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**Feel Good, Do Good Online? Spillover and Crossover Effects of Happiness on  
Adolescents' Online Prosocial Behavior**

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## Abstract

Although the majority of research on adolescents' online behavior has focused on antisocial behavior such as cyberbullying, adolescents more often behave prosocially than antisocially online. Research on offline prosocial behavior has shown that happiness and prosocial behavior are related. Furthermore, spillover-crossover research suggests that emotional states originating in one context can *spill over* to another context (Bakker, Westman, & van Emmerik, 2009) and can even *cross over* from one person to another. Therefore, this study examined whether happiness is also related to adolescents' *online* prosocial behavior and whether others' (in this case, parents') happiness also indirectly, via transmission to adolescents' own happiness, predicts adolescents' online prosocial behavior. Via a daily diary method, the associations of adolescents' own happiness and their parents' happiness with adolescents' online prosocial behavior were tested on a daily level. The findings suggest that, on a daily level, happiness creates a ripple effect whereby adolescents and parents take their positive emotional states from school and work home, and adolescents act on their happiness by behaving more prosocially online. The strongest spillover and crossover effects were found for girls and their mothers, evoking questions for future research to understand these gender differences.

*Keywords:* happiness, online prosocial behavior, spillover, crossover, adolescents, parents.

## **Feel Good, Do Good Online? Spillover and Crossover Effects of Happiness on Adolescents' Online Prosocial Behavior**

Adolescents are avid users of digital technologies: According to the 2015 Pew Research Center Report, 92% of teenagers report going online daily and 24% say they go online “almost constantly” (Lenhart, 2015). Furthermore, in 2015, 91% of teenagers with a mobile phone made use of text-messages and 76% used social media (Lenhart, 2015). It thus appears that adolescents make high use of digital technologies for social activities. Much previous research has focused on adolescents' antisocial use of digital media, e.g., cyberbullying (for a review, see Kowalski, Giumetti, Schroeder, & Lattanner, 2014). However, adolescents also behave prosocially online<sup>1</sup> (Erreygers, Vandebosch, Vranjes, Baillien, & De Witte, 2017; Lister, 2007; Wang & Wang, 2008). In fact, research has revealed that online prosocial behavior is more prevalent among adolescents than online antisocial behavior (Erreygers et al., 2017; Lister, 2007).

Evidence from previous studies with samples from all ages has indicated that offline prosocial behavior and happiness are related (Aknin, Broesch, Hamlin, & Van de Vondervoort, 2015; Aknin, Hamlin, & Dunn, 2012; S. K. Nelson, Layous, Cole, & Lyubomirsky, 2016; Otake, Shimai, Tanaka-Matsumi, Otsui, & Fredrickson, 2006). Moreover, happiness and prosocial behavior have been found to mutually reinforce each other through a positive feedback loop, with prosocial spending increasing happiness and vice versa. For instance, it has been shown that prosocial spending (i.e., spending money on someone else) increases happiness, which in turn stimulates prosocial spending (Aknin et al., 2013; Aknin, Dunn, & Norton, 2012). The link between happiness and prosocial behavior ties in to the Broaden-and-

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<sup>1</sup> Throughout this text, the term *online* behavior is used to refer to any form of communicative behavior performed via linked digital devices such as computers or (smart)phones, and the applications associated with them (e.g. social networking sites, email, text messaging or calling).

Build Theory (Fredrickson & Joiner, 2002), which posits that experiencing positive emotions broadens people's perspectives and actions and thereby builds enduring biopsychosocial resources and relationships. For instance, happiness can stimulate people to think of others and do good for them, fostering relationships. Interestingly, to date it has not been studied whether the association of happiness with (offline) prosocial behavior can be generalized to online prosocial behavior. Therefore, in this study we will examine whether happiness is associated with online prosocial behavior in adolescence.

Another aspect regarding the association between happiness and prosocial behavior that has not received attention, pertains to whether the association traverses contexts and transmits between individuals. Investigating this topic would tie in with the idea that emotional states originating in one context can *spill over* to another context (Bakker, Westman, & van Emmerik, 2009) and can even *cross over* from one person to another (Lawson, Davis, McHale, Hammer, & Buxton, 2014; Rodríguez-Muñoz, Sanz-Vergel, Demerouti, & Bakker, 2014). Consequently, we examine whether others' (in this case, parents') happiness also indirectly, via transmission to adolescents' own happiness, predicts adolescents' online prosocial behavior. Via a daily diary method, the associations of adolescents' own happiness and their parents' happiness with adolescents' online prosocial behavior will be tested on a daily level.

### **Adolescents' Online Prosocial Behavior**

Online prosocial behavior refers to “voluntary behavior carried out in an electronic context with the intention of benefitting particular others or promoting harmonious relations with others” (Erreygers, Vandebosch, Vranjes, Baillien, & De Witte, 2018a). Examples of online prosocial behavior include comforting a friend via digital technologies, online sharing of resources and information with a classmate, and helping peers out on social network sites.

So far, only a few studies have explored the antecedents of online prosocial behavior (Erreygers et al., 2017; Erreygers, Vandebosch, Vranjes, Baillien, & De Witte, 2018b; Lee, Kim, & Cho, 2014; Wright, 2014; Wright & Li, 2011). These have reported that females report more online prosocial behavior than males (Ferenczi, Marshall, & Bejanyan, 2017; Lister, 2007), and that online prosocial behavior is associated with offline prosocial behavior (Lister, 2007; Wright & Li, 2011), perceived popularity and social preference (Wright, 2014), being the recipient of online prosocial behavior (Erreygers et al., 2018b), frequency of using digital technologies (Erreygers et al., 2017; Lister, 2007; Wright & Li, 2011), relational self-construal (i.e., the extent to which individuals define their identity through their social relationships; Ferenczi et al., 2017), altruism and reciprocity (Wang & Wang, 2008), and positive and negative emotions (Erreygers et al., 2017). Most of these studies used interindividual (or between-subjects) analyses, which provide information on the level of the population (Molenaar & Campbell, 2009). However, interindividual analyses do not provide information on the individual level, i.e., whether those variables are associated with each other *within* rather than between persons (Molenaar & Campbell, 2009). To examine person-specific processes, for example, whether someone's emotions are associated with his or her online prosocial behavior later that day, intraindividual analyses are needed. Diary studies are suited for these kinds of analyses, as they allow for multiple measurements of the same individual over time (Bolger, Davis, & Rafaeli, 2003). Therefore, using a daily diary approach, this study examined whether adolescents' online prosocial behavior is predicted by happiness within days.

### **Spillover and Crossover of Emotions**

Spillover and crossover processes within families have been reported in many studies (e.g., Bakker, Demerouti, & Burke, 2009; Flook & Fuligni, 2008; J. A. Nelson, O'Brien, Blankson, Calkins, & Keane, 2009). Spillover refers to the transmission of emotional states from one context (e.g., work or school) to another context (e.g., home) within individuals.



Crossover refers to the transmission of emotional states between individuals (e.g., from parents to their children). Notably, the majority of the spillover and crossover research has examined negative spillover and crossover effects for stress and negative emotional states (Bakker, Westman, et al., 2009). For instance, early adolescents' experience of stressful events in the family has been shown to increase the likelihood of subsequent negative academic-related and leisure events later that day (e.g., Salamon, Johnson, & Swendsen, 2011). However, a few studies tapping into these mechanisms have revealed that spillover and crossover also occur for positive states (e.g., Lawson et al., 2014; Matjasko & Feldman, 2005; Mauno, Hirvonen, & Kiuru, 2017; Rodríguez-Muñoz et al., 2014). For example, Lawson and colleagues (2014) found that when mothers on average reported more positive work experiences, their children reported that their mothers displayed lower levels of negative mood after work. Moreover, mothers' positive mood after work was also associated with their children's positive affect and their quality and quantity of sleep (Lawson et al., 2014). Similarly, a survey study among 671 Finnish mother-child dyads reported that mothers' work engagement and recovery from work was associated with their life satisfaction and closeness with their children, which was in turn linked with their children's life satisfaction (Mauno et al., 2017).

The crossover of emotions has also been referred to as emotional transmission. According to Larson and Almeida (1999, p. 6) "emotional transmission occurs when events or emotions in one family member's immediate daily experience show a consistent predictive relationship to subsequent emotions or behaviors in another family member". Research has already shown that both parents (Doby & Caplan, 1995) and children (Repetti, 1996) bring their emotions back home from work and school, respectively. In addition, several studies have supported the existence of emotional transmission within families, and there appears to be a stronger transmission of emotions from parents to children than the other way around (R. W. Larson & Almeida, 1999). While some researchers have suggested that fathers' emotions have

the strongest impact on the emotions of other family members (R. W. Larson & Almeida, 1999), studies have also shown that mothers' emotions are transmitted to their adolescent children (Downey, Purdie, & Schaffer-Neitz, 1999; R. W. Larson & Gillman, 1999). Some studies have even reported stronger transmission effects from mothers to their children (Matjasko & Feldman, 2005), particularly from mothers to their daughters (R. Larson & Richards, 1994).

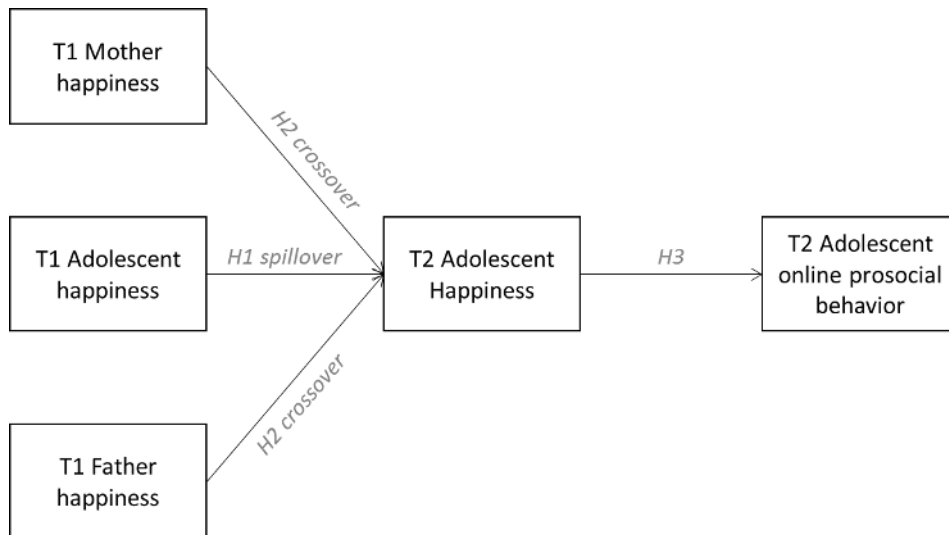
### **Present Study**

In this study we examine spillover and crossover effects of adolescents' and their parents' daily happiness on adolescents' online prosocial behavior via a daily diary (see Figure 1). For five consecutive school/work days, adolescents and their parents completed a short diary twice a day: right after school/work (T1), and at home at the adolescent's bedtime (T2)<sup>2</sup>.

In accordance with previous research on the spillover of emotions, our first hypothesis (H1) is: *Spillover: adolescents' happiness after school predicts their happiness at home*. Further, following the literature on crossover and emotional transmission from parents' emotions to their adolescent children's emotions, we hypothesize (H2): *Crossover: parents' happiness after work predicts their children's happiness at home*. Lastly, consistent with previous studies that have documented positive associations between positive emotions and prosocial behavior, the third hypothesis (H3) is: *Adolescents' happiness at home predicts their online prosocial behavior*. When combined, these hypotheses result in a mediation model in which adolescents' and parents' T1 happiness predicts adolescents' T2 online prosocial behavior via their T2 happiness. Multigroup analyses will be conducted in order to be able to examine possible gender differences in spillover and differences between dyads in crossover.

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<sup>2</sup> This study was part of a larger diary research project on emotions and online behavior in families. As this study focused on adolescents' online prosocial behavior, findings on parent outcome variables will be reported elsewhere (authors, manuscript in preparation).



**Fig. 1** Diagram of the hypotheses of the spillover and crossover of happiness and its effect on online behavior

Because previous research has shown that the more adolescents use digital technologies, the more online prosocial behavior they display (Erreygers et al., 2017; Lister, 2007; Wright & Li, 2011), we added the use of digital technologies as a control variable.

Our hypotheses are tested in a daily diary study. Diary methods are ideally suited for spillover and crossover studies, as they can capture events and experiences as they unfold over time in their natural context (Bolger et al., 2003). The use of a diary enables us to examine the dynamic nature of work and school experiences and their association with subsequent happiness at home and online prosocial behavior. Diaries also limit the likelihood of retrospection, as the time span between the event or experience and the report thereof is considerably reduced (Bolger et al., 2003). Furthermore, the repeated-measures design of diary studies allows for within-person analyses, next to traditional between-person associations (Bolger et al., 2003). Because individuals are followed and repeatedly measured over the course of time, diary methods can capture temporal sequences while simultaneously taking into account individuals' prior levels of the dependent variables.

## **Method**

### **Procedure**

In a time based-design, participants reported on their emotions and online prosocial behavior. Participants were assessed twice daily during five consecutive school/working days (Monday–Friday) for a period of one school/working week. They completed the diary once right after school (for adolescents) or work (for parents) (T1) and once right before the child went to bed (T2). Happiness was assessed at T1 and T2, and online prosocial behavior at T2. Participants completed the diaries electronically via their smartphone or their computer.

Before the start of the study, the participants were thoroughly informed about the whole process (i.e. the duration of the study, how to access the diaries, and when to complete them). They also received a test link to inspect the compatibility of the electronic diary with their device. During the diary week, the participants received a text message or email twice each day to remind them to complete the diaries, at a time point which they had indicated was most appropriate for them. Confidentiality of all individual responses was guaranteed. The study was approved by the Ethics Committee for the Social Sciences and Humanities of the [institution anonymized for peer review].

### **Participants**

The sample consisted of 136 families (98 two-parent families, 38 families in which only one parent participated) from the Flemish (Dutch-speaking) part of Belgium. To be eligible for the study, families had to have at least one child in the first or second grade of secondary school (equivalent to US grade 7 or 8) and any parent living with the child had to be employed part-time or full-time (because we wanted to examine parents' happiness elicited by the work context). Only the (biological or step-)parents who lived with the child during the diary week were asked to participate. Initially, 36 families were recruited by the first two authors via four secondary schools, two universities, and social media. To reach a higher number of participants,

100 additional families were recruited via a market research agency. Families received a € 100 incentive for participation if all family members completed at least 80% of the diaries.

The participants were 136 adolescents (67 boys, 69 girls) and 234 working parents (126 biological mothers, 96 biological fathers, four stepmothers, six stepfathers, one foster mother, and one adoption mother). The children were on average 13.51 years old ( $SD = 0.63$ ) and the parents 44.15 years old ( $SD = 4.66$ ).

Of the parents, 66.2% were married, 18.4% were cohabiting, 12.0% were divorced or separated, 0.9% were widowed, and 2.6% were single parents. 68.4% of the parents worked full-time, 31.6% part-time. The majority of the parents had completed higher education (71.8%). Almost half of the families (47.4%) were households with three (biological or step-) children, 2.1% were one-child families, 25.2% were families with two children, 21.8% with four children, 3.0% with five children, and one family consisted of eight children. In 99% of the families parents and their children spoke Dutch with each other at home. French ( $N = 3$ ), English ( $N = 3$ ), Spanish ( $N = 2$ ), Swedish ( $N = 1$ ), and Chinese ( $N = 1$ ) were the other languages children spoke at home, in addition to or instead of Dutch.

### **Missing Data**

Most participants completed all the diaries at both times points. A few missings were due to technical problems (not receiving a reminder to complete the diary in time). Further, not all diary entries were completed at the requested time points. For T1 (right after school/work), diaries that were completed less than one hour before T2, or after 9:00pm for the adolescents were omitted. For T2 (at adolescents' bedtime), diaries that were completed before 8:00pm were not analyzed (because the average bedtime for Flemish adolescents this age is 9:30pm; Van den Bulck, 2004), as well as diaries that were completed the following morning. This resulted in the following missing data rates: 22 (3.2%) of the adolescents', 8 (1.2%) of the

mothers', and 7 (1.4%) of the fathers' entries at T1; and 51 (7.5%) of the adolescents' entries at T2. Full information maximum likelihood (FIML) was used to estimate the model and handle missing data (Enders & Bandalos, 2001).

## Measures

Because diary studies are demanding for participants, it is important to use brief measures (Cranford et al., 2006); therefore our diary consisted of short or one-item measures assessing the main concepts<sup>3</sup>.

***Happiness (T1 and T2).*** Both adolescents and parents rated their current level of happiness on a 5-point Likert-type scale from 1 (*Not at all*) to 5 (*Very strong*).

***Online Prosocial Behavior (OPB; T2).*** Five items assessed adolescents' online prosocial behavior (e.g., "Cheering up, comforting or supporting someone via the internet/mobile phone", "Helping or offering help to someone via the internet/mobile phone"). These items were based on the Online Prosocial Behavior Scale (Erreygers et al., 2018a), a scale which was developed specifically to measure adolescents' online prosocial behavior. The OPBS was shortened and modified for diary use. On a 5-point Likert-type scale ranging from 1 (*Not at all*) to 5 (*Very much*), adolescents rated how often they had demonstrated these behaviors online after they came home from school. The items were summed per day per person to create an online prosocial behavior index, with a minimum of 5 and maximum of 25.

***Use of Digital Technologies (UDT; T2).*** Adolescents rated how often they had used digital technologies for interpersonal contact (e.g., use of social network sites, instant messaging, emailing, texting) throughout the day, on a 5-point Likert-type scale ranging from 1 (*Not at all*) to 5 (*Very much; more than two hours*).

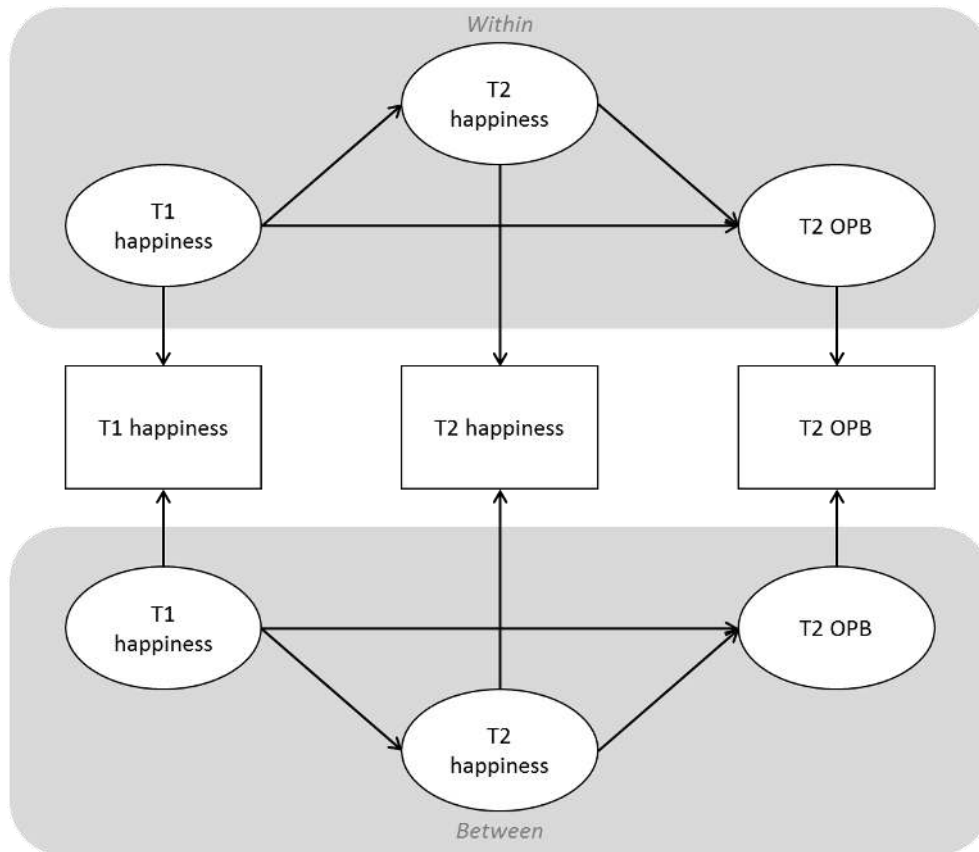
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<sup>3</sup> Only the measures relevant for the current study are reported here.

## Analyses

Due to the nested two-level nature of the daily diary data (i.e., repeated measures nested within persons/families), multilevel analysis was used to test the hypotheses. The hypotheses were combined in a mediation model of T1 happiness predicting T2 OPB via T2 happiness. To test this model, we conducted a mediation analysis in Mplus 8.0 (Muthén & Muthén, 2017) using a 1-1-1 multilevel structural equation model (MSEM) with fixed slopes (Preacher, Zhang, & Zyphur, 2011; Preacher, Zyphur, & Zhang, 2010), because the predictors (T1 adolescent happiness, T1 mother happiness, and T1 father happiness), mediator (T2 adolescent happiness), and outcome variable (T2 adolescent OPB) were all assessed on the day level (Level 1). This analysis yields path estimates of the direct (T1 happiness – T2 happiness, T1 happiness – T2 OPB, and T2 happiness – T2 OPB) and indirect (T1 happiness – T2 OPB via T2 happiness) associations. For the indirect effects, we interpret the 90% confidence intervals to correspond to one-tailed,  $\alpha < .05$  hypothesis test, as recommended by Preacher et al. (2010).

MSEM uses a robust maximum likelihood estimation method, which does not assume normality. It also accommodates missing data and unbalanced clusters and generates robust parameter estimates (Preacher et al., 2010). Traditional multilevel regression modeling using manifest variables (MLM) combines between-person and within-person effects in estimating the indirect effect, thereby conflating or biasing the estimate. In contrast, in MSEM, Level-1 predictor and mediator variables are decomposed into two uncorrelated latent variable parts (Preacher et al., 2010). This means that each manifest Level-1 variable is implicitly separated into latent within and between components. In other words, pure within-person relationships at Level 1 and pure between-person relationships at Level 2 are estimated. Figure 2 shows a diagram of the tested model (for clarity, only T1 adolescent happiness is shown, but T1 father and mother happiness were also included in the analysis, and T2 use of digital technologies was included as control variable).



**Fig. 2** Simplified diagram of the 1-1-1-mediation model of adolescents' happiness and online prosocial behavior

This model allows testing the hypotheses at two levels: within-person (i.e., day-level) and between-person. At the within-person level, the model examines whether daily variations from adolescents' own mean level of happiness after school and from their parents' mean levels of happiness after work predict adolescents' happiness and online prosocial behavior at home later that day. In other words, it examines within-day associations between happiness after school or work, happiness at home, and OPB. At the between-person level, the model examines whether adolescents' and parents' average happiness after school or work influences adolescents' mean level of happiness and OPB, across days. Stated differently, it examines average associations between happiness after school or work, happiness at home, and OPB.

To test hypothesis 2 (crossover), we analyzed whether T1 father happiness and T1 mother happiness predicted T2 adolescent happiness, controlling for adolescents' own T1 happiness. Again, both within- (i.e., whether T1 daily variation in happiness predicts T2 daily



variation in happiness) and between-person (i.e., whether family members' mean level of T1 happiness predicts adolescents' mean level of T2 happiness) effects were modeled.

Multigroup analysis was conducted to examine differences between parent-daughter and parent-son dyads.

## Results

### Descriptive Analyses

Table 1 shows the means, standard deviations, and correlations of the study variables, taking into account that each participant contributed multiple observations. In order to estimate the relative amount of between-person and within-person variance in the outcome variables, the intraclass correlation coefficient (ICC) was calculated based on an unconditional random coefficient model. The ICC was 68.7%, meaning that 68.7% of the total variance in OPB was attributable to between-person level variance.

[Table 1 about here]

### Model Testing

The multigroup 1-1-1 multilevel SEM mediation model allowed for tests of all hypotheses simultaneously. The results of this model are displayed in Table 2 and 3. The control variable (use of digital technologies) was significantly associated with online prosocial behavior both within- and between-persons, for boys and for girls.

[Table 2 about here]

***Hypothesis 1: Spillover.*** As a test of the spillover hypothesis (H1), the direct associations between adolescents' T1 happiness and their T2 happiness were examined (see Table 2). For boys and girls, both within- and between-persons, there was a significant positive effect of T1 happiness on T2 happiness, confirming H1. In other words, on days that

adolescents reported higher than (their own) average levels of happiness after school, they also reported higher levels of happiness at home later that day (within-person level).

Additionally, adolescents who reported higher than average happiness levels after school overall (across days), also reported higher than average happiness levels at home (between-person level).

**Hypothesis 2: Crossover.** To test the crossover hypothesis (H2), the direct associations of fathers' and mothers' T1 happiness with their adolescents' T2 happiness were examined, controlling for adolescents' self-reported T1 happiness (see Table 2). Only the within-person association between mothers' T1 happiness and their daughters' T2 happiness was significant, indicating that on days that mothers were happier when they returned from work, their daughters felt happier at home later that evening.

**Hypothesis 3: Happiness – Online Prosocial Behavior.** The third hypothesis predicted that adolescents' happiness would be positively associated with their OPB. This hypothesis was only confirmed within-persons for girls: On days that girls reported more happiness at home, they reported more OPB (see Table 2). (Happiness at home and OPB were both measured at T2, indicating a cross-sectional association.)

**Mediation.** Indirect effects of adolescents' own, their fathers' and their mothers' T1 happiness predicting adolescents' T2 OPB via adolescents' T2 happiness were examined as a test of mediation (see Table 3). Two significant indirect effects were found for girls: Within-persons, girls' own and their mothers' T1 happiness predicted their T2 OPB via girls' T2 happiness. Stated differently, on days that girls felt happier after school or that their mothers

were happier after work, they behaved more prosocially online, and this association was explained by girls' higher happiness at home.<sup>4</sup>

## Discussion

This study examined whether, on a daily basis, adolescents' and their parents' happiness after school or work influences adolescents' later happiness at home and their online prosocial behavior (OPB) via a five-day diary study conducted among 136 families. Results suggest that adolescents' school-related happiness predicted their happiness at home later that day, indicating a spillover effect of happiness from school to home. Also across days, adolescents' average levels of school-related happiness were positively associated with their average happiness at home. Moreover, within days, girls' (but not boys') happiness at home was linked with their OPB. Further, on days that mothers reported higher work-related happiness, their daughters were happier in the evening at home, indicating a crossover effect of mothers' happiness to their daughters' happiness. Lastly, mediation analyses suggest that girls' happiness at home explained the association between girls' own and their mothers' school- or work-related happiness, and girls' OPB at the day level.

Our results firstly indicate that adolescents were happier at home on days that they felt happier at school. These results are consistent with previous research indicating that affective experiences can be carried over from one context to the other, such as happiness from the work to the home context (Matjasko & Feldman, 2006) and stress from the school to the family context (Flook & Fuligni, 2008). However, to the best of our knowledge this is the first study to document a happiness spillover effect from school to home in adolescents. Our findings indicate that not only adolescents' negative states are transferred from school to home; also their positive states are carried over to the family context. From a different

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<sup>4</sup> We also estimated a mediation model with T2 OPB as mediator of the association between T1 happiness and T2 happiness. However, none of the indirect paths in this model were significant.

perspective, this spillover effect could also be considered a special case of temporal stability across contexts. Future research could compare the relative strength of happiness spillover (T1 in context 1, T2 in context 2) and stability (T1 and T2 in the same context) to provide a stronger test of a spillover effect between contexts.

Furthermore, our results suggest that adolescents who reported higher than average levels of school-related happiness also reported higher than average levels of happiness at home across days. These findings are an indication of the stability of happiness across days and contexts, which is consistent with the literature indicating that people differ in their average levels of happiness (Lyubomirsky & Tucker, 1998). These individual differences in overall happiness seem to be related to cognitive processes: “Happy individuals perceive, interpret, and subsequently think about life events and life circumstances in more positive ways than do unhappy ones” (Lyubomirsky & Tucker, 1998, p. 179). Nevertheless, even when taking these mean differences in happiness into account (i.e., overall individual happiness stability), within days and within persons, deviations from adolescents’ own mean level of school-related happiness were linked with deviations from adolescents’ own mean level of happiness at home, supporting a happiness spillover effect (or within-person daily happiness variability).

Our results further indicate that happiness is transmitted from mothers to daughters: Girls’ happiness at home was predicted by their mothers’ work-related happiness at the daily level. There were neither significant crossover effects to sons nor from fathers to their sons or daughters. These results corroborate with those of Matjasko and Feldman (2005), who found that mothers’ happiness when returning home from work was transmitted to their adolescent children’s happiness later at home, whereas there were no significant father-adolescent crossover effects. Larson and Richards (1994) also found the strongest crossover effects in mother-daughter dyads. The strong crossover effect from mothers may be explained by the

fact that mothers are often more involved in parenting their adolescent children than fathers (Paulson & Sputa, 1996), and that mothers are particularly important sources of advice and understanding (Greene & Grimsley, 1990; Richardson, Galambos, Schulenberg, & Petersen, 1984). Additionally, research has shown that mothers are more involved in the emotional lives of their children than fathers (Klimes-Dougan et al., 2007), that they talk more with their daughters than with their sons (Leaper, Anderson, & Sanders, 1998), and that they focus more on positive versus negative emotions with their daughters (Fivush, 1989). A possible explanation for the lack of happiness transmission from fathers to their children is that fathers on average spend less time at home with their children (Craig, Powell, & Smyth, 2014). Our diaries included a question on the time spent with each other each day, but unfortunately adding this variable and its interaction with parents' happiness to the model resulted in model estimation issues, so we could not evaluate this possibility. Another explanation that has been suggested is that even if fathers spend time with their children, they interact less with them, decreasing the likelihood of emotional crossover (Matjasko & Feldman, 2005).

Another finding of this study is that girls' (but not boys') happiness at home was associated with their OPB at the daily level. Stated differently, on days that girls felt happier, they behaved more prosocially online. This finding is consistent with that of Erreygers et al. (2017), who reported a positive association between adolescents' positive emotions and their OPB as well. Previous research on offline prosocial behavior has also indicated that prosocial behavior and happiness are related (Aknin et al., 2015; Aknin, Hamlin, et al., 2012; S. K. Nelson et al., 2016; Otake et al., 2006) and mutually reinforce each other, forming a positive feedback loop (Aknin et al., 2013; Aknin, Dunn, et al., 2012). More generally, a positive feedback loop between positive emotions and positive behavioral experiences has been observed in many studies (e.g., Fredrickson & Joiner, 2002; Garland et al., 2010; Handley, Lassiter, Nickell, & Herchenroeder, 2004; Snippe et al., 2017). A possible explanation for this

link between positive affect and prosocial behavior is that prosocial behaviors can be used instrumentally to maintain an already existing positive feeling, referred to as the “feel-good, do-good” effect (Rosenhan, Salovey, & Hargis, 1981). Relatedly, Wegener and Petty (1994) have proposed this is a mood maintenance process by which people in a happy mood seek out positive experiences to maintain or elevate their mood. Further, according to the Broaden-and-Build Theory (Fredrickson & Joiner, 2002) experiencing positive emotions expands people’s mindset (“broaden”), which may stimulate people to think of others and do good for them (“building” relationships and resources). This study is the first to find evidence for the happiness-prosocial behavior link for online prosocial behavior on a daily level.

However, unexpectedly, this association was only significant for girls and not for boys. Previous studies on the association between happiness and prosocial behavior have generally not reported gender differences in this association (Aknin et al., 2013; Aknin, Dunn, et al., 2012; Aknin, Hamlin, et al., 2012). Although there were no gender differences in the respondents’ happiness at home ( $M_{\text{boys}} = 3.52$ ,  $M_{\text{girls}} = 3.45$ ,  $t(608) = 0.787$ ,  $p = .431$ ), boys reported significantly less OPB than girls ( $M_{\text{boys}} = 8.83$ ,  $M_{\text{girls}} = 11.07$ ,  $t(562.618) = 6.108$ ,  $p < .001$ ), which is consistent with gender differences reported in offline prosocial behavior (e.g., Zimmer-Gembeck, Geiger, & Crick, 2005). Perhaps boys’ OPB is less contingent on their affective state than girls’ OPB. Also, previous research has suggested that women are more emotionally expressive online than men, and that they seem to be more concerned with expressing positive and avoiding negative emotions than men, whereas men seem less concerned with being polite and more often violate social norms of online behavior (Derks, Fischer, & Bos, 2008; Fischer, 2011; Herring, 1994). Alternatively, as boys generally play more, and more violent video games than girls (Lenhart et al., 2008; Lenhart, Smith, Anderson, Duggan, & Perrin, 2015), and playing violent video games decreases prosocial behavior (Anderson & Bushman, 2001; Greitemeyer & Mügge, 2014), it could be that the

positive effect of happiness on prosocial behavior does not emerge in boys because of their higher engagement in prosocialness-decreasing violent video games at home, or because the online platforms they use provide less opportunities for prosocial behavior.

Lastly, our results suggest a mediation effect of girls' happiness at home on the association between girls' and mothers' school- or work-related happiness, and girls' OPB later that day. Thus, on days that adolescent girls or their mother were happier when they returned from school or work, girls felt happier later that night at home, and behaved more prosocially online. Firstly, the indirect effect of girls' own happiness on their OPB provides more support for the spillover of happiness from the school to the home context, indicating that happiness is not only transferred from school to home but also to girls' online behavior. Secondly, the indirect association of mothers' happiness via their daughters' happiness on their daughters' OPB illustrates that mothers' happiness is not only transmitted to their daughters' happiness but also influences their daughters' OPB. Thus, happiness seems to engender a ripple effect across contexts, between (female) individuals, and to behavior.

### **Limitations and Suggestions for Future Research**

Several limitations of this study must be acknowledged. Firstly, this study only examined spillover and crossover of happiness. Perhaps other positive emotions, such as gratitude or forgiveness (Bartlett & DeSteno, 2006; Eisenberg, 2015; Karremans, 2005), may also be transferred between contexts and between persons on a daily level. Future research could explore whether other positive emotions also spill over and cross over and whether happiness influences other emotions.

A second limitation of the study is that our relatively small sample size limited statistical power, which precluded including other possible relevant control variables at the within-person level, and moderator variables at the between-person level. Previous studies

have shown that parent-adolescent closeness (Matjasko & Feldman, 2005) and parent-child relationship quality (Bai, Reynolds, Robles, & Repetti, 2016) moderate children's day-level interactions with their parents. Future studies with larger samples could examine the influence of these and other variables on the spillover and crossover of happiness in adolescents.

Thirdly, in the majority of the families that participated in this study, the participating child was not an only child. Although we did not take siblings into account, they may also have influenced the participating adolescents' happiness and OPB, as previous research has shown that having siblings influences emotional understanding and social behavior (Brody, 1996). Studying sibling interactions and influences would be a fruitful area for further work.

Fourthly, because we wanted to assess parents' work-related emotions, families with unemployed parents were excluded from participation. Given that unemployment also has a considerable effect on children's happiness and well-being (Jones, 1988; Powdthavee & Vernoit, 2013), further work is needed to examine whether the associations found in this study also generalize to non-dual worker families. Moreover, the majority of the parents in our sample were higher-educated and almost all families spoke Dutch (national language in Belgium) at home. Further research should confirm whether the findings generalize to lower-educated families and to people from different ethnic backgrounds or to other cultures.

Further, happiness was measured with a single item, whereas it has been argued that multiple-item measures reduce measurement error and increase reliability. However, previous studies have shown that single-item measures of happiness and life satisfaction are highly correlated with multiple-item measures of these constructs and show the same patterns of correlations with other constructs (Abdel-Khalek, 2006; Cheung & Lucas, 2014), demonstrating that "measuring happiness by a single item is reliable, valid, and viable" (Abdel-Khalek, 2006, p. 139). Moreover, the use of single item measures is a common and



accepted practice in experience sampling and daily diary research (Fisher & To, 2012). Especially when straightforward unidimensional constructs (e.g., “how happy do you feel right now”) are assessed, the use of single items has been argued to be appropriate (Fisher & To, 2012). Previous diary studies have successfully used single item measures of happiness (e.g., Rodríguez-Muñoz et al., 2014).

Finally, happiness at home (T2 happiness) and OPB were assessed at the same time point. For mediation analysis, preferably all variables are measured consecutively, rather than cross-sectionally, to be able to make stronger claims about causality and temporality (Hayes, 2013). Ideally, our study would have consisted of an extra time point to measure emotions at home before assessing online prosocial behavior. However, to keep the burden for the participants as low as possible in order to maximize the response likelihood, we limited the number of diaries to two per day. The fact that the reverse indirect paths (T1 happiness – T2 OPB – T2 happiness) were not significant, supports the plausibility of the proposed associations.

### **Conclusion**

The present study adds to the growing body of research on positive spillover and crossover effects. The findings suggest that happiness creates a ripple effect whereby adolescents and parents take their positive school and work experiences home, and adolescents carry over their happiness by behaving prosocially online. The strongest spillover and crossover effects were found for girls and their mothers, evoking questions for future research to understand these gender differences. We hope the findings of this study inspire future research to further explore the intra- and interpersonal dynamics underlying adolescents’ online prosocial behavior, as this behavior can be a powerful counterweight against online antisocial behavior and may in turn promote adolescents’ happiness and well-being.

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Table 1

## Means, Standard Deviations, and Correlations

		<i>M</i>	<i>SD</i>	1	2	3	4	5
Adolescents								
1	T1 Happiness	3.56	1.08					
2	T2 Happiness	3.46	1.08	0,65***				
3	T2 OPB	9.92	4.64	0,14*	0,20***			
4	T2 UDT	3.46	1.06	-0,04	0,02	0,39***		
Fathers								
5	T1 Happiness	3.02	1.03	0,32***	0,28***	-0,01	-0,14*	
Mothers								
6	T1 Happiness	3.12	1.01	0,25***	0,28***	0,02	-0,01	0,32***

*Note.* OPB = online prosocial behavior; UDT = use of digital technologies. All numbers are within-level statistics (each participant is given equal weight, independent of the number of contributed observations).

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

Table 2

## Direct Effects of the Multigroup 1-1-1 MSEM Mediation Model with Fixed Slopes

	Boys			Girls		
	<i>b</i>	<i>SE</i>	<i>p</i>	<i>b</i>	<i>SE</i>	<i>p</i>
Within-person level						
T2 happiness						
T1 happiness	<b>0.286</b>	<b>0.071</b>	<b>0.000</b>	<b>0.295</b>	<b>0.065</b>	<b>0.000</b>
T1 happiness father	0.074	0.059	0.210	0.030	0.068	0.664
T1 happiness mother	0.019	0.071	0.793	<b>0.181</b>	<b>0.045</b>	<b>0.000</b>
T2 OPB						
T2 happiness	0.228	0.198	0.250	<b>0.828</b>	<b>0.282</b>	<b>0.003</b>
T1 happiness	0.119	0.291	0.684	0.021	0.216	0.924
T1 happiness father	-0.217	0.205	0.289	-0.179	0.295	0.543
T2 happiness mother	0.147	0.213	0.490	-0.032	0.236	0.893
T2 UDT	<b>1.008</b>	<b>0.262</b>	<b>0.000</b>	<b>0.518</b>	<b>0.215</b>	<b>0.016</b>
Between-person level						
T2 happiness						
T1 happiness	<b>1.115</b>	<b>0.073</b>	<b>0.000</b>	<b>0.955</b>	<b>0.064</b>	<b>0.000</b>
T1 happiness father	-0.065	0.079	0.410	0.009	0.069	0.900
T1 happiness mother	0.002	0.134	0.987	0.097	0.076	0.201
T2 OPB						
T2 happiness	2.530	34.293	0.941	6.843	22.772	0.764
T1 happiness	-1.378	38.412	0.971	-4.982	21.918	0.820
T1 happiness father	0.388	2.360	0.869	-0.336	1.419	0.813
T2 happiness mother	-0.341	0.834	0.682	-1.046	2.311	0.651
T2 UDT	<b>1.529</b>	<b>0.381</b>	<b>0.000</b>	<b>2.961</b>	<b>0.625</b>	<b>0.000</b>

*Note.* OPB = online prosocial behavior; UDT = use of digital technologies. Significant effects are printed bold.

Table 3

Indirect Effects of T1 Adolescent, Father, and Mother Happiness via T2 Happiness on T2 OPB						
	Boys			Girls		
	<i>b</i>	<i>SE</i>	90% <i>CI</i>	<i>b</i>	<i>SE</i>	90% <i>CI</i>
Within-person level						
Adolescent	0.065	0.058	[-0.031, 0.161]	<b>0.244</b>	<b>0.105</b>	<b>[0.071, 0.418]</b>
Father	0.017	0.019	[-0.014, 0.048]	0.025	0.058	[-0.071, 0.120]
Mother	0.004	0.016	[-0.022, 0.031]	<b>0.150</b>	<b>0.068</b>	<b>[0.037, 0.262]</b>
Between-person level						
Adolescent	2.820	38.228	[-60.065, 65.705]	6.533	21.796	[-29.321, 42.388]
Father	-0.165	2.206	[-3.794, 3.464]	0.059	0.538	[-0.826, 0.944]
Mother	0.006	0.353	[-0.574, 0.586]	0.665	2.158	[-2.885, 4.215]

*Note.* OPB = online prosocial behavior. Significant effects are printed bold.

### **Compliance with Ethical Standards**

The authors declare that they have no potential conflicts of interest.

This research involved human participants, who gave informed consent to participate.

The study was approved by the Ethics Committee for the Social Sciences and Humanities of the University of Antwerp.