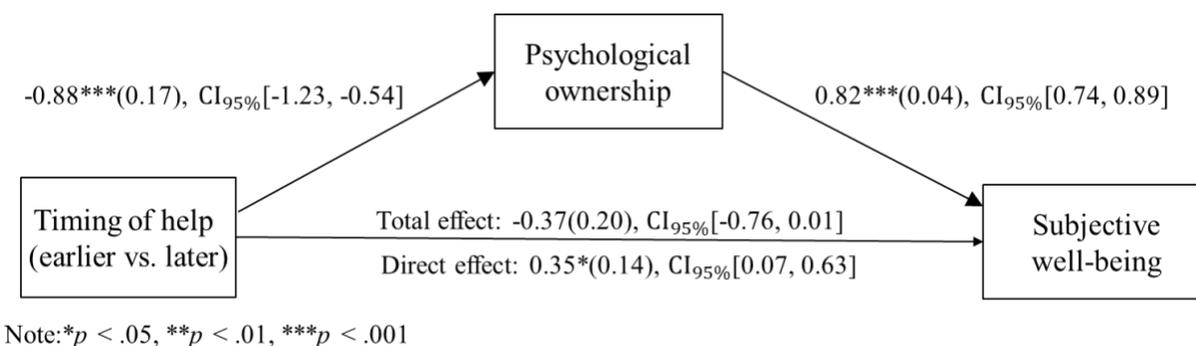


Figure 4. Psychological ownership mediated the effect of the timing of help on subjective well-being (Study 3a).

Alternative Accounts. The conditions did not differ in the perceived threat to self-esteem ($M_{\text{earlier}} = 4.01$, $SD = 1.74$ vs. $M_{\text{later}} = 4.21$, $SD = 1.70$), $t(399) = -1.11$, $p = .27$. Participants in the earlier-stage condition reported a stronger sense of indebtedness ($M_{\text{earlier}} = 4.00$, $SD = 1.88$ vs. $M_{\text{later}} = 3.51$, $SD = 1.95$), $t(399) = 2.61$, $p = .009$, $d = 0.26$, $CI_{95\%} [0.06, 0.46]$, but this finding is in the opposite direction of the alternative account's prediction—the sense of indebtedness should be stronger in the later-stage condition to explain the decrease in subjective well-being.

Self-Reported Motivation. We found no difference in self-reported motivation between the conditions ($M_{\text{earlier}} = 5.24$, $SD = 1.26$ vs. $M_{\text{later}} = 5.17$, $SD = 1.25$), $t(399) = 0.55$, $p = .58$. We conducted the Johnson-Neyman floodlight analysis (Johnson & Neyman, 1936; Spiller et al.,

2013) to test the moderating effect of motivation, but there was no moderation, $F(1,397) = 1.38$, $p = .24$. It is possibly because there was not enough variance in the measures; most participants were intrinsically motivated to play the game ($M = 5.21$, $SD = 1.26$) with only 13.5% of participants below the midpoint.

Other Measures. The two conditions did not differ in the perceived difficulty of the game ($M_{\text{earlier}} = 4.33$, $SD = 1.45$ vs. $M_{\text{later}} = 4.47$, $SD = 1.26$), $t(399) = -1.04$, $p = .30$, or perceived proficiency at playing Minesweeper ($M_{\text{earlier}} = 3.86$, $SD = 1.52$ vs. $M_{\text{later}} = 3.82$, $SD = 1.45$), $t(399) = 0.31$, $p = .76$. There was a marginal difference in prior experience with Minesweeper ($M_{\text{earlier}} = 77.1\%$ vs. $M_{\text{later}} = 84.0\%$), $\chi^2(1) = 3.03$, $p = .082$, but controlling for it did not change the effects: subjective well-being, $F(1, 398) = 2.83$, $p = .094$, $d = 0.17$, $CI_{95\%} [0.03, 0.36]$, psychological ownership, $F(1, 398) = 23.44$, $p < .001$, $d = 0.48$, $CI_{95\%} [0.28, 0.68]$, or the mediation, the indirect effect = -0.68 , $SE = 0.14$, $CI_{95\%} [-0.97, -0.40]$.

Method of Study 3b

Participants. We recruited 202 participants on Prolific (U.S. residents) to complete the study in exchange for 0.60 euros ($M_{\text{age}} = 29.60$, $SD = 9.09$, 37% male).

Procedure. This study used a 2 (timing of help: earlier stage vs. later stage) between-subjects design. Participants were told that they would complete an online jigsaw puzzle with 12 parts, to be solved one part at a time with no time constraints (see the Web Appendix Part 4 for instructions and other details). Each part of the puzzle had four blocks that needed to be arranged to form an image; participants received immediate feedback if they submitted the wrong arrangement (“Wrong solution. Try again”) and reworked the puzzle until they got it right. Together, the 12 parts comprised an image of an American celebrity (Conan O’Brien).

After completing a short trial, participants were informed that they would get help from another player at some point during the task. As in Study 3a, we included two items to measure intrinsic versus extrinsic motivation: “What mainly motivates you to do this puzzle?” (1 = *I want to get monetary compensation*; 7 = *I think it will be interesting*) and “To what extent does doing this puzzle feel more like work versus more like fun?” (-3 = *more like work*; 3 = *more like fun*). We repeated the assessment of self-reported motivation *after* participants completed the puzzle. We converted the second item to a 1–7 scale and then collapsed the two items (before the puzzle; $\alpha = .53$; after the puzzle: $\alpha = .64$; higher values indicate stronger intrinsic motivation).

All participants started working on the puzzle and received help after either the first part (earlier-stage condition) or the ninth part (later-stage condition). At that point, participants were asked to pause the task so that another participant could help them. After waiting for about one minute, participants received the message, “Your helper solved three parts for you!” and were shown the parts of the puzzle completed by the helper. Participants in the earlier-stage condition resumed the puzzle while those in the later-stage condition moved on.

After finishing the puzzle, participants completed our dependent measures: subjective well-being on three items (“How do you feel about your puzzle experience?”; 1 = *Very Negative*, 7 = *Very Positive*; 1 = *Very Unsatisfied*, 7 = *Very Satisfied*; 1 = *Very Unhappy*, 7 = *Very Happy*; $\alpha = .95$), psychological ownership of solving the puzzle on three items (“I feel I made it on my own,” “I thought to myself, ‘I did it!’”, and “I feel a sense of ownership for the final outcome”; 1 = *strongly disagree*, 7 = *strongly agree*; $\alpha = .92$), and the measures of the threat to self-esteem (“The helper seemed to think that I was having a hard time.”; 1 = *strongly disagree*, 7 = *strongly agree*) and sense of indebtedness (“How much do you feel you owe the helper?”; 1 = *I owe nothing*, 7 = *I owe a lot*). We also measured the perceived difficulty of the helper’s work (“How

easy/difficult do you think the portion that the helper completed was?"; 1 = *easy*, 7 = *difficult*), perceived difficulty of the whole activity ("How easy/difficult was the puzzle?"; 1 = *easy*, 7 = *difficult*), whether participants had done any jigsaw puzzles before, whether they had done similar jigsaw puzzles before (1 = *yes*, 2 = *no*), and self-reported proficiency at jigsaw puzzles (1 = *very bad*, 7 = *very good*). Finally, they reported their gender and age.

Results of Study 3b

Subjective Well-Being. In support of H1, participants who received help in the later stage reported lower subjective well-being ($N = 103$; $M = 5.41$, $SD = 1.40$) than those who received help in the earlier stage ($N = 99$; $M = 5.95$, $SD = 1.13$), $t(200) = 3.01$, $p = .003$, $d = 0.42$, $CI_{95\%} [0.15, 0.70]$.

Psychological Ownership and Mediation. Participants who received help in the later stage reported less psychological ownership of their puzzle ($M = 4.45$, $SD = 1.69$) than those who received help in the earlier stage ($M = 5.42$, $SD = 1.31$), $t(200) = 4.55$, $p < .001$, $d = 0.64$, $CI_{95\%} [0.36, 0.92]$. A mediation analysis using R (Tingley et al., 2019) indicated that if sequential ignorability holds, then there is evidence that psychological ownership mediated the effect of the timing of help on subjective well-being, indirect effect = -0.58 , $SE = 0.13$, $CI_{95\%} [-0.85, -0.33]$, in support of H2. A sensitivity test revealed that the direction of the indirect effect remains as long as the correlation between the residuals of psychological ownership and subjective well-being is less than 0.65 (explanation in Study 2; graphs in the Web Appendix).

Alternative Accounts. The conditions did not differ significantly in the perceived threat to self-esteem ($M_{\text{earlier}} = 3.29$, $SD = 1.84$ vs. $M_{\text{later}} = 3.21$, $SD = 1.59$), $t(200) = 0.33$, $p = .74$. The sense of indebtedness was marginally stronger in the earlier-stage condition ($M_{\text{earlier}} = 3.74$, $SD =$

1.58 vs. $M_{\text{later}} = 3.34$, $SD = 1.63$), $t(200) = 1.76$, $p = .080$, $d = 0.25$, $CI_{95\%} [-0.03, 0.52]$, which is opposite from the prediction of the alternative account.

Self-Reported Motivation. We found no difference in motivation between the conditions before the puzzle ($M_{\text{earlier}} = 5.48$, $SD = 1.19$ vs. $M_{\text{later}} = 5.35$, $SD = 1.28$), $t(200) = 0.69$, $p = .49$, but a marginally significant difference after the puzzle, such that intrinsic motivation was stronger in the earlier-stage condition than in the later-stage condition ($M_{\text{earlier}} = 5.49$, $SD = 1.34$ vs. $M_{\text{later}} = 5.15$, $SD = 1.50$), $t(200) = 1.69$, $p = .092$, $d = 0.24$, $CI_{95\%} [-0.04, 0.52]$. As in Study 3a, the Johnson-Neyman floodlight analysis revealed no moderation by motivation before the puzzle, $F(1,198) = 1.00$, $p = .32$, or after the puzzle, $F(1,198) = 0.08$, $p = .78$. Like Study 3a, only 9.4% (before the puzzle) and 15.3% (after the puzzle) of participants were below the midpoint, indicating that most participants were intrinsically motivated.

Other Measures. The two conditions did not differ in the perceived difficulty of the whole activity ($M_{\text{earlier}} = 3.59$, $SD = 1.52$ vs. $M_{\text{later}} = 3.36$, $SD = 1.45$), $t(200) = 1.08$, $p = .28$, participants' prior experience with jigsaw puzzles ($M_{\text{earlier}} = 82.8\%$ vs. $M_{\text{later}} = 82.5\%$), $\chi^2(1) = 0.003$, $p = .95$, or their perceived proficiency at solving puzzles ($M_{\text{earlier}} = 4.82$, $SD = 1.20$ vs. $M_{\text{later}} = 5.01$, $SD = 1.13$), $t(200) = -1.17$, $p = .24$. The conditions differed on the perceived difficulty of the helper's work ($M_{\text{earlier}} = 3.78$, $SD = 1.65$ vs. $M_{\text{later}} = 2.75$, $SD = 1.38$), $t(200) = 4.83$, $p < .001$, $d = 0.68$, $CI_{95\%} [0.40, 0.96]$, and participants' prior experience with similar jigsaw puzzles ($M_{\text{earlier}} = 21.2\%$ vs. $M_{\text{later}} = 35.0\%$), $\chi^2(1) = 4.70$, $p = .030$, but controlling for these variables did not change the results for subjective well-being, $F(1, 198) = 5.05$, $p = .026$, $d = 0.32$, $CI_{95\%} [0.04, 0.59]$, psychological ownership, $F(1, 198) = 14.66$, $p < .001$, $d = 0.54$, $CI_{95\%} [0.26, 0.82]$, or the mediation, indirect effect = -0.51 , $SE = 0.14$, $CI_{95\%} [-0.79, -0.25]$.

Discussion

The findings from Studies 3a and 3b provide converging evidence for H1, using real activities. In addition, we found consistent evidence for our mechanism based on psychological ownership (H2) and against two additional mechanisms, a threat to self-esteem and sense of indebtedness, that were identified by the prior literature. The main timing effect occurred both with help from an AI assistant (Study 3a) and with help from (allegedly) another participant (Study 3b).

We acknowledge two limitations. First, Study 3a has a potential confound due to the nature of the minesweeper game. The earlier part of the game has more masked boxes than the later part, so it is possible that participants felt that the earlier (vs. later) help was more instrumental. However, it is unclear whether more instrumental help should lead to higher or lower subjective well-being; recipients plausibly could feel more appreciation *or* more indebtedness after receiving more instrumental help. If participants who received earlier help felt more appreciation for the helper, then appreciation could increase subjective well-being and confound our estimation of the timing effect. However, we found that participants who received earlier help experienced more indebtedness, which should *decrease* their subjective well-being and lead to a more conservative estimation of the timing effect.

Second, we attempted to test H3 (the moderating effect of intrinsic versus extrinsic motivation) by measuring the extent to which participants were motivated by their interest in the games versus by the compensation for the task. We found no significant moderation, likely because participants did not vary much in motivation. In a supplementary study, we tested H3 again with similar motivation measures but using a different online game (“Find the hidden picture”; Web Appendix Part 2). In that study, we found significant moderation by motivation, in the predicted direction: The timing effect replicated among participants who were intrinsically

motivated but reversed among participants who were extrinsically motivated. Since we found inconsistent moderation results when using measured motivation, we decided to manipulate motivation to test H3 in Studies 4a and 4b.

STUDIES 4A AND 4B: MODERATION BY INTRINSIC VERSUS EXTRINSIC MOTIVATION

In Studies 4a and 4b, we tested H3 by manipulating motivation in hypothetical scenarios. We expected the timing effect to hold only when the recipient imagined having intrinsic motivation for the activity but not when the recipient imagined having extrinsic motivation. In Study 4a, we also tested whether our effect is generalizable to another type of helper: an expert. (In the preceding studies, the human helpers could reasonably be assumed to have a similar level of expertise as the recipients.) As in Studies 3a and 3b, we included measures for two alternative mechanisms (threat to self-esteem and sense of indebtedness). Given past research has identified the alternative mechanisms in relationship contexts, we reasoned that they may be more relevant in Studies 4a and 4b (featuring an instructor and a roommate as helpers) than in Studies 3a and 3b. Both studies were pre-registered: https://aspredicted.org/HZK_F4G (Study 4a) and https://aspredicted.org/X1D_1MP (Study 4b).

Method of Study 4a (Flower Arranging)

Participants. We recruited 400 participants on MTurk (U.S. residents) to complete the study in exchange for 0.40 dollars ($M_{\text{age}} = 39.02$, $SD = 12.32$, 42% male).

Procedure. Participants were randomly assigned within a 2 (timing of help: earlier stage vs. later stage) \times 2 (motivation: intrinsic vs. extrinsic) between-subjects design. All participants read a scenario about flower arranging, which contained the motivation manipulation:

Intrinsic-motivation condition: Imagine you are very interested in learning flower arrangement as you find it very enjoyable. You have been participating in a flower arrangement workshop to learn and enjoy the activity.

Extrinsic-motivation condition: Imagine you are not interested in learning flower arrangement at all as you find it very boring. However, you have been participating in a flower arrangement workshop because it is part of your company's mandatory employee-education program.

In the next part of the scenario, we manipulated the timing of help:

Earlier-stage condition: Today is the workshop day. Right after you start to make your flower arrangement, the instructor comes to you and offers her help. She gives you a few tips, picks up a few flowers and foliage, and places them in your vase. After that, you proceed to work on your own and finish your arrangement.

Later-stage condition: Today is the workshop day. You began to make your arrangement and have worked on it. When you are close to the finish, the instructor comes to you and offers her help. She gives you a few tips, picks up a few flowers and foliage, and places them in your vase. After that, she finished your arrangement.

After reading the scenario, participants indicated their subjective well-being on three items ("How would you feel when it is done?"; 1 = *Negative*, 7 = *Positive*; 1 = *Unsatisfied*, 7 = *Satisfied*; 1 = *Unhappy*, 7 = *Happy*; $\alpha = .94$), and psychological ownership of the flower arrangement on four items ("I would feel I made it on my own," "I would feel I deserve full credit for making the flower arrangement," "I would think to myself, 'I did it!'", and "I would feel a sense of ownership for the final outcome"; 1 = *not at all*, 7 = *very much*; $\alpha = .93$). To test alternative accounts, we measured the perceived threat to self-esteem and sense of indebtedness on the same scales as in Studies 3a and 3b. Participants rated the difficulty of the helper's work (1 = *not at all*, 7 = *very difficult*), rated their own proficiency at flower arranging (1 = *not good at all*, 7 = *very good*), and indicated whether they had done flower arranging before (1 = *yes*, 2 = *no*). Finally, participants reported their gender and age.

Results of Study 4a

Subjective Well-Being. A two-way ANOVA on subjective well-being revealed a main effect of the timing of help ($M_{\text{earlier}} = 5.52$, $SD = 1.27$ vs. $M_{\text{later}} = 4.91$, $SD = 1.71$), $F(1, 396) = 16.96$, $p < .001$, $d = 0.41$, $CI_{95\%} [0.21, 0.61]$, and no main effect of motivation ($M_{\text{intrinsic}} = 5.20$, $SD = 1.71$ vs. $M_{\text{extrinsic}} = 5.23$, $SD = 1.34$), $F(1, 396) = 0.03$, $p = .86$. More importantly, the ANOVA yielded a significant two-way interaction, $F(1, 396) = 8.43$, $p = .004$, $d = 0.29$, $CI_{95\%} [0.09, 0.49]$ (Figure 5) such that help in the later (vs. earlier) stage resulted in significantly lower subjective well-being in the intrinsic-motivation condition ($M_{\text{earlier}} (N = 90) = 5.78$, $SD = 1.22$ vs. $M_{\text{later}} (N = 109) = 4.72$, $SD = 1.90$), $t(197) = 4.54$, $p < .001$, $d = 0.65$, $CI_{95\%} [0.36, 0.93]$, but not in the extrinsic-motivation condition ($M_{\text{earlier}} (N = 111) = 5.32$, $SD = 1.27$ vs. $M_{\text{later}} (N = 90) = 5.13$, $SD = 1.43$), $t(199) = 0.96$, $p = .34$.

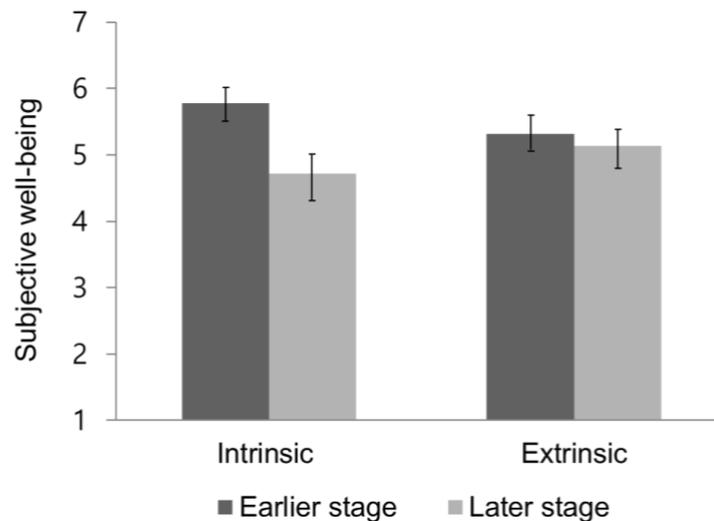


Figure 5. When motivation was intrinsic, help in a later stage resulted in lower subjective well-being than help in an earlier stage. When motivation was extrinsic, however, the timing effect disappeared (Study 4a). Error bars represent 95% confidence intervals.

Psychological Ownership and Moderated Mediation. A two-way ANOVA on psychological ownership revealed a main effect of the timing of help such that later help led to lower psychological ownership ($M_{\text{earlier}} = 4.76$, $SD = 1.46$ vs. $M_{\text{later}} = 4.05$, $SD = 1.81$), $F(1, 396) = 18.97$, $p < .001$, $d = 0.44$, $CI_{95\%} [0.24, 0.63]$. There was no main effect of motivation ($M_{\text{intrinsic}}$

= 4.42, $SD = 1.75$ vs. $M_{\text{extrinsic}} = 4.39$, $SD = 1.60$), $F(1, 396) = 0.33$, $p = .56$, and no two-way interaction, $F(1, 396) = 0.88$, $p = .35$. As in prior studies, we conducted mediation analyses using R (Tingley et al., 2019). If sequential ignorability holds, then there is evidence that psychological ownership mediated the effect of the timing of help on subjective well-being in the intrinsic-motivation condition, indirect effect = -0.68, $SE = 0.20$, $CI_{95\%} [-1.09, -0.31]$, and in the extrinsic-motivation condition, indirect effect = -0.24, $SE = 0.11$, $CI_{95\%} [-0.47, -0.05]$. A sensitivity test revealed that the direction of the indirect effect in the intrinsic-motivation condition remains as long as the correlation between the residuals of psychological ownership and subjective well-being is less than 0.80 (explanation in Study 2; graphs in the Web Appendix).

We also conducted a moderated mediation analysis (PROCESS Model 15³, 5000 bootstraps) with the timing of help (earlier = -0.5, later = 0.5) as the independent variable, psychological ownership as the mediator, motivation as the moderator (intrinsic = -0.5, extrinsic = 0.5), and subjective well-being as the dependent variable (Figure 6). Model 15 tests if the path from psychological ownership to subjective well-being is moderated by the type of motivation. As predicted, there was a significant interaction between psychological ownership and motivation on subjective well-being, $b = -0.35$, $SE = 0.06$, $t(394) = -5.38$, $p < .001$, $CI_{95\%} [-0.48, -0.22]$, such that psychological ownership had a stronger impact on subjective well-being in the intrinsic-motivation condition, $b = 0.78$, $SE = 0.04$, $t(197) = 17.62$, $p < .001$, $CI_{95\%} [0.69, 0.87]$, than in the extrinsic-motivation condition, $b = 0.43$, $SE = 0.05$, $t(199) = 9.09$, $p < .001$, $CI_{95\%}$

³ In Study 4a and 4b where we tested the moderating role of motivation, a moderated mediation model was estimated using PROCESS Model 15 (Hayes, 2017), which places the moderator on the direct link between IV (i.e., timing of help) and DV (i.e., subjective well-being) and the link between the mediator (i.e., psychological ownership) and DV. On the other hand, in Study 7 where we tested the moderating role of the type of help, we used PROCESS Model 8, which places the moderator on the direct link between IV and DV and the link between IV and the mediator. That is, the Model 15 specifies that the path from psychological ownership to subjective well-being is moderated by motivation, whereas the Model 8 specifies that the path from timing of help to psychological ownership is moderated by the type of help, and that psychological ownership then influences subjective well-being.

[0.34, 0.52]. The index of moderated mediation was significant, $b = 0.25$, $SE = 0.08$, $CI_{95\%} [0.11, 0.42]$; there was a conditional indirect effect in the intrinsic-motivation condition, $b = -0.55$, $SE = 0.14$, $CI_{95\%} [-0.84, -0.29]$, but the effect was smaller in the extrinsic-motivation condition, $b = -0.31$, $SE = 0.09$, $CI_{95\%} [-0.49, -0.15]$.

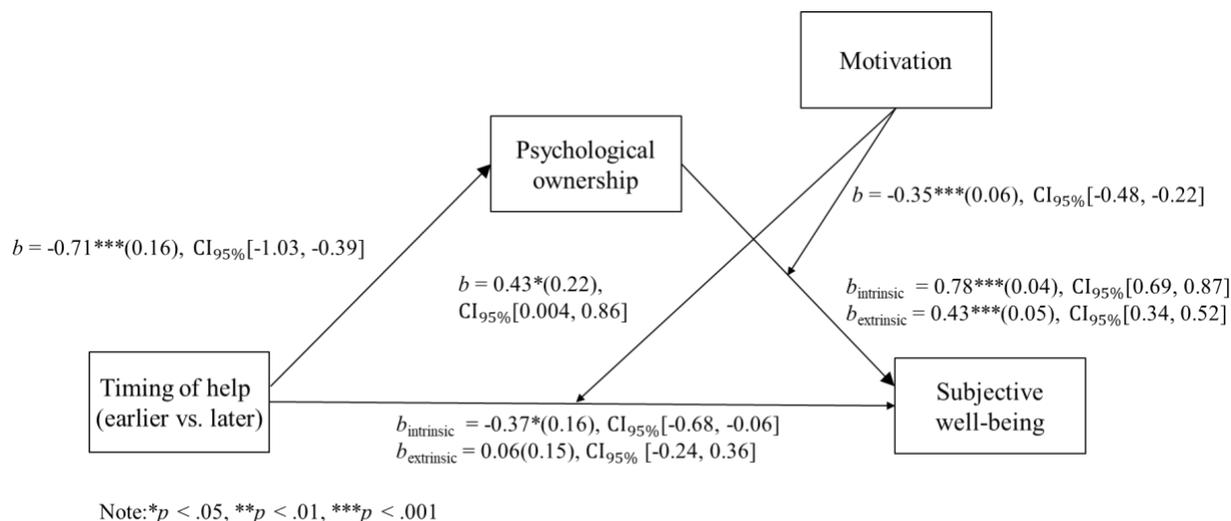


Figure 6. Moderated mediation (Study 4a): The path from psychological ownership to subjective well-being was moderated by the type of motivation.

Alternative Accounts. In the intrinsic-motivation conditions (where we found a significant timing effect), the two timing conditions did not differ in the sense of indebtedness ($M_{earlier} = 4.61$, $SD = 1.59$ vs. $M_{later} = 4.28$, $SD = 1.88$), $t(197) = 1.31$, $p = .19$, but did differ in the threat to self-esteem such that participants who received help in a later stage felt more threatened ($M_{earlier} = 4.47$, $SD = 1.46$ vs. $M_{later} = 4.95$, $SD = 1.50$), $t(197) = -2.31$, $p = .022$, $d = 0.33$, $CI_{95\%} [0.05, 0.61]$. A parallel multiple mediation analysis with both psychological ownership and the threat to self-esteem revealed that the effect of timing on subjective well-being was significantly mediated by psychological ownership, $b = -0.68$, $SE = 0.20$, $CI_{95\%} [-1.09, -0.30]$, but *not* by the threat to self-esteem, $b = -0.03$, $SE = 0.03$, $CI_{95\%} [-0.09, 0.01]$. In the extrinsic-motivation conditions (where we did not find a significant timing effect), the two timing conditions did not differ in the

threat to self-esteem ($M_{\text{earlier}} = 5.00, SD = 1.50$ vs. $M_{\text{later}} = 5.22, SD = 1.25$), $t(199) = -1.12, p = .26$, or the sense of indebtedness ($M_{\text{earlier}} = 4.46, SD = 1.62$ vs. $M_{\text{later}} = 4.44, SD = 1.77$), $t(199) = 0.06, p = .95$.

Other Measures. There were no differences among conditions in the perceived difficulty of the helper's work (intrinsic: $M_{\text{earlier}} = 3.51, SD = 1.86$ vs. $M_{\text{later}} = 3.54, SD = 1.58$; extrinsic: $M_{\text{earlier}} = 3.23, SD = 1.61$ vs. $M_{\text{later}} = 3.43, SD = 1.70$), $F(1, 396) = 0.28, p = .60$, the participants' perceived proficiency at flower arranging (intrinsic: $M_{\text{earlier}} = 4.29, SD = 1.76$ vs. $M_{\text{later}} = 4.10, SD = 1.88$; extrinsic: $M_{\text{earlier}} = 3.81, SD = 1.88$ vs. $M_{\text{later}} = 3.60, SD = 1.80$), $F(1, 396) = 0.004, p = .95$, or prior experience with flower arranging, intrinsic: $M_{\text{earlier}} = 54.4\%$ vs. $M_{\text{later}} = 56.9\%$, $\chi^2(1) = 0.12, p = .73$, extrinsic: $M_{\text{earlier}} = 43.2\%$ vs. $M_{\text{later}} = 36.7\%$, $\chi^2(1) = 0.89, p = .35$.

Method of Study 4b (Lego Assembly)

Participants. We recruited 404 participants on MTurk (U.S. residents) to complete the study in exchange for 0.40 dollars. We obtained 402 valid responses ($M_{\text{age}} = 39.50, SD = 12.62$, 46% male) after excluding two responses from duplicate IP addresses.

Procedure. This study used a 2 (timing of help: earlier stage vs. later stage) \times 2 (motivation: intrinsic vs. extrinsic) between-subjects design. We used the Lego assembly scenario from Study 1 but manipulated motivation:

Intrinsic-motivation condition: Imagine that you enjoy assembling Legos in your free time. You find the activity very fun and enjoyable. At your work, everyone was asked to display something on their desk as part of the office decoration. You love Lego figures, so you took this opportunity to buy and display one of your favorite characters, Mr. Incredible. You begin doing the fun activity.

Extrinsic-motivation condition: Imagine that you do not enjoy assembling Legos. You find the activity somewhat mundane and boring. At your work, everyone was asked to display a Lego figure on their desk as part of the office decoration. You don't really care for Lego figures, so you just bought the first one you found, Mr. Incredible. You begin doing the boring activity.

The two motivation conditions were identical in all other aspects. The rest of the scenario was similar to Study 1 except that we included only two timing conditions:

Earlier-stage condition: Right after you finish Step 1 of 12, Sam, your roommate, walks by and asks you to send him photos you took during your summer vacation. While you are doing that, Sam helps you by assembling Steps 2, 3, and 4 instead of you. You complete the remaining steps on your own and finish assembling the Lego.

Later-stage condition: Right after you finish Step 9 of 12, Sam, your roommate, walks by and asks you to send him photos you took during your summer vacation. While you are doing that, Sam helps you by assembling Steps 10, 11, and 12 instead of you and finishes the Lego.

Participants completed the measures of subjective well-being ($\alpha = .93$) and psychological ownership ($\alpha = .91$) from Study 4a. We measured the threat to self-esteem and sense of indebtedness (as in Studies 3a, 3b, and 4a) and included a manipulation-check item for motivation: “According to the scenario, to what extent did assembling the Mr. Incredible Lego feel more like work versus more like fun?” ($-3 = \textit{more like work}$, $3 = \textit{more like fun}$; converted to 1-7 scale for analyses). Then, we measured the perceived difficulty of the helper’s work ($1 = \textit{not at all}$, $7 = \textit{very difficult}$), participants’ own proficiency at Lego assembly ($1 = \textit{very bad}$, $7 = \textit{very good}$), and their prior experience with Lego assembly ($1 = \textit{yes}$, $2 = \textit{no}$). Finally, they reported their gender and age.

Results of Study 4b

Manipulation Check. Confirming the success of our motivation manipulation, participants in the intrinsic-motivation condition perceived Lego assembly as more fun than those in the extrinsic-motivation condition ($M_{\textit{intrinsic}} = 5.89$, $SD = 1.19$ vs. $M_{\textit{extrinsic}} = 2.95$, $SD = 1.87$), $F(1, 398) = 355.47$, $p < .001$, $d = 1.88$, $CI_{95\%} [1.64, 2.12]$.

Subjective Well-Being. A two-way ANOVA on subjective well-being revealed a main effect of the timing of help ($M_{\textit{earlier}} = 5.74$, $SD = 1.12$ vs. $M_{\textit{later}} = 5.39$, $SD = 1.52$), $F(1, 398) =$

6.93, $p = .009$, $d = 0.26$, $CI_{95\%} [0.07, 0.46]$, and no main effect of motivation ($M_{intrinsic} = 5.59$, $SD = 1.51$ vs. $M_{extrinsic} = 5.54$, $SD = 1.16$), $F(1, 398) = 0.17$, $p = .68$. More importantly, the ANOVA yielded a significant two-way interaction, $F(1, 398) = 12.32$, $p < .001$, $d = 0.35$, $CI_{95\%} [0.15, 0.55]$ (Figure 7). As predicted in H3, a significant timing effect on subjective well-being occurred in the intrinsic-motivation condition ($M_{earlier} (N = 101) = 5.99$, $SD = 1.02$ vs. $M_{later} (N = 102) = 5.19$, $SD = 1.79$), $t(201) = 3.95$, $p < .001$, $d = 0.55$, $CI_{95\%} [0.27, 0.83]$, but not in the extrinsic-motivation condition ($M_{earlier} (N = 99) = 5.48$, $SD = 1.16$ vs. $M_{later} (N = 100) = 5.59$, $SD = 1.15$), $t(197) = -0.70$, $p = .48$.

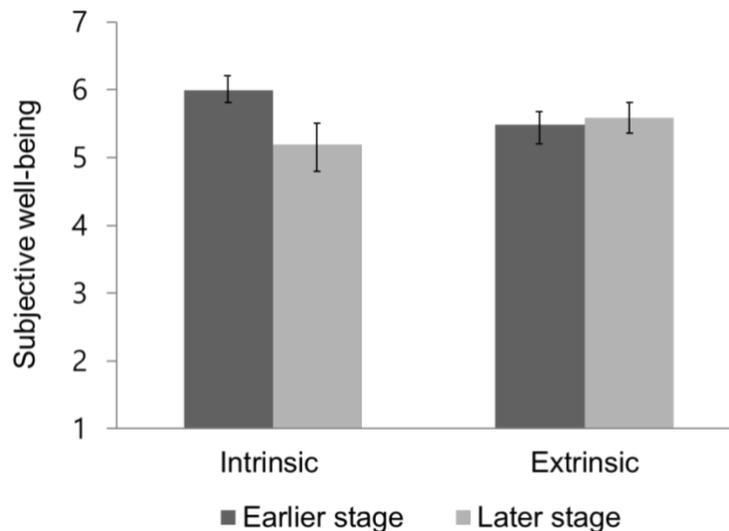


Figure 7. When motivation was intrinsic, help in a later stage resulted in lower subjective well-being than help in an earlier stage. When motivation was extrinsic, however, this timing effect disappeared (Study 4b). Error bars represent 95% confidence intervals.

Psychological Ownership and Moderated Mediation. A two-way ANOVA on psychological ownership found a marginally significant main effect of the timing of help ($M_{earlier} = 4.67$, $SD = 1.49$ vs. $M_{later} = 4.38$, $SD = 1.59$), $F(1, 398) = 3.65$, $p = .057$, $d = 0.19$, $CI_{95\%} [0.01, 0.39]$, a main effect of motivation ($M_{intrinsic} = 4.78$, $SD = 1.53$ vs. $M_{extrinsic} = 4.26$, $SD = 1.52$), $F(1, 398) = 12.07$, $p = .001$, $d = 0.35$, $CI_{95\%} [0.15, 0.54]$, and no significant two-way interaction, $F(1,$

398) = 2.71, $p = .10$. A mediation analysis using R revealed that if sequential ignorability holds, then there is evidence that psychological ownership mediated the effect of the timing of help on subjective well-being in the intrinsic-motivation condition, indirect effect = -0.28, $SE = 0.12$, $CI_{95\%} [-0.55, -0.06]$, but *not* in the extrinsic-motivation condition, indirect effect = -0.01, $SE = 0.04$, $CI_{95\%} [-0.09, 0.08]$. A sensitivity test revealed that the direction of the indirect effect in the intrinsic-motivation condition remains as long as the correlation between the residuals of psychological ownership and subjective well-being is less than 0.55 (explanation in Study 2; graphs in the Web Appendix).

As in Study 4a, we also conducted a moderated mediation analysis (PROCESS Model 15, 5000 bootstraps) with the timing of help (earlier = -0.5, later = 0.5) as the independent variable, psychological ownership as the mediator, the type of motivation as the moderator (intrinsic = -0.5, extrinsic = 0.5), and subjective well-being as the dependent variable. The index of moderated mediation was not significant but was in the predicted direction, $b = 0.10$, $SE = 0.06$, $CI_{95\%} [0.00, 0.25]$. The conditional indirect effect was larger in the intrinsic-motivation condition, $b = -0.15$, $SE = 0.09$, $CI_{95\%} [-0.33, 0.00]$, than in the extrinsic-motivation condition, $b = -0.05$, $SE = 0.03$, $CI_{95\%} [-0.13, 0.00]$.

Alternative Accounts. In the intrinsic-motivation conditions (where we found a significant timing effect), the two timing conditions did not differ in the threat to self-esteem ($M_{\text{earlier}} = 3.48$, $SD = 1.92$ vs. $M_{\text{later}} = 3.17$, $SD = 1.97$), $t(201) = 1.13$, $p = .26$, but had a marginally significant difference in the sense of indebtedness ($M_{\text{earlier}} = 3.49$, $SD = 1.86$ vs. $M_{\text{later}} = 3.00$, $SD = 1.94$), $t(201) = 1.82$, $p = .070$, $d = 0.26$, $CI_{95\%} [-0.02, 0.53]$, which is opposite to the prediction of the alternative account. In the extrinsic-motivation conditions (where we did not find a significant timing effect), the two timing conditions did not differ in the threat to self-esteem ($M_{\text{earlier}} = 3.94$,

$SD = 1.93$ vs. $M_{\text{later}} = 3.64$, $SD = 1.70$), $t(197) = 1.16$, $p = .25$, or the sense of indebtedness ($M_{\text{earlier}} = 3.66$, $SD = 1.73$ vs. $M_{\text{later}} = 3.55$, $SD = 1.81$), $t(197) = 0.43$, $p = .67$.

Other Measures. There were no differences among conditions in the perceived difficulty of the helper's work (intrinsic: $M_{\text{earlier}} = 3.43$, $SD = 1.66$ vs. $M_{\text{later}} = 3.20$, $SD = 1.64$; extrinsic: $M_{\text{earlier}} = 3.03$, $SD = 1.66$ vs. $M_{\text{later}} = 3.23$, $SD = 1.55$), $F(1, 398) = 1.75$, $p = .19$, the participants' perceived proficiency at Lego assembly (intrinsic: $M_{\text{earlier}} = 4.85$, $SD = 1.58$ vs. $M_{\text{later}} = 4.80$, $SD = 1.61$; extrinsic: $M_{\text{earlier}} = 4.48$, $SD = 1.60$ vs. $M_{\text{later}} = 4.70$, $SD = 1.52$), $F(1, 398) = 0.70$, $p = .40$, or prior experience with Lego assembly (intrinsic: $M_{\text{earlier}} = 86.1\%$ vs. $M_{\text{later}} = 85.3\%$), $\chi^2(1) = 0.03$, $p = .86$, (extrinsic: $M_{\text{earlier}} = 76.8\%$ vs. $M_{\text{later}} = 83.0\%$), $\chi^2(1) = 1.20$, $p = .27$.

Discussion

The findings of Studies 4a and 4b support H3 using hypothetical scenarios: The effect of the timing of help held only when participants imagined having intrinsic motivation for the activity but not when participants imagined having extrinsic motivation. The timing effect generalized to a situation when help was given by an expert (an instructor in Study 4a) as well as a situation involving a helper with a similar level of expertise (a roommate in Study 4b), as in earlier studies.

STUDY 5: RECEIVING HELP AT WORK

Our studies have focused on leisure activities (e.g., Lego assembly, online games, flower arranging) as they are the typical examples of intrinsically-motivating activities. However, we expect that the hypothesized timing effect exists in other types of activities as long as people are driven primarily by intrinsic motivation. Thus, in Study 5, we tested the timing effect in a work context. We preregistered the study: https://aspredicted.org/HXZ_Q3N

Method

Participants. We recruited 199 participants on Prolific (U.S. residents) to complete the study in exchange for 0.30 euros ($M_{\text{age}} = 35.43$, $SD = 12.01$, 36% male).

Procedure. Participants were randomly assigned within a 2 (timing of help: earlier stage vs. later stage) between-subjects design. All participants imagined that they were an architect and were working on a project that was intrinsically motivating:

Imagine you are an architect that has been put in charge of designing an amenities center for a new community. You are excited about this project and the chance to do something where you can use some of your creativity and skills. You feel proud of doing it.

Earlier-stage condition: You get started working on your design creating the amenities center. Right on the next day, your colleague, Sam, comes to you and offers help. He gives you a few tips on the design, changing some parts. After that, you proceed to work on your own for several days and complete the project, putting the finishing touches.

Later-stage condition: You get started working on your design creating the amenities center and have worked on several days. When you are close to the finish, your colleague, Sam, comes to you and offers help. He gives you a few tips on the design, changing some parts. After that, he completes the project, putting the finishing touches.

After reading the scenario, participants indicated their subjective well-being on three items (“How would you feel when the project is done?”; 1 = *Negative*, 7 = *Positive*; 1 = *Unsatisfied*, 7 = *Satisfied*; 1 = *Unhappy*, 7 = *Happy*; $\alpha = .98$) and psychological ownership of the project on four items (“I would feel I made it on my own,” “I would feel I deserve full credit for doing the project,” “I would think to myself, ‘I did it!’”, and “I would feel a sense of ownership for the final outcome”; 1 = *not at all*, 7 = *very much*; $\alpha = .89$). As in Studies 3 and 4, participants rated the threat to their self-esteem and sense of indebtedness. Finally, they reported their gender and age.

Results

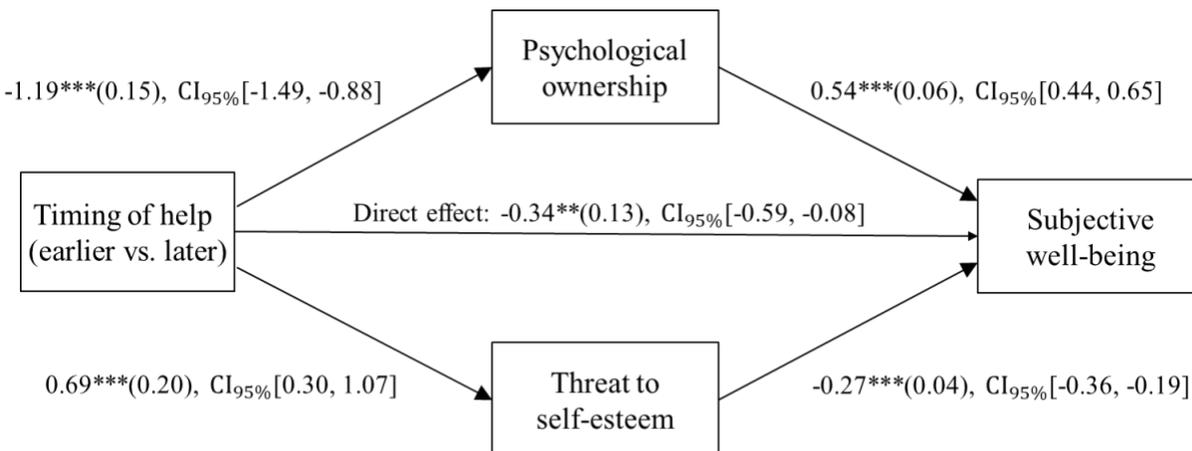
Subjective Well-Being. In support of H1, participants who received help in the later stage reported lower subjective well-being ($N = 100$; $M = 5.30$, $SD = 1.44$) than those who received

help in the earlier stage ($N = 99$; $M = 6.47$, $SD = 0.68$), $t(197) = 7.34$, $p < .001$, $d = 1.04$, $CI_{95\%}$ [0.74, 1.34].

Psychological Ownership and Mediation. Participants who received help in the later stage reported less psychological ownership of their project ($M = 4.41$, $SD = 1.27$) than those who received help in the earlier stage ($M = 5.60$, $SD = 0.87$), $t(197) = 7.70$, $p < .001$, $d = 1.09$, $CI_{95\%}$ [0.79, 1.39]. A mediation analysis using R revealed that if sequential ignorability holds, then there is evidence that psychological ownership mediated the effect of the timing of help on subjective well-being, indirect effect = -0.78, $SE = 0.15$, $CI_{95\%}$ [-1.10, -0.51]. A sensitivity test revealed that the direction of the indirect effect remains as long as the correlation between the residuals of psychological ownership and subjective well-being is less than 0.65 (explanation in Study 2; graphs in the Web Appendix).

Alternative Accounts. The conditions did not differ in the sense of indebtedness ($M_{\text{earlier}} = 3.62$, $SD = 1.29$ vs. $M_{\text{later}} = 3.66$, $SD = 1.34$), $t(197) = -0.20$, $p = .85$, but differed in the threat to self-esteem ($M_{\text{earlier}} = 2.92$, $SD = 1.25$ vs. $M_{\text{later}} = 3.61$, $SD = 1.52$), $t(197) = -3.48$, $p = .001$, $d = 0.49$, $CI_{95\%}$ [0.21, 0.78]: Participants who received help in the later (vs. earlier) stage perceived more of a threat to their self-esteem. A parallel mediation analysis revealed that both psychological ownership, $b = -0.65$, $SE = 0.13$, $CI_{95\%}$ [-0.92, -0.42], and the threat to self-esteem, $b = -0.19$, $SE = 0.06$, $CI_{95\%}$ [-0.32, -0.08], mediated the effect of timing on subjective well-being. However, psychological ownership was responsible for most of the total indirect effect of 71.3% (psychological ownership: 55.2% vs. threat to self-esteem: 16.1%; see Figure 8). We confirmed that the indirect effect through psychological ownership was larger than the indirect effect through the threat to self-esteem using the “lavaan” package in R (contrast: estimate = 0.23, $SE =$

0.06, $z = -3.90$, $p < .001$).



Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Figure 8. Parallel multiple mediation (Study 5): The effect of the timing of help on subjective well-being was mediated by both psychological ownership and the threat to self-esteem, but psychological ownership was the primary mediator, accounting for most of the total indirect effect (55.2% out of 71.3%).

Discussion

We replicated the timing effect (H1) and mediation through psychological ownership (H2) using a hypothetical scenario involving a work context. Unlike in Studies 3 and 4, we found an additional significant mediation through the threat to self-esteem; we reason that self-esteem may be more important in the setting of work than in the setting of leisure activities. Still, our analyses showed that psychological ownership was the superior mediator even in the work context.

STUDY 6: BEHAVIORAL INTENTIONS

The main purpose of Study 6 was to explore downstream consequences of the timing effect of help on subjective well-being. People who experience less satisfaction with an activity should be less motivated to engage in the activity in the future. Thus, we assessed subsequent behavioral intentions regarding the target activity. In addition, we examined another alternative

account: the recipient's perception of the helper's intention. Someone who provides help toward the end (vs. beginning) may receive more credit for the successful completion of the activity (Cryder et al., 2013; Faro et al., 2010; Shanks et al., 1989), so the recipient may perceive the helper's intention as less genuine when the help is given toward the end, and this shift in perceived intention may decrease the recipient's well-being (Weinstein & Ryan, 2010). Therefore, we measured perceptions of the helper's intention.

Method

Participants. We recruited 206 female participants on Prolific (U.S. residents) to complete the study in exchange for 0.25 euros ($M_{age} = 39.76$, $SD = 13.65$; one participant did not provide demographic information).⁴

Procedure. This study used a 2 (timing of help: earlier stage vs. later stage; between-subjects factor) \times 2 (activity: arranging flowers vs. decorating a birthday card; within-subjects factor) mixed design. Participants were randomly assigned to either the earlier- or the later-stage condition. All participants read two separate scenarios, in the same order: the flower-arranging scenario from Study 4a (specifically, the intrinsic-motivation version) and then a scenario about decorating a birthday card using a drawing app (see the Web Appendix Part 4 for an image):

Consider that you enjoy drawing as a hobby. One day, you find a new app that uses artificial intelligence (AI) to create drawings. The app identifies what a user wants and automatically creates part of the drawing. You decide to download a trial version and decorate a birthday card for your friend.

Earlier-stage condition: Soon after you start working on your drawing, the AI helper avatar appears on your screen and says, "I can help you with the initial part of your drawing!" You click OK and see the AI helper paint the background color and draw balloons tied to gift boxes for you. After this initial stage, you proceed to work on your own for several minutes and finish decorating the card.

⁴ We recruited only female participants because we assumed that flower arranging was more relevant to women. Note that Study 4a also used flower arranging, and we replicated the main effect with both genders. (We conducted Study 4a after Study 6.)

Later-stage condition: Several minutes into your drawing, the AI helper avatar appears on your screen and says, “I can help you with the final part of your drawing!” You click OK and see the AI helper paint the background color, draw balloons tied to gift boxes, and finish decorating the card for you.

After reading each scenario, participants completed the dependent measures for the scenario: subjective well-being on a three-item measure (flower arranging: $\alpha = .98$; card decorating: $\alpha = .97$), behavioral intentions regarding the target activity (“How likely would you be to come back for another flower arrangement workshop?” and “How likely would you be to purchase the app after the trial period is over?”; 1 = *very unlikely*, 7 = *very likely*), and psychological ownership of the activity on a four-item measure (“I would feel I made it on my own,” “I would feel I deserve full credit for completing the activity,” “I would think to myself, ‘I did it!’”, and “I would feel a sense of ownership for the final outcome”; 1 = *not at all*, 7 = *very much*; flower arranging: $\alpha = .96$; card decorating: $\alpha = .96$).

To test the alternative account based on perceptions of the helper’s intention, we included two separate measures in the flower-arranging scenario (“To help me get a better outcome” and “To control my outcome”; 1 = *strongly disagree*, 7 = *strongly agree*). We did not ask this question for the card-decorating scenario because the helper was not human and thus did not possess intentions. Last, for each scenario, participants reported the perceived difficulty of the helper’s work (“How difficult do you think the step performed by the [instructor / AI helper] was?”; 1 = *not at all*, 7 = *very difficult*), rated their own proficiency at the activity (1 = *not good at all*, 7 = *very good*), and indicated whether they had done each activity before (1 = *yes*, 2 = *no*). Finally, participants reported their gender and age.

Results

Subjective Well-Being. For both activities, participants in the later-stage condition reported lower subjective well-being than those in the earlier-stage condition (flower arranging: $M_{\text{earlier}} (N = 103) = 6.04, SD = 1.06$ vs. $M_{\text{later}} (N = 103) = 3.59, SD = 1.76; t(204) = 12.11, p < .001, d = 1.69, CI_{95\%} [1.37, 2.00]$; card decorating: $M_{\text{earlier}} (N = 103) = 5.82, SD = 1.17$ vs. $M_{\text{later}} (N = 103) = 5.09, SD = 1.42; t(204) = 3.97, p < .001, d = 0.55, CI_{95\%} [0.27, 0.83]$), supporting H1.

Behavioral Intentions. Participants in the later-stage (vs. earlier-stage) condition were less willing to come back for another flower-arranging workshop ($M_{\text{earlier}} = 5.51, SD = 1.44$ vs. $M_{\text{later}} = 3.50, SD = 1.60$), $t(204) = 9.49, p < .001, d = 1.32, CI_{95\%} [1.02, 1.62]$, and were less willing to purchase the drawing app ($M_{\text{earlier}} = 3.90, SD = 1.67$ vs. $M_{\text{later}} = 3.37, SD = 1.57$), $t(204) = 2.37, p = .019, d = 0.33, CI_{95\%} [0.06, 0.61]$.

Psychological Ownership and Mediation. For both activities, participants in the later-stage condition reported less psychological ownership of the activity and the outcome than those in the earlier-stage condition (flower arranging: $M_{\text{earlier}} = 5.18, SD = 1.39$ vs. $M_{\text{later}} = 2.90, SD = 1.51; t(204) = 11.30, p < .001, d = 1.58, CI_{95\%} [1.26, 1.89]$; card decorating: $M_{\text{earlier}} = 4.65, SD = 1.50$ vs. $M_{\text{later}} = 4.00, SD = 1.79; t(204) = 2.83, p = .005, d = 0.39, CI_{95\%} [0.12, 0.67]$). Separate mediation analyses using R revealed that if sequential ignorability holds, then there is evidence that psychological ownership significantly mediated the effects of the timing of help on both subjective well-being (flower arranging: $b = -1.61, SE = 0.17, CI_{95\%} [-1.95, -1.29]$; card decorating: $b = -0.33, SE = 0.12, CI_{95\%} [-0.57, -0.10]$) and behavioral intentions (flower arranging: $b = -1.49, SE = 0.19, CI_{95\%} [-1.88, -1.11]$; card decorating: $b = -0.33, SE = 0.13, CI_{95\%} [-0.60, -0.10]$). We conducted a sensitivity test for each activity: The direction of the indirect effect remains as long as the correlation between the residuals of psychological

ownership and subjective well-being is less than 0.65 (flower arranging) and less than 0.70 (card decorating; explanation in Study 2; graphs in the Web Appendix).

Perception of the Helper's Intentions. Participants in the later-stage (vs. earlier-stage) condition had a stronger belief that the flower-arranging instructor was trying to control the outcome ($M_{\text{earlier}} = 2.83$, $SD = 1.68$ vs. $M_{\text{later}} = 4.45$, $SD = 1.63$), $t(204) = -7.00$, $p < .001$, $d = 0.98$, $CI_{95\%} [0.69, 1.26]$, and a weaker belief that the instructor was trying to help them get a better outcome ($M_{\text{earlier}} = 6.27$, $SD = 0.99$ vs. $M_{\text{later}} = 5.54$, $SD = 1.35$), $t(204) = 4.41$, $p < .001$, $d = 0.62$, $CI_{95\%} [0.34, 0.89]$. That is, later help was perceived as less genuine than earlier help, consistent with the alternative account. A parallel multiple mediation analysis revealed that both psychological ownership, $b = -1.28$, $SE = 0.17$, $CI_{95\%} [-1.62, -0.97]$, and perceived intentions (“To help me get a better outcome”: $b = -0.21$, $SE = 0.08$, $CI_{95\%} [-0.38, -0.08]$; “To control my outcome”: $b = -0.15$, $SE = 0.08$, $CI_{95\%} [-0.32, -0.01]$) mediated the effect of timing on subjective well-being. However, psychological ownership was responsible for most of the total indirect effect of 67.2% (psychological ownership: 52.4% vs. perceived intentions: 14.8%). We confirmed that the indirect effect through psychological ownership was larger than the indirect effect through perceived intentions using the “lavaan” packages in R (contrast: estimate = -0.92, $SE = 0.19$, $z = -4.78$, $p < .001$).

Other Measures. For both activities, the timing conditions did not differ in the perceived difficulty of the helper's work (flower arranging: $M_{\text{earlier}} = 2.90$, $SD = 1.40$ vs. $M_{\text{later}} = 2.60$, $SD = 1.30$; $t(204) = 1.60$, $p = .11$; card decorating: $M_{\text{earlier}} = 3.04$, $SD = 1.57$ vs. $M_{\text{later}} = 2.78$, $SD = 1.55$; $t(204) = 1.21$, $p = .23$). The timing conditions did not differ in participants' perceived proficiency at flower arranging ($M_{\text{earlier}} = 3.66$, $SD = 1.61$ vs. $M_{\text{later}} = 3.37$, $SD = 1.50$), $t(204) = 1.35$, $p = .18$, but differed in their perceived proficiency at drawing using an app ($M_{\text{earlier}} = 3.21$,

$SD = 1.69$ vs. $M_{\text{later}} = 2.67$, $SD = 1.38$), $t(203) = 2.49$, $p = .014$, $d = 0.35$, $CI_{95\%} [0.07, 0.62]$.

Controlling for this variable did not change our results: subjective well-being, $F(1, 202) = 13.63$, $p < .001$, $d = 0.55$, $CI_{95\%} [0.27, 0.83]$, behavioral intention: $F(1, 202) = 4.41$, $p = .037$, $d = 0.34$, $CI_{95\%} [0.07, 0.62]$, or psychological ownership, $F(1, 202) = 6.57$, $p = .011$, $d = 0.39$, $CI_{95\%} [0.11, 0.66]$. Finally, the timing conditions did not differ in participants' prior experience with card decorating ($M_{\text{earlier}} = 29.4\%$ vs. $M_{\text{later}} = 30.1\%$), $\chi^2(1) = 0.01$, $p = .92$, but differed in prior experience with flower arranging ($M_{\text{earlier}} = 52.4\%$ vs. $M_{\text{later}} = 39.8\%$), $\chi^2(1) = 3.30$, $p = .069$.

Controlling for this variable did not change our results: subjective well-being, $F(1, 203) = 145.64$, $p < .001$, $d = 1.68$, $CI_{95\%} [1.26, 2.00]$, behavioral intention: $F(1, 203) = 90.86$, $p < .001$, $d = 1.33$, $CI_{95\%} [1.02, 1.63]$, or psychological ownership, $F(1, 203) = 124.74$, $p < .001$, $d = 1.56$, $CI_{95\%} [1.24, 1.87]$.

Discussion

Results from both activities provide converging evidence for the timing effect.

Importantly, we demonstrated a downstream consequence of the timing effect: Participants who received help later (vs. earlier) were less willing to come back for a subsequent flower-arranging workshop and were less willing to purchase the drawing app.

STUDY 7: MODERATION BY THE TYPE OF HELP

Study 7 examined the second proposed moderator of the timing effect: the type of help. Studies 1–6 involved dependency-oriented help, meaning that the helper directly contributed to the completion of the activity (Nadler, 1997, 1998, 2002). We predicted that our effect would not hold for autonomy-oriented help, which allows the recipient to maintain independence and thus should not decrease the psychological ownership of the activity (H4).

Method

Participants. We recruited 400 participants on Prolific (U.S. residents) to complete the study in exchange for 0.63 euros. We had 398 valid responses ($M_{age} = 32.95$, $SD = 11.97$, 50% male) after excluding two responses from duplicate IP addresses.

Procedure. This study used a 2 (timing of help: earlier stage vs. later stage) \times 2 (type of help: dependency-oriented vs. autonomy-oriented) between-subjects design. We used the flower-arranging scenario from Study 4a and Study 6, but we manipulated the description of the help provided by the instructor. In the dependency-oriented condition, the instructor provided direct help: “The instructor comes to you and offers her help. She picks up a few flowers and foliage, and places them in your vase.” In the autonomy-oriented condition, the instructor provided a few tips: “The instructor comes to you and gives you a few tips on how to make your arrangement look better. Based on the tips, you pick up a few flowers and foliage, and place them in your vase.” Participants completed the same dependent measures as in Studies 4a and 6, including subjective well-being ($\alpha = .96$) and psychological ownership ($\alpha = .96$).

Results

Subjective Well-Being. A two-way ANOVA on subjective well-being revealed a main effect of the timing of help ($M_{earlier} = 6.04$, $SD = 1.12$ vs. $M_{later} = 5.34$, $SD = 1.59$), $F(1, 394) = 34.30$, $p < .001$, $d = 0.59$, $CI_{95\%} [0.39, 0.79]$, a main effect of the type of help ($M_{dependency} = 5.07$, $SD = 1.57$ vs. $M_{autonomy} = 6.31$, $SD = 0.88$), $F(1, 394) = 109.09$, $p < .001$, $d = 1.05$, $CI_{95\%} [0.84, 1.26]$, and a significant two-way interaction, $F(1, 394) = 29.50$, $p < .001$, $d = 0.54$, $CI_{95\%} [0.34, 0.74]$ (Figure 9). In the dependency-oriented condition, we replicated the timing effect (H1): Help in the later (vs. earlier) stage led to lower subjective well-being ($M_{earlier} (N = 100) = 5.74$, $SD = 1.23$ vs. $M_{later} (N = 99) = 4.39$, $SD = 1.60$), $t(197) = 6.65$, $p < .001$, $d = 0.94$, $CI_{95\%} [0.65,$

1.23]. By contrast, in the autonomy-oriented condition, subjective well-being did not differ between the earlier- and later-stage conditions ($M_{\text{earlier}} (N = 100) = 6.33, SD = 0.92$ vs. $M_{\text{later}} (N = 99) = 6.28, SD = 0.85$), $t(197) = 0.40, p = .69$, consistent with H4.

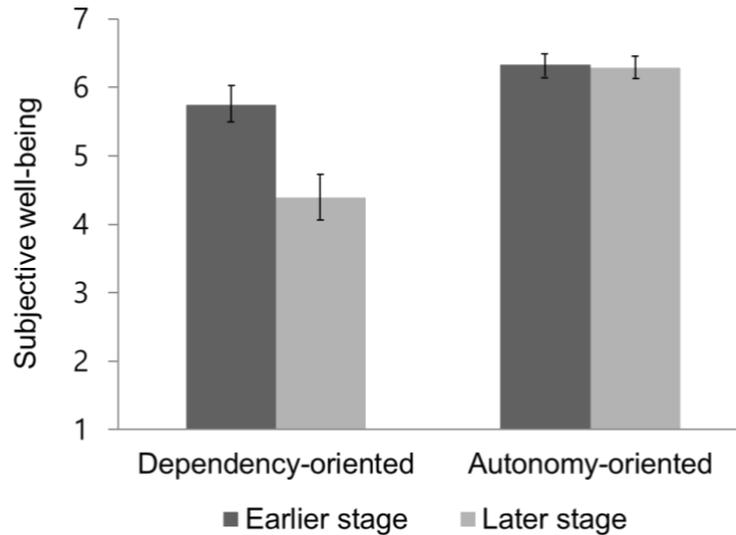


Figure 9. Dependency-oriented help in a later (vs. earlier) stage resulted in lower subjective well-being, but the timing of autonomy-oriented help did not matter for subjective well-being (Study 7). Error bars represent 95% confidence intervals.

Psychological Ownership and Moderated Mediation. A two-way ANOVA on psychological ownership revealed a main effect of the timing of help ($M_{\text{earlier}} = 5.38, SD = 1.45$ vs. $M_{\text{later}} = 4.78, SD = 1.75$), $F(1, 394) = 18.14, p < .001, d = 0.43, CI_{95\%} [0.23, 0.63]$, a main effect of the type of help ($M_{\text{dependency}} = 4.38, SD = 1.68$ vs. $M_{\text{autonomy}} = 5.78, SD = 1.23$), $F(1, 394) = 99.15, p < .001, d = 1.00, CI_{95\%} [0.79, 1.21]$, and a significant two-way interaction, $F(1, 394) = 21.48, p < .001, d = 0.46, CI_{95\%} [0.27, 0.66]$. In the dependency-oriented condition, psychological ownership was lower among participants who received help in the later (vs. earlier) stage ($M_{\text{earlier}} = 5.01, SD = 1.50$ vs. $M_{\text{later}} = 3.75, SD = 1.62$), $t(197) = 5.67, p < .001, d = 0.80, CI_{95\%} [0.51, 1.09]$. In the autonomy-oriented condition, the timing of help did not affect psychological ownership ($M_{\text{earlier}} = 5.76, SD = 1.30$ vs. $M_{\text{later}} = 5.81, SD = 1.17$), $t(197) = -0.30, p$

= .76. Mediation analyses using R revealed that if sequential ignorability holds, then there is evidence that psychological ownership mediated the effect of the timing of help on subjective well-being in the dependency-oriented condition, indirect effect = -0.89, $SE = 0.18$, $CI_{95\%} [-1.25, -0.57]$, but *not* in the autonomy-oriented condition, indirect effect = 0.03, $SE = 0.09$, $CI_{95\%} [-0.15, 0.21]$. A sensitivity test for mediation in the dependency-oriented condition revealed that the direction of the indirect effect remains as long as the correlation between the residuals of psychological ownership and subjective well-being is less than 0.75 (explanation in Study 2; graphs in the Web Appendix).

We also conducted a moderated mediation analysis (PROCESS Model 8, 5000 bootstraps) with the timing of help (earlier = -0.5, later = 0.5) as the independent variable, psychological ownership as the mediator, the type of help as the moderator (dependency-oriented = -0.5, autonomy-oriented = 0.5), and subjective well-being as the dependent variable (Figure 10). Model 8 tests if the path from the timing of help to psychological ownership is moderated by the type of help. We found a significant interaction between the timing of help and type of help on psychological ownership, $b = 1.31$, $SE = 0.28$, $p < .001$, $CI_{95\%} [0.75, 1.87]$, such that later (vs. earlier) help led to lower psychological ownership in the dependency-oriented condition, $b = -1.26$, $SE = 0.20$, $t(197) = -6.29$, $p < .001$, but not in the autonomy-oriented condition, $b = 0.05$, $SE = 0.20$, $t(197) = 0.27$, $p = .79$. The index of moderated mediation was significant, $b = 0.84$, $SE = 0.19$, $CI_{95\%} [0.46, 1.22]$; there was a conditional indirect effect in the dependency-oriented condition, $b = -0.80$, $SE = 0.15$, $CI_{95\%} [-1.10, -0.50]$, but not in the autonomy-oriented condition, $b = 0.03$, $SE = 0.11$, $CI_{95\%} [-0.18, -0.26]$.

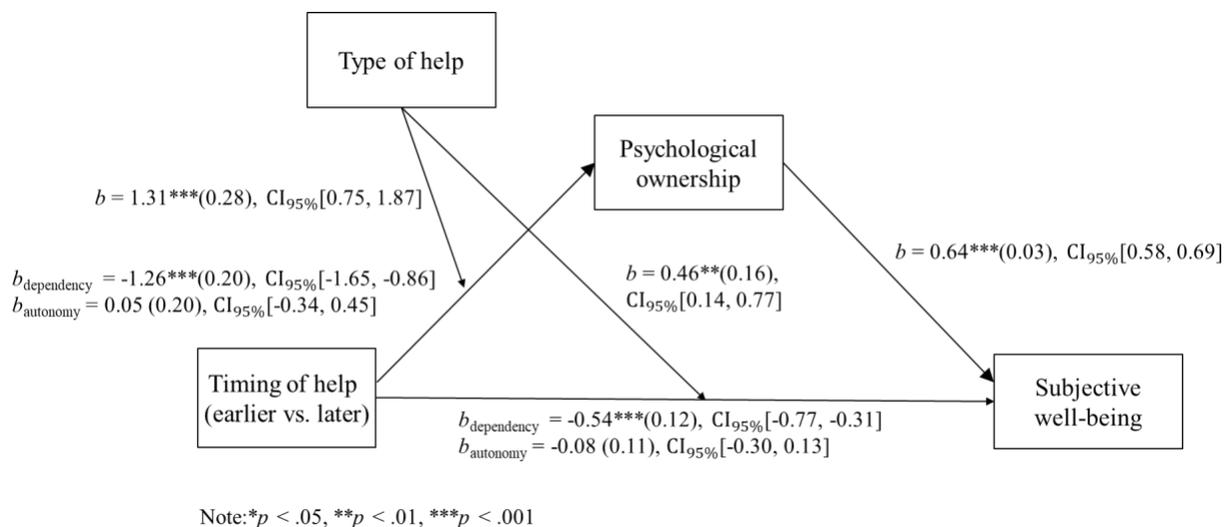


Figure 10. Moderated Mediation (Study 7): The path from the timing of help to psychological ownership was moderated by the type of help; then, psychological ownership influenced subjective well-being.

Other Measures. There were no differences among conditions in participants' interest in flower arranging (dependency-oriented: $M_{\text{earlier}} = 3.25$, $SD = 1.84$ vs. $M_{\text{later}} = 3.29$, $SD = 1.99$; autonomy-oriented: $M_{\text{earlier}} = 3.53$, $SD = 2.00$ vs. $M_{\text{later}} = 3.38$, $SD = 1.90$), $F(1, 394) = 0.24$, $p = .63$, or their perceived proficiency at flower arranging (dependency-oriented: $M_{\text{earlier}} = 2.99$, $SD = 1.63$ vs. $M_{\text{later}} = 2.96$, $SD = 1.55$; autonomy-oriented: $M_{\text{earlier}} = 3.30$, $SD = 1.65$ vs. $M_{\text{later}} = 2.99$, $SD = 1.50$), $F(1, 394) = 0.78$, $p = .38$. Participants' prior experience with flower arranging did not differ between the timing conditions within the dependency-oriented condition ($M_{\text{earlier}} = 30.0\%$ vs. $M_{\text{later}} = 24.2\%$), $\chi^2(1) = 0.83$, $p = .36$, but did differ within the autonomy-oriented condition ($M_{\text{earlier}} = 39.0\%$ vs. $M_{\text{later}} = 24.2\%$), $\chi^2(1) = 5.01$, $p = .025$. Controlling for this variable did not alter our effects: subjective well-being, $F(1, 393) = 30.43$, $p < .001$, $d = 0.55$, $CI_{95\%} [0.35, 0.75]$, or psychological ownership, $F(1, 393) = 22.20$, $p < .001$, $d = 0.47$, $CI_{95\%} [0.27, 0.67]$.

Discussion

In Study 7, the timing effect occurred with dependency-oriented help, consistent with H1 and the results of Studies 1–6, but not with autonomy-oriented help, supporting H4. When help

elicits feelings of dependency by infringing upon the recipient's autonomy, the timing of help matters—later (vs. earlier) help is more harmful to the recipient's well-being. When help allows the recipient to maintain autonomy, however, the timing of help does not matter.

GENERAL DISCUSSION

Previous literature on social support and helping has shown that help can psychologically harm recipients by threatening self-esteem and by inducing a sense of indebtedness or inequity (e.g., Bolger et al., 2000; Coyne et al., 1988; Deelstra et al., 2003; Fisher et al., 1982; Gleason et al., 2003; Nadler, 2002, 2015; Tsang, 2006; Watkins et al., 2006). The current research proposes the timing of help as a novel situational factor that modulates the negative effect of help on the recipient's subjective well-being. Whereas most prior literature has examined the effect of help on recipients in the face of stressors, we examine the effect of help on recipients who are pursuing intrinsically-motivating activities. In nine studies, we show a *timing effect*: Recipients experience less happiness and satisfaction when help is given in a later (vs. earlier) stage of the activity. The timing effect occurs with various activities and types of helpers, and in both hypothetical scenarios (Studies 1, 4a, 4b, 5, 6, and 7) and real activities with real help (Studies 2, 3a, and 3b).

We show that the timing effect is mediated by a decrease in the recipient's psychological ownership of the activity (Studies 2–7); psychological ownership decreases more with later (vs. earlier) help. We also identify two important theoretical moderators: The timing effect holds when the recipient is intrinsically motivated but not when the recipient is extrinsically motivated (Studies 4a and 4b), and the effect holds with dependency-oriented help but not with autonomy-oriented help (Study 7). Lastly, we demonstrate a downstream consequence of the timing effect:

People who experience less happiness and satisfaction upon receiving later help are less likely to pursue the activity in the future (Study 6).

Alternative Accounts

We addressed several alternative accounts. First, prior literature on social support has identified a perceived threat to self-esteem (Fisher et al., 1982; Nadler, 2015) and a sense of indebtedness or inequity (Buunk et al., 1993; Gleason et al., 2003; Tsang, 2006; Watkins et al., 2006) as important mechanisms by which help can be detrimental for a recipient's well-being. We engaged with the alternative accounts in two ways. First, we verified that the timing effect cannot be explained fully by self-esteem or indebtedness. The alternative mechanisms were identified in contexts of close or ongoing relationships, so we tested whether the timing effect occurs in settings without close relationships, such that self-esteem and indebtedness should have minimal relevance: with a non-human AI helper (Studies 3a and 6) and with an anonymous helper (another participant; Studies 2 and 3b). We replicated the timing effect in all cases. Second, to evaluate whether self-esteem or indebtedness might contribute some to the timing effect, we included measures for the two mechanisms in Studies 3–5, some of which involved close relationships (a roommate in Study 4b; a colleague in Study 5). In most studies, our timing manipulation did not influence the perceived threat to self-esteem or sense of indebtedness (see Table S9 in the Web Appendix). In the cases with significant or marginally significant differences between the earlier- and later-stage conditions, we consistently found that our proposed mechanism (psychological ownership) was either the only mediator or the superior mediator of the timing effect. In the context of intrinsically-motivating activities, we conclude that psychological ownership is the most parsimonious and compelling account for the timing effect. We reason that self-esteem and indebtedness may be less important for leisure activities

(featured in all but one study) than for activities in which demonstrating self-competence is more relevant (e.g., exams, work). In fact, in our only study that involved a work activity rather than a leisure activity (Study 5), the threat to self-esteem contributed to the timing effect (but was a weaker mediator than psychological ownership).

Second, research has shown that an item administered at the end of a test feels more difficult than the same item administered at the beginning (Leary & Dorans, 1985; Nagy et al., 2018). If a helper completes part of the task that seems more (vs. less) difficult, it may cause more damage to the recipient's perceived ownership and subjective well-being. To address this account, we measured the perceived difficulty of the helper's work in Studies 1, 2, 3b, 4, and 6. We found no systematic pattern: There were no differences in Studies 1 (Lego task), 4, or 6 (both tasks), while later help was perceived as more difficult in Study 1 (Rubik's Cube task), and earlier help was perceived as more difficult in Studies 2 (pet blocks) and 3b (jigsaw puzzle). All our results were qualitatively the same when we controlled for perceived difficulty.

Lastly, it is possible that recipients who receive help later (vs. earlier) perceive the helper's intention as less genuine (e.g., to gain more credit for the activity or to exercise more control over the recipient; Faro et al., 2010; Shanks et al., 1989), and receiving help that seems less genuine may decrease the recipient's well-being (Weinstein & Ryan, 2010). In Study 6, we measured perceptions of the helper's intention, and we found that later help was perceived as less genuine than earlier help. The difference in perceived intention contributed to the timing effect, but psychological ownership was a much stronger mediator.

Theoretical and Practical Implications

The current research makes several contributions to the literature on social support and helping. First, the current research is the first to document the effect of the timing of help on the

recipient's subjective well-being, adding a novel situational moderator to prior research that has tested characteristics of the task, helper, and help as moderators of the effect of receiving help. Second, we identify a novel mechanism underlying the negative effect of help on recipients: psychological ownership. Although we acknowledge that multiple mechanisms may be in play, we find that psychological ownership is a more consistent and superior explanation than the mechanisms identified in prior research, including the threat to self-esteem and sense of indebtedness or inequity (Buunk et al., 1993; Fisher et al., 1982; Gleason et al., 2003; Nadler & Fisher, 1986; Tsang, 2006; Watkins et al., 2006).

Relatedly, the current research contributes to the literature on psychological ownership (Baer & Brown 2012; Belk, 1988; Dirks et al., 1996; Kirk et al., 2018; Pierce et al., 2003). Although the literature has identified various factors that reduce psychological ownership (see Dawkins et al., 2017 for review), no link has been made between helping and psychological ownership. Our research shows that the provision of help, which may be a generous behavior from the helper's perspective, can cause unintended consequences by infringing upon the recipient's psychological ownership, and this effect is more pronounced when the help is given toward the end (vs. beginning).

The current research also contributes to the literature on interpersonal goal pursuit. Prior studies have shown that the reactions of help recipients vary with the level of goal progress. Specifically, people appreciate helpers more during a task than after the task (Converse & Fishbach, 2012), and people feel closer to significant others who are instrumental for a goal when goal progress is low than when it is high (Fitzsimons & Fishbach, 2010). We contribute to this literature by studying the effect of the timing of help on subjective well-being, and our

findings support the conclusion of prior studies: Help in a later stage of goal pursuit produces more negative effects (in our case, lower subjective well-being).

Finally, the current research has implications for the broader literature on goal pursuit. Prior research has suggested that motivation generally increases with proximity to the desired end state (i.e., the goal-gradient hypothesis; Förster et al., 1998; Kivetz et al., 2006; Losco & Epstein, 1977; Nunes & Drèze, 2006), partly because each action in a later (vs. earlier) stage has a greater perceived impact on goal completion (Brendl & Higgins, 1996; Förster et al., 1998; Koo & Fishbach, 2012). Our findings reveal a similar “goal-gradient” pattern in the effect of help, which has a larger negative impact on the recipient’s well-being when given closer to the recipient’s completion of the activity.

Our findings provide important practical implications for those who wish to give help in ways that are most beneficial for recipients. First, help providers (e.g., instructors, educators, parents) should be aware that the timing of help matters if their help is dependency-oriented and help recipients are intrinsically motivated. It is better to give help as early as possible in an activity to minimize negative consequences for the recipient’s subjective well-being—an important determinant of the recipient’s motivation to pursue similar activities in the future, as shown in Study 6. Second, designers of help interventions within products and services should note that our effect applies to not only human helpers but also AI helpers (Studies 3a and 6), which are increasingly popular tools for customer service and assistance. Finally, in the workplace, mentoring is often used to help new employees adapt and gain proficiency at required tasks. Employees tend to develop a sense of ownership of their projects/tasks (Parker, 2000; Parker et al., 1997, 2006), and ownership is important for their job satisfaction as well as performance (Mayhew et al., 2007; Pierce et al., 2009, Van Dyne & Pierce, 2004). Therefore,

mentors should attempt to provide help near the beginning rather than the end of projects (assuming that mentees are intrinsically motivated to pursue the projects) to minimize harmful effects on the mentees' well-being.

Limitations and Directions for Future Research

We wish to highlight several limitations, which create potential directions for future research. First, although three of our studies use actual behavior to demonstrate the main timing effect and mediation through psychological ownership, we test the moderators (the type of motivation and type of help) with scenario studies, only. For example, in Studies 4a and 4b, we found the timing effect when participants imagined having intrinsic motivation but not when they imagined having extrinsic motivation. Although these findings support our theorizing, imagined motivation can differ from actual motivation. We acknowledge that future research could offer stronger conclusions with behavioral studies.

Second, most of our studies used leisure activities (i.e., hobbies), because they are typical examples of intrinsically-motivating activities. However, we believe that the timing effect should generalize to any activity for which the help recipient is intrinsically motivated, such that they feel ownership of the activity as they work toward completion. We provided preliminary evidence by replicating the timing effect in a work setting (Study 5: an architect working on an intrinsically-motivating design project), but future research could offer more nuanced practical implications for workplaces by testing the effect in a variety of work scenarios, perhaps identifying boundary conditions that are unique to the workplace. (We expect our boundary conditions of the type of motivation and type of help to hold in the workplace, though we did not test them here.)

Relatedly, most prior literature on social support has examined how emotional support influences the recipient's ability to cope with stressors. As the current research focused on enjoyable activities, it is unclear whether the timing effect would generalize to stressful events. We predict that as long as people are intrinsically motivated (whether they are coping with stressors or pursuing a hobby), they should feel psychological ownership of the outcome, and the timing effect should apply. For some stressors (e.g., illness, depression) for which people may not develop psychological ownership, the timing effect would not apply. It is also possible that the contributions of alternative mechanisms (namely, a threat to self-esteem and sense of indebtedness) may increase in a context of stressful events, as coping with stressors is more relevant to these mechanisms. Future research should examine these important questions.

Third, with the exception of Study 1 and Study 6 (card decorating), we focused on unsolicited help (also called "assumptive help"). Prior literature has explored how solicited versus unsolicited help affects recipients (Nadler, 2015). At first blush, unsolicited help seems to pose a greater threat to the recipient's freedom of action and should be more likely to trigger reactance (Brehm, 1966; Nadler, 2015). However, research suggests a more complex relationship. For example, Asian Americans appreciate unsolicited help more than solicited help, while European Americans react similarly to both types (Mojaverian & Kim, 2013); reactions toward solicited versus unsolicited help are influenced by other variables including group membership (Halabi et al., 2016, 2018), ethnicity (Schneider et al., 1996), and task difficulty (Halabi et al., 2011). We found that our timing effect applied to both solicited and unsolicited help in Study 1, but in light of the complex findings related to this moderator, future research should adopt a more systematic approach with actual help exchanges. Relatedly, future research can examine whether the stage of the task and type of motivation influence whether individuals

choose to ask for help. It would be interesting to test whether individuals strategically seek help at earlier stages to protect their psychological ownership of the activity and maximize their well-being.

Finally, the current research explores how the timing of help moderates *detrimental* psychological effects on the help recipients, but one may wonder whether the timing of help matters for *positive* psychological effects such as belongingness and gratitude (Brewer, 1991; Fowler et al., 2013; Nadler, 2020). Future research may systematically examine the role of timing in situations where help is expected to improve the recipient's well-being. We speculate that the opposite pattern may arise: Later (vs. earlier) help may be more appreciated by the recipient because the recipient perceives later help as more instrumental, so they are more grateful for it.

Conclusions

Previous research has shown that help can cause psychological distress for the recipients. The current research proposes a novel situational factor that modulates the negative effect of help: the *timing* of help. When receiving help in a later (vs. earlier) stage of an activity, people perceive a greater loss of psychological ownership of the activity, so they experience less happiness and satisfaction. The timing effect occurs when recipients are intrinsically motivated to do the activity and when help is dependency-oriented. Next time you provide dependency-oriented help to an intrinsically-motivated individual, try to do it early.

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