An Experience Sampling Method Intervention on Acts of Kindness for Strong and Weak Social Ties: A Randomized Controlled Trial

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Abstract

Literature on performing acts of kindness (AOKs) displays conflicting perspectives on its efficacy for improving mental wellbeing. One reason for this might be that the underlying mechanisms of AOK interventions remain largely unexplored. The main aim of this study was to better understand the effectiveness and the underlying mechanisms of performing AOKs. The social tie with the beneficiary of an AOK, the effort, which is put into an AOK, and the motives of the benefactor when performing the AOK were studied in relation to each other and to mental wellbeing. A single-blind randomized controlled design in combination with an Experience Sampling Methods (ESM) intervention was implemented, utilizing three conditions: AOKs towards strong social ties (n = 11), AOKs towards weak social ties (n = 12), and tracking emotions (n = 11). Dutch and German university students were recruited for this study (n = 34). Outcome measures were mental wellbeing (MHC-SF), perceived stress (PSS), depressive symptoms and anxiety (HADS), as well as positive and negative affect. Results demonstrated that tracking emotions and performing AOKs both lead to improved mental wellbeing. The social tie did not make a difference for any health outcome. A stronger social tie led to more effort but did not influence motives. Effort, motives, and their interaction did not affect any health outcome. Future studies should further investigate the effectiveness of AOK interventions compared to other interventions, and additional research is needed to gain more insights into the underlying mechanisms of performing AOKs.

Introduction

Positive Psychology and Positive Psychological Interventions

Positive psychology emphasizes the necessity to adopt a more open and appreciative perspective on humans and their mental health. It suggests that not only pathology is relevant for mental health and functioning but further, positive qualities of an individual or community need to be considered (Snyder & Lopez, 2001; Wood & Tarrier, 2010). Research supports this claim and shows that nourishing positive resources can decrease stress, somatization, symptoms of depression, anxiety, and it can act as a buffer against mental illness (Bono et al., 2013; Lee Duckworth et al., 2005). In addition, it can enable an individual to grow beyond the absence of pathology into a state of flourishing, which describes an optimal state of experiencing positive emotions, engagement, meaning, positive relationships, as well as accomplishment (Jankowski et al., 2020; Peter et al., 2011; Scorsolini-Comin et al., 2013). Hence, not only clinical populations can benefit from positive psychology, but also people, who have not been diagnosed with any pathology (Linley et al., 2009).

Through Positive Psychological Interventions (PPIs), the theory behind positive psychology is connected to practice. PPIs aim at cultivating positive subjective experiences, developing positive individual traits, and building civic virtue and positive institutions (Meyers et al., 2013). There is strong, consistent support for their effectiveness across literature (Boiler et al., 2013; Donaldson et al., 2019; Hendriks et al., 2020). For example, the recent meta-analysis from Carr et al. (2021), which included 347 different studies and over 72.000 participants, provides evidence that PPIs have a significant positive effect on wellbeing, strengths, and quality of life, while decreasing symptoms of depression, anxiety, and stress. Hence, PPIs can be regarded reliable tools to target and enhance positive change.

Kindness Interventions and Acts of Kindness

Kindness interventions are a type of PPI, which focus on nourishing kind behaviour towards the self or others. Literature suggests that being kind towards others and acting prosocial can be favoured over self-kindness in terms of positive effects on one's own wellbeing (Fiselier, 2018; Nelson et al., 2016; Nelson-Coffey et al., 2021). Prosocial behaviour is defined as being "voluntary, intentional behaviour that results in benefits for another person" (Eisenberg & Miller, 1987, p. 92). Instructions for kindness interventions employing prosocial behaviour are often formulated as the following: "During the coming week, please perform at least five acts of kindness per day... Examples of acts of kindness are: holding a door for someone at university, greeting strangers in the hallway… etcetera." (Curry et al., 2018, p. 323) Hence, Acts of Kindness (AOKs) are often incorporated in such kindness interventions, as for their nature of being simple, accessible to everyone, and easy to implement (Curry et al., 2018).

A range of studies provide evidence that performing AOKs has many health benefits, such as experiencing an increased positive affect, life satisfaction, will to live, happiness, or a decrease in symptoms of depression, anxiety, or somatization (Curry et al., 2018; Dulin et al., 2001; Dulin & Hill, 2003; Ghergel et al., 2021; Mongrain et al., 2018; Rowland & Curry, 2019; Schacter & Margolin, 2019). However, some studies oppose the idea that performing AOKs is an especially efficient tool to improve people's mental wellbeing. For example, the study of Buchanan and Bardi (2010) found that performing acts of novelty, meaning acts which are new or unusual for a person, leads to the same improvements in life satisfaction compared to performing AOKs. Additionally, Ko et al. (2021) found that recalling AOKs might already be as effective in improving wellbeing, as actually performing AOKs. This criticism is further reflected in the meta-analysis of Curry et al. (2018), which included 27 different studies on the efficacy of kindness interventions in improving wellbeing. They

found that 7 out of the 27 interventions had a small negative effect on wellbeing on average across the participants. Hence, AOK interventions might not be the most efficient choice to increase mental wellbeing, compared to other PPIs. This discrepancy in literature on AOK interventions' effectiveness might be explained by the unexplored, underlying mechanisms, which are involved when performing AOKs and conducting other kindness interventions.

The Evolution of Human Kindness

Already back in the 1960s, evolutionary biopsychologists tried to gain insights into the origin and development of human kindness behaviours. Two of the most relevant and well-substantiated theories in this domain are the Inclusive Fitness Theory and the Reciprocal Altruism Theory (Axelrod & Hamilton, 1981; Hamilton, 1964; Marshall, 2015; Osiński, 2009; Stenseth & Smith, 1984; Trivers, 1971, Van Baalen & Jansen, 2006). The Inclusive Fitness Theory describes that the usage of kindness is largely influenced by the degree of genetic relatedness between the benefactor and beneficiary of the kind act (Hamilton, 1964). More specifically, Hamilton (1964) argues that kindness towards kin (genetic relatives) is favoured by evolution, as it increases the chance of our own genes being passed on. This mechanism is called kin altruism. Further, the Reciprocal Altruism Theory of Trivers (1971) states that our genes being passed on is not the only motivation for being kind. He explains that evolution also favours kindness if there is a high probability of seeing the beneficiary again in the future and receiving a similarly kind act back. Thus, the cost and benefit of being kind need to be balanced to a certain degree. This mechanism is called reciprocal altruism. As demonstrated by Fletcher and Zwick (2006) these two theories are not distinct explanations for human kindness, but rather complement each other because both forms of altruism underlie the same main determinant – having a direct or indirect future benefit from being kind. Transferring this theoretical knowledge of kin and reciprocal altruism onto the context

of AOK interventions provides relevant implications and potential explanations for previously conflicting study results.

The Social Tie with the Beneficiary

The first, and most obvious implication of kin and reciprocal altruism, is the notion that it is relevant towards whom one is kind. The theories clearly favour being kind towards family members, friends, or other ingroup members compared to, for example, complete strangers, whom we are unlikely to see again in the future (Hamilton, 1964; Trivers, 1971). Thus, it is reasonable to argue that the effects of performing an AOK might be influenced by the type of beneficiary. According to Aknin et al. (2011), the relationship strength that the benefactor of an AOK has with its beneficiary can be broadly divided into two categories: *Strong social ties* describe the relationship with close friends and family, while *weak social ties* represent a relationship with less frequent contact, lower emotional intensity, and limited intimacy. Based on kin and reciprocal altruism, it can be hypothesized that performing an AOK towards someone, with whom one shares a strong social tie, leads to better health outcomes compared to a weak social tie. However, the few studies, which examined the role of the social tie for performing AOKs until now, are not all in line with this idea.

For example, the study of Alden and Trew (2013) investigated the effects of performing AOKs on positive affect in socially anxious students. Within their study design, they accounted for strong and weak social ties. The results indicated that the strength of the social tie did not predict differences in positive affect, which opposes the idea of the evolutionary theories on kindness behaviour (Hamilton, 1964; Bissonnette et al., 2015; Trivers, 1971; Gintis et al., 2001). Further, the study of Rowland and Curry (2019) systematically investigated the influence of social ties on the effects of a kindness intervention regarding subjective happiness and their findings were similar. The study

included adults and employed four different experimental conditions for strong social ties, weak social ties, AOKs towards the self, as well as observing AOKs. The participants were instructed to perform at least one AOK per day throughout the timeframe of a week. The results of the study show that all conditions led to equal improvements in happiness, which also suggests that the recipient is not relevant for the health outcomes of performing AOKs.

However, the study of Wieners et al. (2021) came to a different conclusion. It is the only other study identified, which employed experimental conditions to systematically investigate the role of social ties in the context of kindness interventions. The study utilized three conditions: a strong social ties condition, weak social ties condition, as well as a control condition in which participants did not receive specific instructions on the person towards whom they should perform the AOKs. Only university students were included, and they were instructed to have one kindness day per week on which they should perform five AOKs, throughout the timeframe of a month. In contrast to the previous studies, the results of this paper show that performing AOKs towards people with whom one has a strong social tie leads to higher mental wellbeing compared to the other conditions. Hence, the role of the social tie in the context of performing AOKs is not entirely clear yet. This discrepancy in literature might be explained by other mechanisms underlying human kindness behaviour, which might be related to the social tie.

The Effort put into an AOK

First, it is a logical assumption that the social tie, which we have with someone, directly influences how much energy and effort we are willing to invest into that person. As an example, imagine the situation that you are asked whether you would drive 4 hours to pick someone up from the airport and theoretically you would have all capabilities to do so. Your reaction would still be likely to be dependent on the person, who asks to be picked up. If it

were your best friend, the probabilities that you would perform this kind act might be high. But if it was an acquaintance, who you once met at a party, you might be more inclined to reject. This can be explained by the idea of reciprocal altruism and wanting the cost-benefit-ratio of our kindness to be balanced (Lehmann & Keller, 2006; Axelrod & Hamilton, 1981; Trivers, 1971; Cosmides & Tooby, 2005; McCullough & Pedersen, 2013). The probability that your best friend might return a similarly high-effort favour, after you drove 4 hours to pick them up, seems moderate to high. In contrast, the chance that your acquaintance might return a similarly high-effort favour seems much lower. Therefore, this example showcases, that a stronger social tie with the beneficiary of our kindness is likely to lead to more effort, which we are willing to put into our kind behaviour. Further, it shows that putting more effort into an AOK is likely to be more beneficial for our own health, as it increases our chances of receiving a similarly high-effort AOK back.

This relationship between social ties and effort might be a reason for the conflicting study results regarding the role of the social tie for the health benefits of AOK interventions. Instead of the social tie directly influencing the effectiveness of performing AOKs, it might rather be the case that it directly influences effort. Therefore, it would only indirectly impact the health benefits, which can be expected from an AOK intervention. Still, effort has rarely been measured across papers on AOK interventions until now. The study of Fiselier (2018) highlights this lack in literature and states that "…bringing someone to the airport is measured as equal to paying someone's coffee. It is however likely that those are not equal in the effect that they might have on… wellbeing." (p. 22). Therefore, this current study will monitor the effort put into a performed AOK and investigate its relationship with the social tie, and its role for the health benefits of a kindness intervention.

The Motives of the Benefactor

Further, kin, and reciprocal altruism describe that the benefactors' motives play a crucial role when being kind towards others as well. For example, the theories explain that we often evaluate whether being kind is worth it in terms of an expected returned favour in the future (Axelrod & Hamilton, 1981; Trivers, 1971; Cosmides & Tooby, 2005; McCullough & Pedersen, 2013). Looking back at the situation of driving 4 hours to pick someone up from the airport and imagining that you decided to do it for both, your best friend and your acquaintance, your motives in both instances are likely to be different from each other. On the one hand, you know that you can probably expect to gain something back from your best friend after performing such a kind act. This underlying motive could be described as self-oriented. On the other hand, you are aware that it is unlikely that you will receive a similar favour back from your acquaintance, but you still decide to help. In this case, one might consider the underlying motive to be other-oriented. This implies that our underlying motives, when performing the same AOK, can be influenced by the social tie, which we have with the beneficiary of our kind act. It can be hypothesized that a stronger social tie with the beneficiary of an AOK leads to more self-oriented and less other-oriented motives within the benefactor (Hamilton, 1964; Axelrod & Hamilton, 1981).

Literature supports the idea that our motives are relevant in the context of kindness behaviour, but no papers could be identified, which investigated motives in the context of AOK interventions yet. The paper of Crocker et al. (2017) describes that one can distinguish between *selfishness*, meaning the own benefit is the main motivation for an act towards another person, and *otherishness*, meaning the recipient's benefit is the main motivation for an act towards that person. Research found that, for example, recalling otherish motives of prosocial spending led to higher positive affect compared to selfish motives (Wiwad & Aknin, 2017). Further, having otherish motives for volunteer work lead to a lower mortality risk compared to selfish motives (Konrath et al., 2012). Hence, evaluating our own motives

as otherish can be considered superior for our wellbeing, compared to evaluating our motives as selfish.

By not accounting for these motives of the benefactor, earlier studies could have come to misleading conclusions about the role of the social tie for performing AOKs. One can argue that the positive influence of a stronger social tie on the health benefits of performing AOKs, could be counteracted by the simultaneously occurring negative influence of more selfish and less otherish motives. Hence, this current study aims to monitor the motives of an AOK's benefactor along the dimensions of selfishness and otherishness and explore their relationships with the social tie and the mental health outcomes of a kindness intervention.

Current Research

The aim of the current study was to extend existing research on the efficacy and the underlying mechanisms of performing AOKs, within the population of Dutch and German university students. The main focus was to explore whether there are differences in the effect of a 7-days AOK intervention on different health outcomes (wellbeing, perceived stress, depressive symptoms, anxiety, positive affect, and negative affect) in regard to a strong social tie with the beneficiary (e.g., family and friends), a weak social tie with the beneficiary (e.g., strangers), or performing no AOKs, but keeping track of one's own emotions. It was hypothesized that performing AOKs leads to higher mental wellbeing compared to tracking emotions (H1), and that performing AOKs towards people with whom one has a strong social tie leads to higher mental wellbeing compared to a weak social tie (H2). The secondary focus of the current study was to explore the relationship between the social tie, the effort put into an AOK, and the motives of an AOK's benefactor. It was hypothesized that a stronger social tie with the beneficiary leads to higher levels of effort (H3), more selfish (H4a), and less otherish motives (H4b). Finally, the relationship between effort, motives, and the health

outcomes, expected from a kindness intervention, were investigated. It was hypothesized that higher levels of effort (H5), less selfish (H6a), and more otherish motives (H6b) result in higher mental wellbeing. Additionally, it was expected that the interaction between high effort levels and less selfish motives (H7a), as well as high effort levels and more otherish motives lead to the highest mental wellbeing (H7b).

Methods

Design

The ethical approval for this current study was granted on April 19, 2022, by the University of Twente BMS Ethical Committee. A single-blind randomized controlled design was implemented in combination with an Experience Sampling Methods (ESM) intervention. Three study conditions were implemented for performing AOKs towards strong social ties (n = 11), performing AOKs towards weak social ties (n = 12), and tracking the own emotions (n = 11).

Participants

For this current study, only university students studying in the Netherlands, or Germany, who speak either Dutch, German, or English on the level of B2 or higher, were included (n = 34, 62.86% female). The mean age of the sample was 22 and most of the participants were German (80%), while a smaller proportion was Dutch (20%). Testing the randomization of participant characteristics across conditions, utilizing a Chi-square test and one-way ANOVA, revealed that age, nationality, and academic year were significantly different across the study conditions (see Table 1). On average, participants in the weak social ties condition were one year younger, mostly at the start of their studies, and more

individuals were Dutch instead of German compared to the other conditions. These main differences imply that randomization between conditions was not entirely successful.

Table 1. Participant characteristics in all study conditions and chi-square/one-way ANOVA test outcomes on the mean differences between the conditions

	Strong social ties (n=11)	Weak social ties (n=12)	Control Condition (n=11)	Chi-square and one-way ANOVA (n=34)	
				F	P
Age, M (SD)	22.36 (1.57)	21.08 (1.31)	22.73 (1.90)	3.37	**.05**
Gender, n (%)				2.47	.29
Female	9 (81.8%)	7 (53.8%)	6 (55.5%)		
Male	2 (18.2%)	6 (46.2%)	5 (45.5%)		
Nationality, n (%)				11.22	**.02**
Dutch	0 (0%)	5 (38.5%)	0 (0%)		
German	11 (100%)	7 (53.8%)	10 (90.9%)		
Other	0 (0%)	1 (7.7%)	1 (9.1%)		
Academic Year, n (%)				15.65	**.05**
1st year	2 (18.2%)	7 (53.8%)	2 (18.2%)		
2nd year	1 (9.1%)	2 (15.4%)	1 (9.1%)		
3rd year	0 (0%)	2 (15.4%)	4 (36.4%)		
4th year	7 (63.6%)	1 (7.7%)	2 (18.2%)		
Other	1 (9.1%)	1 (7.7%)	2 (18.2%)		
Education, n (%)				5.9	.44
Highschool Diploma	5 (45.5%)	9 (69.2%)	6 (54.5%)		
Bachelor's degree	5 (45.5%)	1 (7.7%)	4 (36.4%)		
Master's degree or higher	0 (0%)	1 (7.7%)	0 (0%)		
Other	1 (9.1%)	2 (15.4%)	1 (9.1%)		

Procedure

Participants were recruited through a mix of snowball- and convenience-sampling. The study was made available on the website ‘Sona Systems’ from the University of Twente and another public recruiting website called ‘Survey Circle’. Moreover, the researcher actively contacted and mobilized private contacts via social media with a default message. People who were interested could gain access to the website Qualtrics (https://qualtrics.com) via a provided link. On Qualtrics, they needed to confirm that they adhered to the inclusion criteria, and they received further information on the study. They were instructed to download the app ‘Ethica’ and randomly received one out of three study codes, each belonging to one of the three study conditions.

After signing into Ethica with the random study code, the participants gave informed consent and could choose their preferred language for the study, that was English, Dutch, or German. After doing so, they received an app-notification which reminded them to conduct the first baseline survey (T0). At the end of the survey, all participants were informed that they would start with the intervention week the following day. Throughout the 7-days intervention period, the participants in all conditions needed to report on their positive and negative affect. The number of surveys which got prompted to the participants throughout the intervention week was inspired by *The Open Handbook of Experience Sampling Methodology* (Dejonkheere & Erbas, 2021). Throughout the time frame of 10 a.m. until 10 p.m. ten equal time intervals were created, and the surveys got prompted to the participants once at a random time within each interval. Thus, participants received ten momentary assessments on positive and negative affect every day throughout the intervention week. Further, participants in the experimental conditions were instructed to perform at least one AOK every day. If they indicated that they performed a new AOK at the end of the assessment survey, additional questions were asked about the closeness with the beneficiary,

the effort put into the AOK, and their underlying motives for that AOK (see Figure 1). One day after the 7-days intervention period, the participants received a second notification for the post-test survey (T1) and a follow-up measurement was prompted to the participants two weeks after the intervention ended (T2). At all three points in time (T0, T1, and T2), the participants received the same survey on mental wellbeing, perceived stress, depressive symptoms, as well as anxiety.

Many participants, who were initially interested in the study, did not sign up in Ethica after receiving more detailed information on the study procedure (see Figure 2). Further, there was a high dropout rate throughout the intervention week, which is why only 18 out of the 34 participants filled in the post-test. Lastly, due to time constraints throughout the process of this master thesis, data for the follow-up survey could not be implemented in the analysis and was entirely excluded.

Figure 1

Overview on the study components over time in days for each study condition

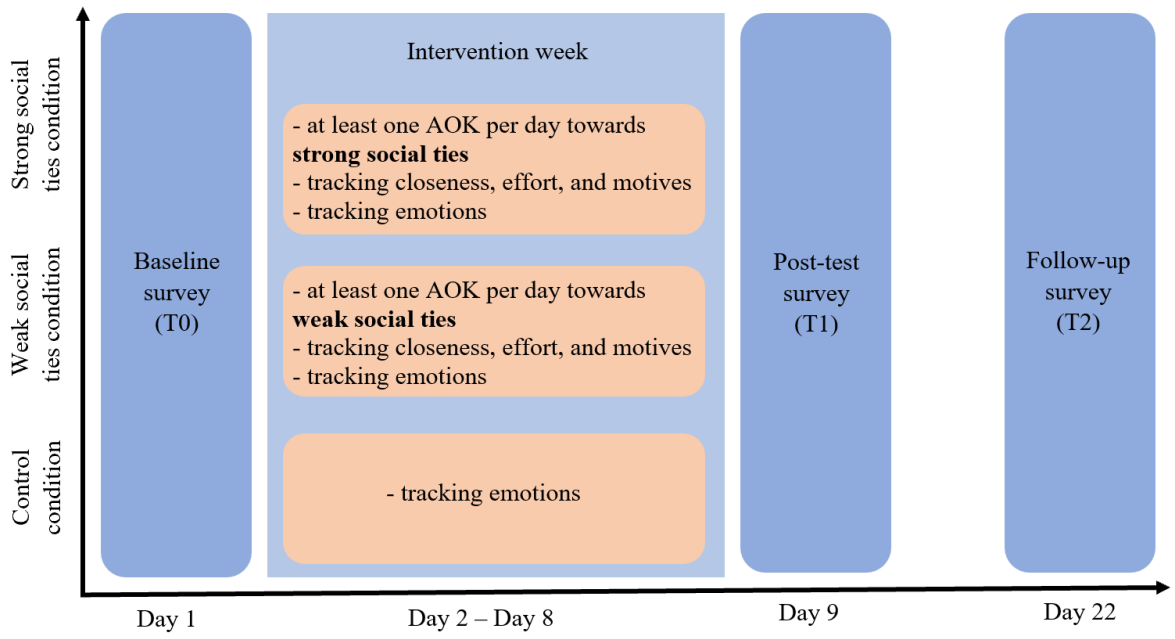
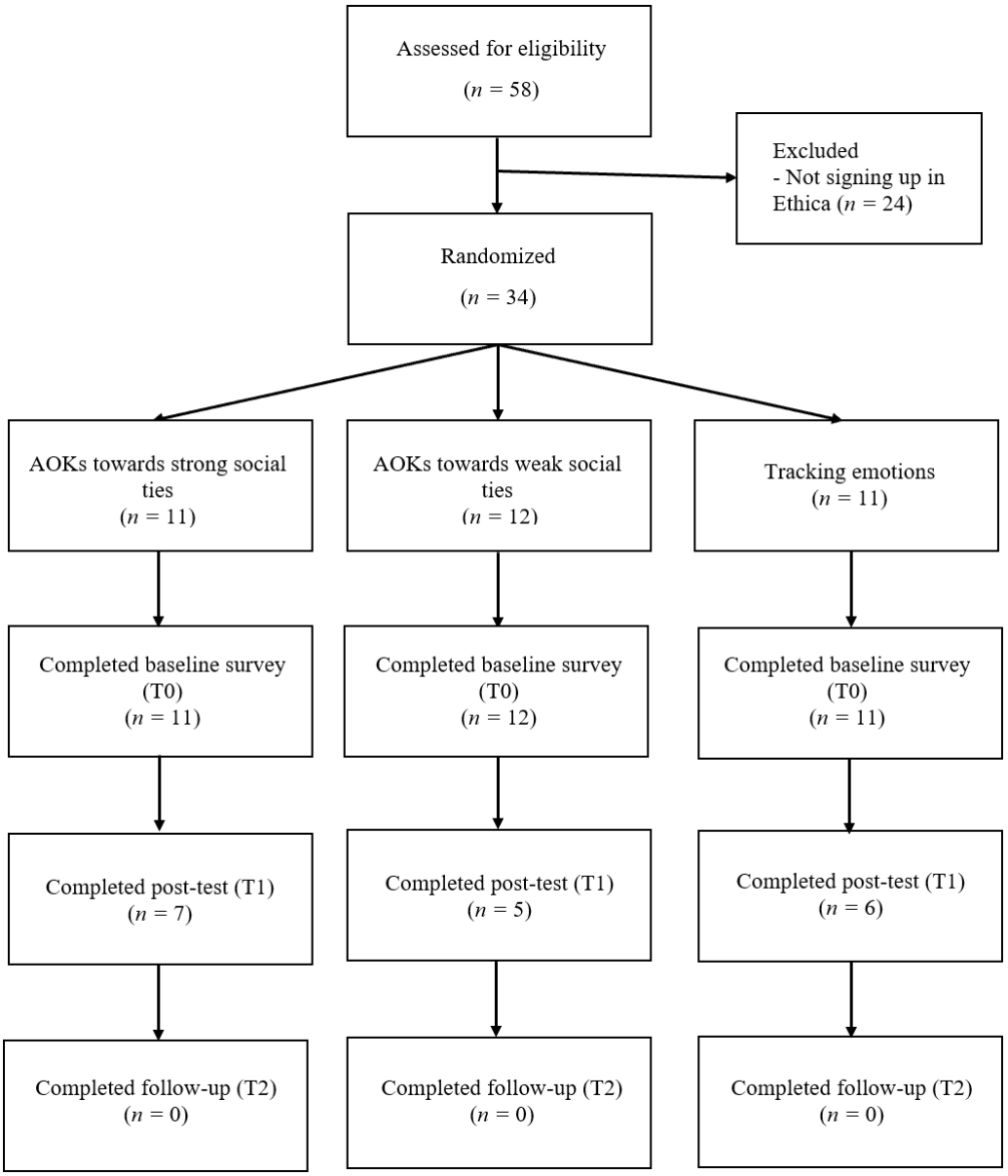


Figure 2

Flowchart of Participants



Acts of Kindness Intervention

Next to filling in the provided surveys, participants in the two experimental conditions received additional instructions on performing AOKs. For example, participants in the strong social ties condition received the following information:

In our daily lives, we all perform acts of kindness towards people who are important to us. For example, we might buy an additional coffee for our partner, do a chore for a family member, cook a meal for a housemate, or help a friend understanding some study material. For the next seven days you are to perform at least one act of kindness every day towards a person that is important to you, or you feel close with. These acts of kindness do not need to be for the same person, the person may or may not be aware of the act, and the act may or may not be similar to the examples listed above.

Participants in the weak social ties condition received the same instructions, but the specified beneficiaries of the AOKs were people, who one does not feel close to. The given context and the provided examples were adjusted to this type of beneficiary as well.

Daily Measurements

Positive and Negative Affect

To measure positive and negative affect, an own questionnaire was created which combined aspects of the Positive and Negative Affect Scale (PANAS) and the Modified Differential Emotions Scale (mDES; Frederickson, 2013; Watson et al., 1988). Positive and negative affect were both measured with four items. The items of positive affect focused on feeling cheerful, enthusiastic, satisfied, and relaxed, while the items of negative affect focused on feeling anxious, insecure, down, and guilty. Each item was formulated in the following manner, e.g., ‘How enthusiastic do you feel right now?’ or ‘How down do you feel right now?’. The participants indicated their answers on a 7-point Likert scale ranging from 1

(Not at all) to 7 (Very much). The scores were summed up into two separate total scores for positive and negative affect. A higher score for positive affect represents, that more positive emotions were present and a higher score for negative affect represents, that more negative emotions were present. The structure and content of the items can be considered comparable to the mDES and PANAS which both have good psychometric properties (Cohn et al., 2009; Fredrickson et al., 2008; Watson et al., 1988). In this current study, Cronbach's alpha was low for both, the positive affect subscale ($\alpha = .25$) and negative affect subscale ($\alpha = .09$).

Perceived Closeness

Additionally, the Inclusion of Other in the Self Scale (IOS) was used to gain a more nuanced insight into the closeness that a participant felt with the person towards whom they performed the AOK (Aron et al., 1992). It consists of one item, e.g., 'Which picture best describes your relationship with the person towards whom you performed the act of kindness?'. The participants needed to answer by choosing one out of seven pictures. Each picture displayed two circles, representing the self and other, which overlapped to different degrees. This scale was chosen as for its good psychometric properties, as well as concise nature (Aron et al., 1992).

The Effort put into an AOK

The effort which was put into a performed AOK was assessed through a self-created scale with three items, e.g., 'How much effort did you put into performing the act of kindness?', 'How hard did you try when performing the act of kindness?', and 'How much extra time did it take you to perform the acts of kindness?'. The participants could indicate their answers on a 7-point Likert scale ranging from, e.g., 1 (No effort at all) to 7 (A lot of effort). A total score was created by summing up all three answers. A high sum score represented a higher amount of effort which was put into the performed AOK, and a low

score represented a lower amount of effort. The Cronbach's alpha for this scale was acceptable with α = .79.

The Motives of the Benefactor

The motives of the benefactor of the AOK were assessed through a self-created scale combining aspects of already-existing scales, which assessed self-oriented and other-oriented motives in the context of, for example, volunteer work (Cornelis et al., 2013; Van de Vliert et al., 2004; Lammers, 1991; Wiwad & Aknin, 2017). The final scale consisted of six items in total, with three items representing selfish and three items representing otherish motives. Each item consisted of a statement, e.g., 'I wanted to make another person happy.' Or 'I thought that I would feel good about myself when being kind to others.'. The participants needed to indicate how true the different statements were for them on a 7-point Likert scale ranging from 1 (Totally disagree) to 7 (Definitely agree). The three items for selfish as well as the three items for otherish motives were summed up separately into two different sum scores. A higher score represented either more selfish or more otherish motives. Cronbach's alpha was low for the subscale of otherish motives (α = .40), but acceptable for the subscale of selfish motives (α = .79).

Measurements at T0, T1, and T2

Mental Health

To measure the mental health of the participants before and after the intervention, the Mental Health Continuum – Short Form (MHC-SF) was used (Keyes, 2002). By measuring emotional, psychological, and social wellbeing in one scale, it provides an elaborate insight into the mental state of an individual (Keyes, 2002; Lamers et al., 2011). The questionnaire asks about the subjective experiences throughout the past month, but for this current study, the feelings during the past (two) week(s) were assessed, fitting to the time frame between

each measurement moment, e.g., “The following questions are about how you have been feeling during the past two weeks. How often did you feel happy?”. Items were rated on a 6-point Likert scale ranging from 0 (never) to 5 (every day). All answers were summed up into one total score and a higher score represented a higher level of wellbeing. The MHC-SF was chosen as for its high reliability and discriminant validity (Lamers et al., 2011; Petrillo et al., 2015). In this current study, Cronbach’s alpha was high with $\alpha = .88$.

Perceived Stress

The Perceived Stress Scale (PSS) from Cohen, et al. (1983) was used to measure the level of perceived stress of the participants. The questionnaire asks about feelings and thoughts, that an individual experienced throughout the last month. For this current study, the feelings during the past (two) week(s) were assessed, fitting to the time frame between each measurement moment, e.g., ‘The following questions are about how you have been feeling during the past two weeks. How often have you been upset because of something that happened unexpectedly?’. Items were rated on a 5-point Likert scale ranging from 1 (Never) to 5 (Very often). All answers were summed up into one total score and a higher score represents a higher level of perceived stress. This scale was chosen as for its good psychometric properties, such as adequate reliability and good validity (Cohen et al., 1983; Cohen et al., 1994; Roberti et al., 2006). Cronbach’s alpha was insufficient in this sample with $\alpha = .31$.

Depressive Symptoms and Anxiety

To measure depressive symptoms and anxiety, the Hospital and Anxiety Scale (HADS) was utilized (Zigmond & Snaith, 1983). The scale poses statements about subjective experiences that one had throughout the past week. The statements were adjusted to be fitting for the time which passed from the previous measurement moment, e.g., ‘Please indicate the

answer that is closest to how you have been feeling in the past two weeks**.** I still enjoyed the things I used to enjoy'. The participants needed to indicate how true the given statement was for them on a 4-point Likert scale ranging from, e.g., 0 (Definitely as much) to 3 (Hardly at all). All answers were summed up into two separate total scores, and a higher score represented either more severe symptoms of depression or anxiety. This scale was chosen as for its concise nature to measure both concepts of depressive symptoms and anxiety, as well as its good psychometric properties with good validity and reliability (Bjelland et al., 2002; Snaith & Zigmond, 2000; Zigmond & Snaith, 1983). In this current study, the Cronbach's alpha was high for both, the depressive symptoms subscale ($\alpha = .84$) and anxiety subscale ($\alpha = .85$).

Data Analysis

The program SPSS Statistics was used to analyse the data of this research (IBM Corp., 2021). The between-participant differences as well as within-participant differences were analysed. The analysis of the between-participant differences focused on the pre- and post-test measures, while the analysis of the within-participant differences centred around the daily measures taken repeatedly throughout the intervention week. Due to the high drop-out rate throughout the intervention week, there was a lot of missing data for the measurements at the post-test. The distribution of missingness was examined with Little's missing completely at random (MCAR) test. The test indicated that data was missing at random with $X^2 = (4, N = 18) = 1.10$, $p = .890$. Hence, it was imputed using multiple imputation (MI). The Markov Chain Monte Carlo (MCMC) imputation procedure was used to conduct MI, and a total of 20 imputed datasets were utilized (Graham et al., 2007). Auxiliary variables used for MI included study variables at T0. Additionally, the daily measures taken throughout the intervention week were mean centred to relate all the answers, which participants gave, to their overall personal tendencies.

To gain a first insight into the gathered data, means and standard deviations were computed for all study variables. A one-way ANOVA was run to determine, whether there were significant differences for the baseline measures across conditions. Further, a t-test was performed to determine whether being in the strong or weak social ties condition significantly predicted the reported levels of closeness with the beneficiary, as a manipulation check. To assess adherence to the given instructions, the numbers and percentages of filled-in surveys and performed AOKs were calculated. Additionally, a bar chart was created to display the percentage of participants, within the strong and weak social ties condition, who performed at least one AOK on each day of the intervention.

To analyse the between-participant differences, four repeated measures ANOVAs (RM-ANOVAs) were created to analyse the differences from pre- to post-test (mental health, perceived stress, anxiety, and depressive symptoms) at the .05 significance level with measurement time (pre- and post-test) as the within-subjects factor and intervention type (performing AOKs vs. tracking emotions) as the between-subjects factor (H1). The measure of Cohen's d was applied to assess the effect size of time from pre- to post-test (Cohen, 1988).

Multiple linear mixed models were created to gain insights into the within-participant differences. All these models had a random intercept. To further test the effectiveness of performing AOKs (H1), the intervention type (performing AOKs vs. tracking emotions) was implemented as the fixed factor, with the dependent variables of positive and negative affect. The remaining linear mixed models in this analysis only implemented the measurement moments in which a participant reported that an AOK was performed (n = 100). To explore the role of the social tie for performing AOKs (H2), a dummy variable for the experimental condition (strong vs. weak social ties) was inserted as the fixed factor, with the weak social ties condition as the reference category. Positive and negative affect were the dependent

variables. To test whether the social tie influences the effort, which is put into an AOK, and the motives of an AOK's benefactor (H3 & H4), the experimental condition (strong vs. weak social tie) was inserted as the fixed factor, with effort (H3), selfishness (H4a), and otherishness (H4b) as the dependent variables. Next, to examine whether higher levels of effort, less selfish motives, more otherish motives, as well as the interaction between them, leads to better health outcomes, (H5), selfish motives (H6a), otherish motives (H6b), as well as the interaction between effort and selfish motives (H7a), and effort and otherish motives (H7b) were implemented as the fixed factors. Positive and negative affect were inserted as the dependent variables.

Results

Descriptives and Adherence

There were no significant differences between the three conditions for all health measurements at baseline (F (2, 31) range .02 - .35, all p's > .05), which provides a proper basis for comparison between the study conditions. Further, it can be stated that the manipulation was not entirely successful, as the reported closeness levels were not significantly different between the strong and weak social ties condition (t (91) = 7.497, p = .087).

Looking at the study adherence, only 25% - 35% of the provided surveys throughout the intervention week were filled in by the participants and a total number of 100 AOKs were performed (see Figure 2). Additionally, Figure 3 shows that the overall adherence to the instructions of performing at least one AOK per day was moderate to low, while being comparable across the strong and weak social ties condition. On the first two days of the intervention week, most participants reported that they performed at least one AOK per day,

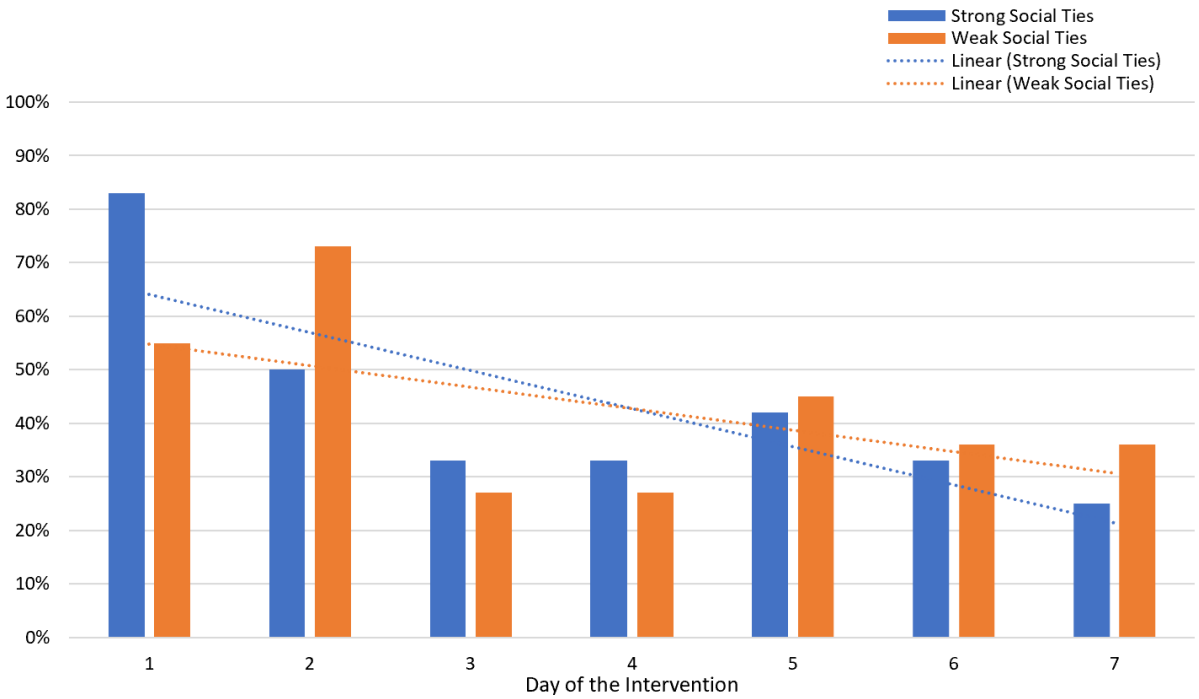
in both experimental conditions. However, starting on the third day there was a significant drop in reported AOKs, which remained about the same for the rest of the intervention week.

Table 2. Means, standard deviations, numbers, and percentages for each measure per condition

	Strong social ties (n=11)	Weak social ties (n=12)	Tracking emotions (n=11)
T0 Measures, M (SD)			
Mental Health	43.27 (10.65)	40.83 (11.09)	41.82 (10.92)
Perceived Stress	16.64 (7.61)	17.33 (4.14)	16.73 (3.58)
Anxiety	6.64 (6.19)	8.25 (3.91)	7.27 (3.58)
Depressive Symptoms	3.55 (4.01)	3.83 (3.69)	3.64 (2.84)
T1 Measures, M (SD)			
Mental Health	45.62 (9.54)	44.83 (10.40)	45.21 (11.81)
Perceived Stress	15.43 (5.38)	15.61 (3.77)	16.78 (4.81)
Anxiety	6.68 (4.30)	6.46 (3.07)	7.33 (4.06)
Depressive Symptoms	3.20 (3.18)	3.38 (2.39)	3.76 (2.76)
Daily Measures, M (SD)			
Positive Affect	16.66 (5.05)	18.40 (3.80)	7.78 (3.74)
Negative Affect	9.09 (4.86)	6.89 (4.14)	16.21 (4.84)
Closeness	4.65 (1.90)	2.02 (1.37)	-
Effort	11.82 (3.90)	8.24 (3.40)	-
Selfish Motives	10.20 (4.71)	8.35 (4.13)	-
Otherish Motives	13.37 (3.71)	14.67 (3.02)	-
Intervention Adherence, N (%)			
Filled-in Daily Surveys	203 (26.36%)	227 (29.48%)	262 (34.03%)
Total of performed AOK	57	43	-

Figure 3

Percentages of all participants, who reported performing at least one AOK for each day of the intervention, within the strong and weak social ties condition



Acts of Kindness and Social Ties

The RM-ANOVA analysis revealed that there was no significant effect of time on most of the study variables (F (1, 32) range .09 – .85, all p's > .05). Time only had a significant effect on mental health, as it largely increased from pre- to post-test (F (1, 32) = 19.44, p = < .001, d = .81). No significant effect of the type of intervention could be identified for any of the health outcomes (F (1, 32) range .00 - .76, all p's > .05). Further, the interaction effect of time and intervention was not significant either for any of the health measures (F (1, 32) range .01 – .97, all p's > .05). The mixed model analysis showed that there was no significant effect of the type of intervention on positive affect (F (1, 32) = .1.24, p = .274) or negative affect (F (1, 32) = .33, p = .570). Therefore, the first hypothesis, stating

that performing AOKs leads to better health outcomes compared to tracking emotions, must be rejected.

Moreover, the experimental condition had no significant influence on positive (F (1, 20) = 2.70, p = .116) and negative affect (F (1, 20) = .06, p = .802). Hence, the second hypothesis must be rejected, as performing an AOK towards a person with whom one shares a strong social tie was not any different compared to a weak social tie.

The role of Effort and Motives

Further, the mixed model analysis revealed that the experimental condition significantly predicted effort (F (1, 10) = 12.90, p < .001, d = .97). Hence, the third hypothesis could be confirmed, because being in the strong social ties condition led to more effort, which was put into an AOK, compared to the weak social ties condition. In contrast, the fourth hypothesis was rejected, since being in the strong social ties or weak social ties condition did not lead to differences in otherish motives (F (1, 17) = .00, p = .953) or selfish motives (F (1, 17) = .04, p = 837).

Moreover, the fifth hypothesis was rejected, because the effort, which is put into an AOK, did not significantly influence positive affect (F (1, 82) = .42, p = .517) or negative affect (F (1, 75) = .00, p = .968). Selfish motives did also not significantly predict positive affect (F (1, 82) = .11, p = .741) or negative affect (F (1, 75) = .55, p = 459) and the same was found for otherish motives, as there was no significant influence on positive (F (1, 82) = .42, p = 521) or negative affect (F (1, 75) = .01, p = 918). Thus, the sixth hypothesis was rejected as well. Lastly, the interaction effect between effort and selfish motives did not have a significant influence on positive (F (1, 82) = .44, p = .509) or negative affect (F (1, 75) = .58, p = .449), and the interaction effect between effort and otherish motives did not significantly predict positive (F (1, 82) = .24, p = 624) or negative affect (F (1, 75) = .02, p =

.884) either. Therefore, the seventh hypothesis was rejected, as the interaction between higher effort levels, less selfish, and more otherish motives did not lead to better health outcomes of a kindness intervention.

Discussion

The current study found that performing AOKs leads to the same improvements in mental wellbeing as tracking one's own emotions. Further, a stronger social tie led to more effort which is put into an AOK. Otherwise, the social tie, effort, and motives had no influence on each other, or on the health effects of performing AOKs. Based on these findings, the questions arise whether AOK interventions are actually efficient tools in improving mental wellbeing, and whether the ideas of the evolutionary theories on human kindness behaviour can be applied to the modern real-life context of AOK interventions. Overall, the current study provides new insights into the underlying mechanisms of performing AOKs.

First, the finding that participants within the experimental conditions experienced improvements in mental wellbeing seems to be in line with a range of earlier studies on AOK interventions (Curry et al., 2018; Dulin et al; Dulin & Hill, 2003; Ghergel et al, 2021). Still, similar health effects were observed within the participants of the control condition, who only tracked their emotions. Since the intervention component of tracking emotions was implemented the same way in all study conditions, one can argue that AOK performance itself did not have a major influence on mental wellbeing. It is more likely that the process of tracking emotions was the main cause for the observed mental wellbeing improvements in all conditions. This idea is supported by literature since, for example, self-reflecting through tracking one's emotions was shown to be an effective tool to improve an individual's positive emotions, self-regulation, and resilience (Bucknell et al., 2022; Pritz, 2016; Wang, et al,

2017). Further, this argumentation is in line with existing papers which also utilized an active control group when investigating the effectiveness of AOK interventions. For example, recalling AOKs or performing acts of novelty, meaning acts which are new or unusual, was shown to be just as effective in improving wellbeing as performing AOKs (Buchanan & Bardi, 2010; Ko et al., 2021). Especially the finding that performing acts of novelty had the same effect as performing AOKs raises the question whether it is also the element of novelty when taking part in an AOK intervention for the first time, that leads to initial wellbeing improvements (Brickman & Campbell, 1972; Brickman et al., 1978). As participants of the current study were instructed to perform AOKs for only 7 days, one can argue that they did not have the chance to habituate to their given task. Hence, the observed improvements in mental health might not be attributable to the performance of AOKs but to the fact, that it was a new, unusual stimulus in the participants' lives. Overall, this showcases that performing AOKs might not be a very efficient tool to improve an individual's wellbeing. Instead, it becomes clear that there are other simpler PPIs to target a person's wellbeing, such as keeping an emotions diary.

Further, this argumentation raises the question whether some earlier studies on the effectiveness of AOK interventions exaggerated the positive influence of performing AOKs. Just as the current study, most other studies in this context utilize self-report scales to monitor study variables, such as happiness, wellbeing, or life satisfaction (Dulin et al., 2001; Dulin & Hill, 2003; Ghergel et al., 2021; Mongrain et al., 2018; Rowland & Curry, 2018; Schacter & Margolin, 2019). The process of tracking these positive characteristics might have already exerted an influence on any observed health measures, which could have been falsely attributed to the AOK interventions. However, one can argue that self-tracking was a much bigger component in the current study compared to most other studies, because of the implemented ESM design. Thus, the interfering influence of self-tracking might be

neglectable for the interpretation of earlier study results. Still, the aspect of novelty might have been a relevant influence in other studies as well, because many papers implemented AOK interventions for a rather short period of time, just as the current study did (Ciocarlan, 2018; Rowland & Curry, 2018). Therefore, it may be possible that the perspective on the effectiveness of AOK interventions might be slightly distorted and not entirely accurate in some papers.

Further, the current study indicated that the social tie with the beneficiary of an AOK does not have a relevant influence on the positive health outcomes of an AOK intervention. This finding adds to the few studies, which investigated social ties in the context of performing AOKs until now (Alden & Trew, 2013; Rowland & Curry, 2019). The study from Wieners et al (2021) remains one of the only studies, which found that a strong social tie can be preferred over a weak social tie in terms of positive health outcomes for the benefactor of an AOK. A potential explanation for these contrasting results might be that the intervention duration in their study was much longer than in the other studies, including this one. For example, this could mean that once one becomes habituated to performing AOKs, the importance of the beneficiary towards whom one is kind increases. This would also compliment the above-mentioned idea of novelty being a relevant element in the context of AOK interventions. Another explanation might be the impact of different underlying mechanisms, other than those which were investigated in this study. For example, it can be argued that the reaction of the beneficiary of an AOK is relevant to the positive emotions that the benefactor experiences after being kind. To some extent, this idea can be substantiated through the evolutionary theories on human kindness behaviour. For example, kin and reciprocal altruism highlight the importance of collaboration and returned favours from the person towards whom one was kind, and the immediate or delayed reaction to that kindness is likely to be dependent on the social tie between the involved individuals (Hamilton, 1964;

Trivers, 1971). Still, no studies could be identified which systematically investigated the influence of, for example, a positive vs. negative reaction, or an active vs. passive reaction of the beneficiary on the wellbeing of the benefactor. Thus, there may still be underlying mechanisms of performing AOKs which remain unexplored, while potentially holding relevance.

Next, there are a few downsides to the basic argumentation based off the evolutionary theories on human kindness behaviour and the way in which their ideas were applied in the current study. First, the theories describe that some types of kindness behaviour are favoured by evolution, meaning that if we perform such behaviours, we increase our chances of survival and our own genes being passed on (Hamilton, 1964; Trivers, 1971). It seems logical to assume that our chance of survival is bound to our wellbeing, and this current study utilizes this logic to make reasonable assumptions on the roles of social ties, effort, and motives in the context of AOK interventions. However, in this current study, the term 'wellbeing' is rather focused on the psychological side of wellbeing, such as immediate positive emotions, mental health, or anxiety. Contrastingly, the evolutionary theories mainly focus on physical aspects, such as having enough food, or being physically save (Harcourt & de Waal, 1992). Therefore, it is important to treat the deduction, that chances of survival must always and automatically equal good psychological wellbeing, with caution. Secondly, the effort which is put into an AOK and the motives of the AOK's benefactor did not have a significant influence on positive and negative effect in this study (Hamilton, 1964, Trivers, 1971). A potential reason for that might be that human kindness behaviour, as described by the evolutionary theories, is considered within a very broad and long-term scope of human life (Hamilton, 1964; Trivers, 1971). Hence, the benefits of performing AOKs with higher effort, more otherish and less selfish motives could potentially appear later in time and not immediately after being kind, as it was measured in this study.

Further, one can argue that the nature of motives has not been thoroughly considered in this current study, as it needs to be acknowledged that, for example, motives can be conscious and unconscious (Beck, 1966). For this reason, many papers highlight the difficulty of capturing an accurate image of our motives, when we cannot even name all of our intentions ourselves (Acker, 2008; Queen & Hess, 2010; Newell & Shanks, 2014). Additionally, simply the design of this current study might have led to distortions of underlying motives within the participants. More specifically, the fact that participants were instructed to perform AOKs and not just monitor AOKs, which they would naturally do throughout their day, provided an extrinsic motive to be kind. One could hypothesize that this resulted in more selfish and less otherish motives (Cerasoli, et al, 2014; Kreps, 1997; Deci, 1972). Thus, tracking AOK which a person naturally performs in a real-life setting might provide a better basis to gain insights into the role of the benefactor's motives.

Strengths

In contrast to other studies researching AOKs, this current study utilized a pre-post study design in combination with ESM study methods. Through the repeated small questionnaires throughout the intervention week, the current study was able to measure momentary, immediate effects of performing AOKs and provide more detailed insights into the performed AOK, the effort put into the AOK, and the motives of the actor (Csikszentmihalyi & Larson, 2014). Thus, this current study exceeded limitations of related studies which mainly relied on a pre-post study design and could only assess effects occurring after a longer period. It is recommended that future research does not ignore the potential of ESM methods in this context but recognizes its usefulness for insights into the underlying mechanisms of performing AOKs.

Further, contrasting to other studies on AOK interventions, the current study had an active control group in which participants were instructed to monitor their positive and negative affect. As literature indicates that tracking emotions is an effective treatment to improve, for example, positive emotions, it was implemented to reduce the likelihood of occurring placebo effects in the control group and gain meaningful insights into the effectiveness of AOK interventions as a PPI (Au et al., 2020; Bucknell et al., 2022; Karlsson et al., 2015; Pritz, 2016; Wang, et al, 2017). Further, implementing the component of tracking emotions the exact same way in the experimental conditions as in the control condition allowed for even more detailed interpretations on the successful components of an AOK intervention.

Limitations

This current study has some limitations which need to be considered when interpreting the results. First, the sample size of this current study can be considered very small with only 34 participants in total and 11-12 participants per condition. Further, there was a very high dropout rate throughout the intervention week with only 18 out of the 34 participants completing the post-test. This was surprising as other ESM studies, which implemented a similar workload for participants, did not display such extraordinarily high dropout rates (Dejonkheere et al., 2018; Dejonckheere & Erbas, 2021; Pe et al., 2013). However, other studies implemented, for example, monetary compensation for the participants, which might have made them more motivated to finish the study. Overall, one can state that this current study has low statistical power, and significant correlations between variables were potentially missed within the statistical analysis.

Additionally, randomization between the study conditions was not entirely successful, because age, nationality, and academic year, were significantly different across conditions.

For example, only the weak social ties condition included Dutch individuals, but the other conditions did not. Thus, this makes the results of this study less generalizable for the research population of German and Dutch university students and it remains unclear whether study results were affected in a meaningful way.

Moreover, it is relevant to notice that social desirability bias might have had crucial implications for the reported levels of effort and motives (Grimm, 2010). For example, the knowledge of being monitored might have led to higher reported effort-levels, as being kind and generous tends to be seen as desirable and virtuous in our society. Further, acting selfishly is rather negatively connotated in society, while being kind just for the sake of another person seems very benevolent to most people. Hence, the self-report scales might have only provided a distorted view for effort and motives.

Further, some scales which were utilized in the current study displayed insufficient reliability in this sample with very low Cronbach's alphas. This was the case for the self-created scales on positive affect, negative affect, and otherish motives, as well as the Perceived Stress Scale. Hence, it is unclear whether findings regarding these measures can be considered accurate. It is recommended to utilize existing scales with good psychometric if possible, and future research should especially focus on further investigating the nature and trackability of underlying motives.

Implications for Future Research

Future studies should implement AOK interventions for a longer period of time so that participants habituate to performing AOKs and more accurate claims can be made about their impact on people's mental wellbeing. Studies should implement an active control group, for example a type of PPI, to gain relevant information on the effective elements of an AOK intervention and its usefulness for practical implementation compared to other interventions.

Further, one should consider making use of ESM measures for insights into within-person differences when performing AOKs. Still, it is advised to reduce the number of momentary assessments or implement some sort of (monetary) compensation for the participants, so that the dropout rates can be reduced. Lastly, due to limitations of this paper it is possible that relevant relationships with the potentially underlying mechanisms of performing AOKs, such as the social tie, effort, and motives, have been missed. Additional research is needed to explore these underlying mechanisms further, by relating them to more long-lasting and stable health measures. Further, other potential working mechanisms should be identified and explored, so that the benefit of future AOK interventions can be maximized.

Conclusion

The current study results suggest that tracking emotions is just as effective in improving mental wellbeing as performing AOKs. It does not seem to be relevant towards whom the AOK is performed, how much effort one puts into the AOK, and what motives one has when performing the AOK. Future research should critically investigate the usefulness of AOK interventions compared to other PPIs, and further explore the role of the social tie, effort, and motives in the context of longer-lasting AOK interventions. Further, other underlying mechanisms of performing AOKs should be considered and identified, so that one can achieve a better understanding on prosocial human kindness behaviour and improve upon the design of future AOK interventions.

Appendix A

This appendix consists of a table which gives an overview on the outcomes of the RM-ANOVA analysis on the effects of time, and intervention type on mental health, perceived stress, anxiety, and depressive symptoms

	Numerator df	Denominator df	F	P-value
Mental Health				
Time	1	32	19.44	**.001**
Intervention type	1	32	.00	.982
Time* Intervention type	1	32	.01	.902
Perceived Stress				
Time	1	32	.85	.363
Intervention type	1	32	.76	.767
Time* Intervention type	1	32	.97	.331
Anxiety				
Time	1	32	.50	.484
Intervention type	1	32	.04	.845
Time* Intervention type	1	32	.65	.426
Depressive Symptoms				
Time	1	32	.09	.770
Intervention type	1	32	.04	.850
Time* Intervention type	1	32	.31	.580

Appendix B

This appendix consists of a table which gives an overview on the outcomes of the linear mixed model analyses on the effects of the experimental condition on effort and motives, as well as the effects of intervention type, experimental condition, effort, and motives on positive and negative affect

	Numerator df	Denominator df	F	P
Effort				
E. Conditions	1	10	12.90	**.000**
Otherish Motives				
E. Conditions	1	17	.00	.953
Selfish Motives				
E. Conditions	1	17	.04	.837
Positive Affect				
Intervention type	1	31	1.24	.274
E. Condition	1	20	2.70	.116
Effort	1	82	.42	.517
Otherish Motives	1	82	.42	.521
Selfish Motives	1	82	.11	.741
Effort*Otherish Motive	1	82	.24	.624
Effort*Selfish Motive	1	82	.44	.509
Negative Affect				
Intervention type	1	33	.33	.570
E. Condition	1	20	.06	.802
Effort	1	75	.00	.968
Otherish Motives	1	75	.01	.918
Selfish Motives	1	75	.55	.459
Effort*Otherish Motive	1	75	.02	.884
Effort*Selfish Motive	1	75	.58	.449

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