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# Blood Donation across the Life Course: The Influence of Life Events on Donor Lapse

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## Abstract

This article examines how blood donation loyalty changes across the life course as a result of life events. Previous studies have shown that life events affect involvement in prosocial behavior, possibly as a result of loss of human and social capital. Using registry data from the blood collection agency in the Netherlands, linked to longitudinal survey data from the Donor InSight study (N = 20,560), we examined whether life events are related to blood donor lapse. Childbirth, losing a job, and starting a job increase the likelihood of donor lapse, while health-related events (i.e., blood transfusion in a family member, death of a family member) decrease the likelihood of donor lapse. Moreover, results showed how social and practical concerns explain donors' decisions to donate blood after the occurrence of life events. We discuss theoretical implications for further studies on prosocial and health-related behavior.

## Keywords

blood donation, human capital, life events, prosocial behavior, social capital

## BACKGROUND

Prosocial behavior can take many forms, ranging from volunteer work for the local community to charitable giving to international causes and from living blood donation to postmortem organ donation. These examples share the characteristic that they are intended to help one or more people other than the self. The likelihood to be involved in prosocial activities not only varies between persons but also within persons across their life course. Taking blood donation as an example, our study addressed the following question: How does prosocial behavior change across the life course as a result of life events?

Previous life course studies—dating back to the late 1970s (Knoke and Thomson 1977; Mortimer and Shanahan 2002)—have examined how civic engagement and involvement in prosocial behavior are susceptible to change over time. For instance, changes in the likelihood and frequency of

volunteering are shown to be related to life events, especially in the family domain. Having young children is often a detrimental factor for volunteering (Einolf 2018; Nesbit 2012). Work-related events affect volunteering to a lesser extent, although full-time employment and job loss were both found to decrease volunteer rates in men (Lancee and Radl 2014; Oesterle, Johnson, and Mortimer 2004).

The current study focused on blood donation in the Netherlands to broaden our theoretical understanding of changes in prosocial behavior across

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the life course. Donating blood is a typical prosocial act that is completely voluntary and anonymous—and benefits the recipient at a cost to the donor in terms of discomfort and time. Yet, cultural differences in blood donation do exist between countries. For instance, in the Netherlands—being a fairly small European country with a population of about 17 million—blood collection is organized around a monopolist blood collection agency (BCA), which annually collects whole blood and plasma from approximately 330,000 nonremunerated donors at 39 fixed and 82 mobile collection sites throughout the country. This system largely contrasts to the collection system in the United States—population about 330 million—for example, where the American Red Cross as well as large numbers of nonprofit community-based blood banks provide blood to local hospitals, all of which have their own guidelines on (financially) remunerating their donors. In his analysis of the relation between institutional factors and blood donor behavior, Healy (2000) showed that the way blood collection is organized in a country relates to the diversity and loyalty of blood donors. For instance, blood collection via the Red Cross is likely to attract nondiverse but loyal donors due to their embeddedness in religious communities, while blood banking systems are more likely to attract diverse but incidental donors.

Despite cross-country differences in donor diversity and loyalty, BCAs in Europe and the United States share the characteristic that the number of blood donors is steadily decreasing, making studies on blood donor behavior socially relevant. While there is an urgent need to build solid groups of committed donors to guarantee a sufficient blood supply (Greinacher et al. 2017), every year, 5% of the Dutch donor population (approximately 20,000 donors) withdraw from the donor pool due to non-medical reasons (Klinkenberg et al. 2018). For BCAs to design more effective retention strategies, it is important to gain in-depth knowledge of decisive moments in blood donors' lives to stop or resume donating.

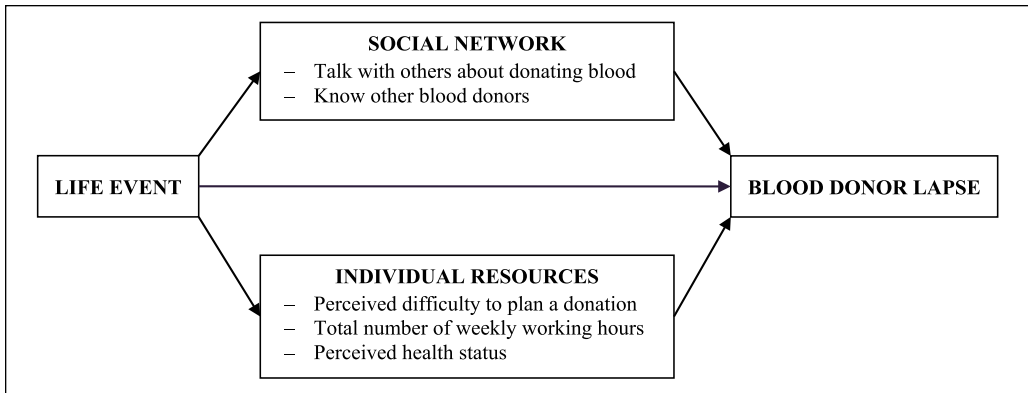
Furthermore, previous donor studies have shown that nonmedical, self-reported reasons to stop donating blood, such as time constraints and decreased social connections, are notably related to life events such as childbirth and changing jobs (Piersma et al. 2017). However, a major shortcoming of these studies is that they typically relied on cross-sectional data, measuring donor behavior and motivations at one point in time without taking into account that people and their behavior are susceptible to change

(Bart et al. 2014). While findings from these cross-sectional analyses illustrated the potential influence of life events, it is not clear whether there exists a causal relationship with blood donor behavior over time. In line with Healy's (2000) key ideas, emphasizing the importance of endogenous factors as determinants of donor behavior, we examined whether changes in the work and family domain as well as health-related life events in the family explain changes in blood donation across the life course. More specifically, we examined at what moments blood donors were at risk for lapse, that is, a transition from active to inactive donor.

Moreover, we investigated *why* certain events were related to blood donor lapse. The integrated theory of volunteering (Wilson and Musick 1997) explained effects of life events on prosocial behavior to be a result of changes in human and social capital: Life events affecting available time, health, and social connectedness subsequently affect the likelihood of being involved in prosocial behavior. Previous research showed that blood donation is indeed sensitive to the material costs that donors have to incur (Schreiber et al. 2006). Individuals with more human capital (e.g., available time and health) and social capital (e.g., social connections) were more likely to donate blood (Bekkers 2006). As these predictions have rarely been tested in relation to life events, we linked large-scale longitudinal survey data from the Donor InSight study (Timmer et al. 2019) to registry data from the BCA in the Netherlands (Sanquin 2018) to study whether life events influenced blood donor lapse and to what extent changes in available time, health, and social connections explained these effects.

### *Human and Social Capital Affect Blood Donation*

To increase knowledge about determinants of prosociality in the case of blood donation, we integrate human and social capital theories within a life course approach (Elder 1994; Elder, Johnson, and Crosnoe 2003), leading to a number of testable hypotheses. The life course approach is a well-established framework for studying various kinds of human behavior and its development over time. It examines human agency, links life stages over time, and studies behavior within social networks and sociocultural contexts. Adapting these life course principles are key in understanding transitions in blood donor behavior over time as a result of life events. We believe that circumstances in people's lives shape donors' human and social capital,



**Figure 1.** Conceptual Model for the Hypothesized Relation between Life Events and Blood Donor Lapse, with Individual Resources and Social Networks as Mediators of the Main Effects.

making it more or less likely that they continue to donate blood over time (Figure 1). We will elaborate on the potential role of human and social capital in shaping blood donor behavior over the life course.

*Human capital and the resources perspective.* Human capital is the set of people's individual assets or resources enabling certain behavior. Sufficient time and health are needed to meet minimal blood donation criteria (Bekkers 2006). As a result, giving blood depends on a person's available time and health resources: The resource-rich are more likely to be involved in prosocial behavior than the resource-poor (Musick and Wilson 2008) as the relative costs of donating blood are lower for individuals who are healthier and have more time. Life events affecting a person's available time and health are therefore likely to influence their likelihood of being involved in blood donation.

The tradeoff between resources and blood donation is not always as straightforward as it seems. A study on blood donor demographics concluded that donors did not differ from nondonors in terms of their employment status (Priller and Schupp 2011). Kalargirou and colleagues (2014) even showed that people who are employed are more likely to be donors than those who do not have a job. Although the unemployed do have more available time, they are not more likely to donate blood as it is questionable to what extent this relatively small investment of time is a reason for donor lapse. Such counterintuitive findings can be explained by the theory of social capital.

*Social capital and the network perspective.* Social capital is defined as the set of people's social

connections within their social network and the behavioral norms that arise from them (Lin 1999). People who have many formal and informal social connections and are part of larger social networks have a higher likelihood of being involved in prosocial behavior (Wilson and Musick 1998). The influence of friends, family, and co-workers was indeed reported as being a motivator for people to start giving blood (Bani and Strepparava 2011; Misje et al. 2005).

When donors are exposed to behavioral norms that encourage blood donation, for instance, by talking about blood donation and knowing other blood donors, their loyalty may increase because the costs of not complying with these behavioral norms become higher. Consistent with what social capital theory predicts, the meta-analysis by Bednall and colleagues (2013) showed subjective and descriptive norms to be positively related with the likelihood of donating blood. The size and composition of social networks change over time due to the occurrence of life events, such as entering the labor market or the death of a relative (Wrzus et al. 2013). Life events that affect a person's social network are therefore likely to influence their likelihood of being involved in blood donation.

### *Life Events Affecting Blood Donation*

The expected relations between life events and blood donor lapse are displayed in Figure 1, including the potential mediating mechanisms derived from human and social capital theories. For each life event (i.e., a blood transfusion in a family member, a serious disease in a family member, the death of a family member, childbirth, starting a job,

losing a job), we describe its impact on donor lapse, following the resources perspective and the social network perspective. These life events were selected because they yielded interesting findings in previous empirical studies, although we do not expect all life events to be associated with all mediating mechanisms in the model. We elaborate on specific hypotheses and previous empirical findings in the following sections.

*Changes in health of family members.* To explore the relation between health-related philanthropy and health-related life events, we examined whether a blood transfusion in a family member, a serious disease in a family member, or the death of a family member were related to blood donor lapse. Although these events are qualitatively different, they share a common element that links them to blood donation: They connect acquaintances and family of patients to medical systems and the need for blood. Following the resources perspective, health-related events may be hypothesized to have a negative influence on donor behavior. Health adversity among family members could make it more difficult for donors to plan a donation as taking care of loved ones takes time and is likely to be prioritized over donating blood. In general, lack of time is one of the most common self-reported reasons to stop donating blood (Piersma et al. 2017), therefore hypothesizing that:

*Hypothesis 1a:* Donors who experienced a health-related event in the family are more likely to lapse compared to donors who did not experience a health-related event in the family.

*Hypothesis 1b:* After experiencing a health-related event in the family, donors find it more difficult to plan a donation, explaining why these donors are more likely to lapse.

A contrasting hypothesis on the effect of health-related events follows from the social network perspective. The likelihood of donating blood could increase after a health-related event because people talk about donating more often or get to know other blood donors. Several cross-sectional studies reported that health-related issues in the family, such as a blood transfusion, were a motivational factor in the decision to donate (e.g., Charbonneau, Cloutier, and Carrier 2015). Moreover, a relation was found between health issues and donor loyalty: Donors with a family member who experienced a blood transfusion had a higher number of lifetime

donations than donors who did not have a transfused family member (Bani and Strepparava 2011). Based on the social network perspective, we hypothesized that:

*Hypothesis 2a:* Donors who experienced a health-related event in the family are less likely to lapse compared to donors who did not experience a health-related event in the family.

*Hypothesis 2b:* After experiencing a health-related event in the family, donors talk about donation more often and know more other donors, explaining why these donors are less likely to lapse.

*Childbirth.* Lack of time because of family responsibilities is a commonly reported barrier to donating blood (Piersma et al. 2017). As these conclusions are based on self-reported, cross-sectional studies, it remains unclear to what extent childbirth affects donor lapse over time. Longitudinal studies on volunteer work reported that the presence of young children in the family hindered volunteer participation (Nesbit 2012; Oesterle et al. 2004) as childbirth may deeply affect the parents' available time and health resources (Elder and Greene 2012).

Lack of time due to family responsibilities was reported more often by male than female blood donors (Charbonneau et al. 2016), although longitudinal studies on volunteer work contrasted these gender differences, with childbirth being detrimental for women's involvement in volunteer work but not men's (Lancee and Radl 2014; Quaranta 2016). We anticipate childbirth to have a larger effect on donor lapse in women than men because women are simply not allowed to donate blood during pregnancy, within six months after childbirth, and while breastfeeding. Donors who are deferred for longer periods of time are less likely to return for a subsequent donation (Custer et al. 2011). Following the resources perspective, we hypothesized that:

*Hypothesis 3a:* Donors who experienced childbirth are more likely to lapse compared to donors who did not experience childbirth.

*Hypothesis 3b:* After childbirth, donors find it more difficult to plan a donation and perceive themselves to be less healthy, explaining why these donors are more likely to lapse.

*Hypothesis 3c:* Childbirth has a larger effect on the lapsing risk in women than men.

*Labor market transitions.* Entering and leaving the labor market is likely to have negative consequences

for blood donation, increasing the risk for lapse. Starting a job increases working hours, with time constraint due to work schedule conflicts being one of the most common self-reported barriers to donating blood (Charbonneau et al. 2016; Klinkenberg et al. 2018). Yet, time is probably not the only constraining factor. Previous studies showed that losing a job and unemployment are negatively related to health status (Schmitz 2011), likely leading to more (self-)deferrals and higher lapsing rates. Moreover, Charbonneau et al. (2015) reported that some blood donors were convinced by their colleagues to donate blood. Donors who were recruited in the workplace and talked about donating with colleagues were more likely to stop donating blood after they left this network. Based on these findings, we expect that:

*Hypothesis 4a:* Donors who started a job or lost their job are more likely to lapse compared to donors who remained unemployed or kept their job, respectively.

*Hypothesis 4b:* After starting a job, donors have a higher number of working hours and find it more difficult to plan a donation, explaining why these donors are more likely to lapse.

*Hypothesis 4c:* After losing a job, donors perceive themselves to be less healthy, talk about blood donation less often, and know fewer other donors, explaining why these donors are more likely to lapse.

In contrast, we could also expect labor market transitions to positively influence donor behavior, decreasing the risk for lapse. For donors who lose their job, their working hours decrease, which might make it easier to plan a donation. Moreover, the study by Priller and Schupp (2011) on blood donation and volunteer work suggested that an increase in working hours is not necessarily related to a decrease in prosocial behavior. Donors who start a job enter new social networks, which increases the likelihood to get to know other donors and talk about donation (Charbonneau et al. 2015). Based on competing explanations from both perspectives, we hypothesized that:

*Hypothesis 5a:* Donors who started a job or lost their job are less likely to lapse compared to donors who remained unemployed or kept their job, respectively.

*Hypothesis 5b:* After losing a job, donors have a lower number of working hours and find it less

difficult to plan a donation, explaining why these donors are less likely to lapse.

*Hypothesis 5c:* After starting a job, donors talk about blood donation more often and know more other donors, explaining why these donors are less likely to lapse.

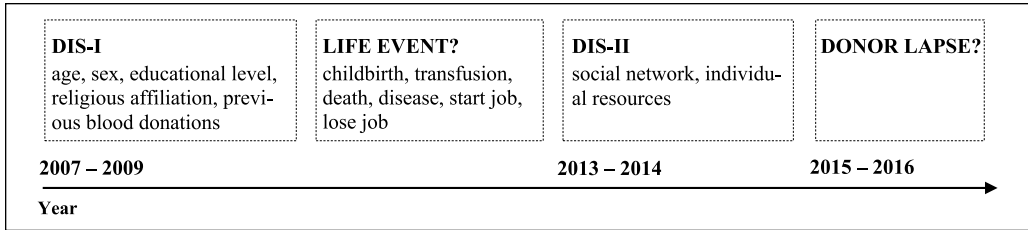
## DATA AND METHODS

### *Data and Procedure*

To explore relations between life events and blood donor lapse, we analyzed the behavior of 20,560 whole-blood and plasma donors in the Netherlands using data from two databases: the Dutch blood donor database (eProgesa; Sanquin 2018) and two waves of the Donor InSight study (DIS; Timmer et al. 2019).

DIS is a large-scale longitudinal survey among a representative sample of Dutch blood donors, registering sociodemographic characteristics, donor health, life events, and motivations to donate blood. The first wave, DIS-I, was collected in 2007 to 2009 and included 31,338 donors. DIS-I had a response rate of 62.8%, which is relatively high compared to other large-scale surveys in the Netherlands (De Leeuw and De Heer 2002). Nonresponse analyses showed statistically significant yet very small differences between DIS-I respondents and nonrespondents with respect to age, sex, and total number of blood donations (Appendix A). The second wave, DIS-II, was collected in 2012 to 2013 and included 34,826 donors. A total of 22,132 donors participated in both waves of DIS, with an attrition rate of 29.4% and an average between-surveys duration of 52 months (SD = 3.7; range, 41–63). The complete DIS-I and DIS-II questionnaires can be found on our Open Science Framework (OSF) project page: [osf.io/26b83/](https://osf.io/26b83/).

Information from these 22,132 blood donors was linked to the Dutch blood donor database (i.e., register data on all Dutch whole-blood and plasma donors and their behavior, such as number of donations, return rates, and deferral reasons), based on anonymous personal identification numbers, after permission from the Sanquin Ethics Advisory Board and with informed consent of the study participants. In this linked longitudinal sample, 1,572 donors were excluded because they were ineligible for future blood donations, did not make at least one whole-blood or plasma donation, or did not provide enough information on the occurrence of life events, resulting in a final study sample of 20,560 blood donors.



**Figure 2.** Overview of the Timing of All Measures Used in the Statistical Analyses.

By linking these databases, we were able to examine whether donors who experienced a life event between DIS-I and DIS-II were more or less likely to lapse than donors who did not experience this life event and whether individual and social mechanisms (measured at the time of DIS-II) were able to explain the relation between the occurrence of life events and donor lapse (Figure 2).

### Measures

**Blood donor lapse.** Following the internationally acknowledged and widely used definition in European blood donor management (DOMAINE; De Kort and Veldhuizen 2010), a lapsed donor was defined as a registered donor who made at least one donation but did not donate in the last 24 months. Hence, we defined two groups: (1) lapsed donors without a donation during the 24 months after completing DIS-II and (2) active donors with at least one donation during these 24 months (1 = lapsed donor, 0 = active donor).

**Life events.** DIS-I and DIS-II included questions on three categories of life events relevant to our study: health-related events in the family, childbirth, and labor market transitions. With regard to health-related events, donors were asked whether any of their direct family members (i.e., parents, siblings, children) had died, received a blood transfusion, or suffered from a serious disease (i.e., cancer, stroke, heart attack). Dummy variables were created representing the occurrence of these events between DIS-I and DIS-II (e.g., 1 = family member died, 0 = no family member died). For childbirth, a dummy variable was created representing whether a child was born to the donor between DIS-I and DIS-II (1 = child born, 0 = no child born). Starting and losing a job were included as life events related to donors' labor market transitions by comparing the donors' answers on the employment status question in DIS-I and DIS-II. Dummy variables were created representing whether

the donor started a job or lost their job between DIS-I and DIS-II (e.g., 1 = donor started a job, 0 = donor remained unemployed).

**Mechanisms.** Two different mechanisms were defined explaining the possible relations between life events and blood donor lapse: the costs of donating blood and influences from the social network. Costs were measured by three proxy variables: total working hours per week, perceived difficulty to plan a blood donation, and perceived health status at the time of DIS-II. Total working hours per week were measured by an open-ended question, with a higher number of working hours per week representing higher costs to donate blood as time becomes a scarcer resource. Perceived difficulty to plan a blood donation was measured on a five-point Likert scale ranging from "completely disagree" to "completely agree," with respondents indicating to what degree they perceived that "it is easy for me to plan giving blood in my life." Answers were then inversely recoded where a higher score reflected higher costs to donate blood. The perceived health status of the respondent was measured by four statements on a five-point Likert scale (i.e., "I seem to get ill more easily than other people," "I am just as healthy as other people I know," "I expect my health to get worse in the coming years," and "my health is excellent"). Statements were recoded so that a higher score reflected higher costs to donate blood (i.e., the higher the score, the more the respondents perceived themselves to be unhealthy), ranging from "completely disagree" to "completely agree" ( $\alpha = .69$ ). Factor analysis (principal axis factoring with varimax rotation) showed the four items to load on a single factor, after which regression scores were saved as a variable representing the perceived health of the donor. Total working hours per week, perceived difficulty to donate blood, and perceived health status were included in the analyses as separate indicators of the costs of donating blood.

Influences from the social network were measured by two proxy variables: talking to others about donating blood and knowing other blood donors at the time of DIS-II. Talking about donation was measured on a four-point Likert scale, asking the respondent, “How often do you talk about blood donation with people around you?,” ranging from “never” to “often.” Whether the donor knew any other blood donors was measured by asking: “Are there people among your direct acquaintances who are blood donors?” Respondents could choose multiple options from a list (i.e., no, partner, family members, friends, acquaintances), and their answers were recoded into a dichotomous variable representing whether they knew a blood donor (1 = knows other donors, 0 = does not know other donors). Talking about blood donation and knowing other donors were included in the analyses as separate indicators of the influences from the social network.

**Control variables.** Donors’ age, sex, educational level, religious denomination, and total number of previous blood donations at the time of DIS-I were included as control variables as these donor characteristics were shown to be related to the likelihood to donate blood (Piersma et al. 2017). Educational level was measured in three categories: low (i.e., none, prevocational secondary education, and lower general secondary education), middle (i.e., senior secondary vocational education, senior general secondary education, and pre-university education), and high (i.e., higher professional education and university education). Religious denomination was measured on a yes-no basis and recoded into four categories: not religious, Protestant (i.e., Dutch Reformed, Reformed, and Protestant), Catholic (i.e., Roman Catholic), and other religion (e.g., Muslim, Hindu, and Buddhist).

### Statistical Analyses

Logistic regression analyses using Stata 15 (College Station, TX: StataCorp LLC) were performed to estimate the effect of life events on blood donor lapse, adjusted for sociodemographic variables. Respondents were included in the analyses if they were “at risk” for experiencing the life event of interest between DIS-I and DIS-II. For childbirth, we included women aged 45 or younger and men aged 55 or younger ( $n = 11,695$ ), based on studies in biology showing the positive relation between aging and infertility rates (Harris et al. 2011). For starting a job, we included all respondents who were

unemployed ( $n = 1,713$ ); for losing a job, we included all respondents who were employed ( $n = 15,356$ ). No selection was applied to analyses for health-related events.

Subsequently, we added an interaction between sex of the donor and childbirth to examine whether childbirth differently affected blood donor lapse for men and women. Third, mediation analyses (i.e.,  $Z_{Mediation}$ , Iacobucci 2012) were performed to test the extent to which costs of donating blood (i.e., working hours, difficulty to plan a donation, and health status) and influences from the social network (i.e., talking to others about donation and knowing other donors) could explain the effects of life events on blood donor lapse, only if the main effect proved to be statistically significant.

## RESULTS

### Life Events and Dutch Donors

The mean age of the study sample was 46.7 years ( $SD = 12.28$ ), consisted of 10,854 female donors (52.8%), and had an average number of 27.4 previous donations ( $SD = 24.41$ ; range, 1–335). Of these donors, about a quarter (25.3%,  $n = 5,197$ ) lapsed during the 24 months after DIS-II. Across all life event categories, health-related events were reported most often: 40.5% ( $n = 8,319$ ) experienced a serious disease in the family, 18.9% ( $n = 3,884$ ) experienced the death of a relative, and 9% ( $n = 1,855$ ) had a family member receiving a blood transfusion. Overall, 58.5% ( $n = 12,036$ ) of the blood donors experienced at least one life event of interest. An overview of sample characteristics and descriptive statistics of all study measures is found in Table 1.

The descriptive analyses suggested childbirth and losing a job to occur slightly more often among lapsed donors, with both events being positively correlated to donor lapse ( $r = .10$ ,  $p < .001$ ;  $r = .03$ ,  $p < .01$ , respectively). However, a blood transfusion in a family member and death of a family member occurred slightly more often among active donors, with these events being negatively yet marginally correlated to donor lapse ( $r = -.02$ ,  $p < .01$ , for both events). For more information, see Appendix B, which includes correlations between all study measures. We now discuss the results for each life event, with complete results of the logistic regression and mediation analyses shown in Table 2 (see Appendix C for the a-path estimates of the mediation analyses).



**Table 1.** Descriptive Statistics of Study Measures for Total Sample and Stratified by Donor Status.

Characteristic	All Donors (N = 20,560)	Active Donors (n = 15,363; 74.7%)	Lapsed Donors (n = 5,197; 25.3%)
<b>Life events, n (%)</b>			
Transfusion	1,855 (9.0)	1,425 (9.3)	430 (8.3)
Serious disease	8,319 (40.5)	6,206 (40.4)	2,113 (40.7)
Death	3,884 (18.9)	2,966 (19.3)	918 (17.7)
Childbirth	2,071 (10.1)	1,268 (8.3)	803 (15.5)
Starting a job	469 (2.3)	343 (2.2)	126 (2.4)
Losing a job	622 (3.0)	447 (2.9)	175 (3.4)
<b>Costs, mean (±SD)</b>			
Working hours	25.6 (±16.7)	26.7 (±16.4)	22.5 (±17.3)
Perceived difficulty to plan donation	1.95 (±1.03)	1.82 (±.92)	2.32 (±1.22)
Perceived health status	1.91 (±.65)	1.86 (±.61)	2.03 (±.72)
<b>Social network</b>			
Talk about donation, mean (±SD)	2.07 (±.50)	2.08 (±.48)	2.06 (±.54)
Know other donors, n (%)	15,056 (73.2)	11,481 (74.7)	3,575 (68.8)
Age, mean (±SD)	46.7 (±12.28)	46.7 (±11.38)	46.9 (±14.61)
<b>Sex, n (%)</b>			
Male	9,706 (47.2)	7,606 (49.5)	2,100 (40.5)
Female	10,854 (52.8)	7,757 (50.5)	3,097 (59.6)
<b>Educational level, n (%)</b>			
Low	517 (2.5)	363 (2.4)	154 (3.0)
Middle	12,479 (60.7)	9,513 (61.9)	2,966 (57.1)
High	7,476 (36.4)	5,417 (35.3)	2,059 (39.6)
<b>Religious denomination, n (%)</b>			
Roman Catholic	6,277 (30.5)	4,797 (31.2)	1,480 (28.5)
Protestant	4,771 (23.2)	3,583 (23.3)	1,188 (22.9)
Other	754 (3.7)	557 (3.6)	197 (3.8)
None	8,684 (42.2)	6,384 (41.6)	2,300 (44.3)
Previous blood donations, median (25th to 75th)	21 (10–37)	23 (11–39)	16 (8–31)

### Health of Family Members

**Blood transfusion in a family member.** Donors who experienced a blood transfusion in a family member had 13% lower odds of lapsing than donors who did not experience such an event (odds ratio [OR] [95% confidence interval (CI)] = .87, [.78, .98],  $p < .05$ ). Subsequent mediation analyses showed no significant relationship between either talking about donation or knowing more donors and experiencing a blood transfusion in a family member. These results were in support of Hypothesis 2a as we found a significant relation between a blood transfusion and a decreased likelihood for donor lapse, while rejecting Hypothesis 2b as no evidence was found for the expected mediating variables.

**Serious disease in a family member.** No significant relation was found between experiencing a serious disease in a family member and blood donor lapse. Also, none of the hypothesized mediating mechanisms was significantly related to a serious disease in a family member, hereby rejecting Hypotheses 1 and 2 with regard to this specific health-related event.

**Death of a family member.** Blood donors who recently lost a family member had 10% lower odds of lapsing than donors who did not experience the death of a family member during the same period (OR [95% CI] = .90 [.83, .98],  $p < .05$ ). However, none of the hypothesized mediating variables (i.e., talking about donation, knowing more donors) was

**Table 2.** Results for the Logistic Regression Analyses of Life Events on Donor Lapse,<sup>a</sup> Mediated by the Hypothesized Mechanisms.<sup>b</sup>

Life events and Mechanisms <sup>c</sup>	Model 1			Model 2			Z Value <sup>f</sup>
	B <sup>d</sup>	SE	OR <sup>e</sup> (95% CI)	B	SE	OR (95% CI)	
Transfusion	-.13*	.06	.87 (.78, .98)	-.14*	.06	.87 (.79, .98)	
Talk about donation				-.04	.04	.96 (.90, 1.02)	.68
Transfusion	-.13*	.06	.87 (.78, .98)	-.14*	.06	.87 (.78, .98)	
Know other donors				-.28***	.04	.76 (.70, .81)	1.33
Serious disease	.02	.03	1.02 (.95, 1.09)	.01	.03	1.01 (.95, 1.08)	
Talk about donation				-.04	.03	.96 (.90, 1.03)	.36
Serious disease	.02	.03	1.02 (.95, 1.09)	.01	.03	1.01 (.95, 1.08)	
Know other donors				-.27***	.04	.76 (.71, .81)	1.92
Death	-.11*	.04	.90 (.83, .98)	-.11*	.04	.90 (.82, .98)	
Talk about donation				-.03	.04	.97 (.91, 1.04)	.04
Death	-.11*	.04	.90 (.83, .98)	-.12*	.04	.89 (.82, .97)	
Know other donors				-.27***	.04	.77 (.71, .83)	.15
Childbirth	.60***	.06	1.83 (1.63, 2.00)	.49***	.06	1.64 (1.46, 1.84)	
Perceived difficulty to plan donation				.60***	.02	1.81 (1.74, 1.89)	8.53***
Childbirth	.60***	.06	1.83 (1.63, 2.00)	.62***	.06	1.86 (1.66, 2.09)	
Perceived health status				.38***	.03	1.46 (1.36, 1.56)	1.47
Start job	.30*	.15	1.34 (1.02, 1.77)	.12	.23	1.08 (.77, 1.38)	
Increased working hours				.02*	.01	1.02 (1.01, 1.04)	2.85**
Start job	.30*	.15	1.34 (1.02, 1.77)	.18	.15	1.20 (.89, 1.62)	
Perceived difficulty to plan donation				.44***	.06	1.56 (1.37, 1.76)	3.22**
Lose job	.40***	.09	1.50 (1.25, 1.80)	.31***	.10	1.37 (1.13, 1.65)	
Perceived health status				.38***	.03	1.46 (1.38, 1.55)	4.57***
Lose job	.40***	.09	1.50 (1.25, 1.80)	.39***	.10	1.48 (1.48, 1.23)	
Know other donors				-.27***	.05	.76 (.70, .84)	2.68**
Lose job	.40***	.09	1.50 (1.25, 1.80)	.39***	.10	1.48 (1.23, 1.79)	
Talk about donation				-.24**	.04	.79 (.73, .86)	1.40

Note: CI = confidence interval; OR = odds ratio; SE = standard error.

<sup>a</sup>Blood donor lapse for nonmedical reasons.

<sup>b</sup>Effects are estimated separately for each life event, only when the donor is at risk for experiencing the life event: childbirth (n = 11,695); transfusion, serious disease, and death (n = 20,560); start job (n = 1,713); and lose job (n = 15,356).

<sup>c</sup>Results adjusted for donors' sex, age, educational level, religious denomination, and the total number of previous blood donations.

<sup>d</sup>Estimated unstandardized regression coefficients.

<sup>e</sup>OR indicates the odds of lapsing compared to the reference category.

<sup>f</sup>Results for the Z<sub>Mediation</sub> analyses (Iacobucci 2012), with corresponding a-path estimates to be found in Appendix C.

\*p < .05, \*\* p < .01, \*\*\* p < .001 (two-tailed tests).

significantly related to the death of a family member. With regard to this specific health-related event, Hypotheses 2a was confirmed as we found negative relation between death of a family member and donor lapse, while rejecting Hypothesis 2b as no evidence was found for the expected mediating variables.

### Childbirth

Blood donors who recently had a child had 83% higher odds of lapsing than donors who did not experience childbirth during the same period (OR [95% CI] = 1.83 [1.63, 2.00], p < .001), hereby

accepting Hypothesis 3a. Mediation analysis showed that childbirth was significantly related to the perceived difficulty to plan a donation (OR [95% CI] = 1.54 [1.40, 1.69],  $p < .001$ ) and that the difficulty to plan a donation was also significantly related to blood donor lapse (OR [95% CI] = 1.81 [1.74, 1.89],  $p < .001$ ).  $Z_{\text{Mediation}}$  showed that the perceived difficulty to plan a donation was a significant mediator of the relationship between childbirth and donor lapse ( $z = 8.53$ ,  $p < .001$ ). However, we could only partially accept Hypothesis 3b as we found no mediating role of the perceived health status of the donor. Moreover, no significant differences were found for men and women in their likelihood to lapse after childbirth, which contrasts expectations stated in Hypothesis 3c.

### Labor Market Transitions

**Starting a job.** Blood donors who started a job had 34% higher odds of lapsing than blood donors who remained unemployed in the same period (OR [95% CI] = 1.34 [1.02, 1.77],  $p < .05$ ), hereby accepting Hypothesis 4a with regard to this specific labor market transition. Using mediation analyses, we examined whether the positive relation between starting a job and donor lapse could be explained by increased working hours and the increased perceived difficulty to plan a donation. Positive, significant relations were found between starting a job and increased working hours ( $\beta = .70$ ,  $t = 40.06$ ,  $p < .001$ ) and between increased working hours and donor lapse (OR [95% CI] = 1.02 [1.01, 1.04],  $p < .05$ ). Also, positive, significant relations were found between starting a job and perceived difficulty to plan a donation (OR [95% CI] = 1.34 [1.02, 1.77],  $p < .05$ ) and between perceived difficulty to plan a donation and donor lapse (OR [95% CI] = 1.56 [1.37, 1.76],  $p < .001$ ).  $Z_{\text{Mediation}}$  showed these mechanisms to be significant mediators of the relationship between starting a job and donor lapse ( $z = 2.85$ ,  $p < .01$ ;  $z = 3.22$ ,  $p < .01$ , respectively), hereby confirming expectations stated in Hypothesis 4b.

**Losing a job.** Blood donors who lost their job had 50% higher odds of lapsing than those who kept their job in the same period (OR [95% CI] = 1.50 [1.25, 1.80],  $p < .001$ ), confirming expectations from Hypothesis 4c. To examine the role of mediating mechanisms, we analyzed whether a decreased perceived health status, talking less about donation, and knowing fewer other donors explained the relation between losing a job and donor lapse. Results indeed show that losing a job was significantly

related to a decreased perceived health status (OR [95% CI] = 1.45 [1.25, 1.67],  $p < .001$ ), talking less about donation (OR [95% CI] = .79 [.65, .97],  $p < .05$ ), and knowing fewer other donors (OR [95% CI] = .74 [.62, .89],  $p < .01$ ). Moreover, all three mechanisms were significantly related to donor lapse.  $Z_{\text{Mediation}}$  showed the decreased perceived health status and knowing fewer other donors to significantly mediate the main effect ( $z = 4.57$ ,  $p < .001$ ;  $z = 2.68$ ,  $p < .01$ , respectively), hereby partially supporting Hypothesis 4c.

## DISCUSSION

Based on a large-scale longitudinal survey and registry data of Dutch blood donors, we investigated the impact of life events on blood donor lapse and examined whether costs and influences from the social network were able to explain this relationship. Life events related to the health of family members, family composition, and labor market transitions all impact blood donor lapse. In line with Elder's (1994) life course approach, our findings suggest that social and practical concerns indeed play a role in people's decision to donate blood and that this decision is susceptible to change over time.

### Human Capital and the Resources Perspective

Following the resources perspective, we found evidence that blood donors make a decision to continue to donate based on their available time. Childbirth increased the likelihood for donor lapse, partially explained by increased perceived difficulty to plan a donation. Remarkably, we did not find differences between men and women, while previous Dutch and Italian studies on volunteer work showed that the presence of young children in the household negatively influenced volunteer work for women but not men (Lancee and Radl 2014; Quaranta 2016). This moderating effect of gender is ascribed to cultural differences, with women mainly taking up responsibility for child care in certain countries. It can also be argued that local regulations affect the impact of life events on prosocial behavior as regulations regarding parental care after childbirth differ significantly between countries. In the Netherlands, fathers have only two days off after childbirth, posing constraints on their available time. In countries with extended paternity leave, fathers have more time after childbirth, making it more likely to stay involved in prosocial activities.

Moreover, we found that starting a job is detrimental for blood donation, partially explained by an increase in working hours. Yet, it is questionable whether time constraints are the real reason for donor lapse. It might well be possible that people perceive that donating blood requires more time and effort than it actually does—a whole blood donation typically takes less than one hour—or that a lack of time is used as excuse for other donation barriers such as fear of adverse reactions, inconvenience, or reduced donation efficacy due to worse health.

### *Social Capital and the Network Perspective*

Following the social network perspective, our results indicate that the tradeoff between resources and blood donation is indeed not as straightforward as it seems: Donors who lost their job were more likely to lapse than donors who kept their job, with knowing fewer donors after losing a job partially explaining this effect. Previous studies indeed suggested that the presence of blood donors in the network might influence the decision to start or continue donating (Bani and Strepparava 2011; Charbonneau et al. 2015). As the effects are small, however, we might argue that social pressure and norms in the workplace are weaker forces in blood donation than peer pressure from friends and family. This “peer proximity” effect, that is, stronger influence from proximal than distal peers (Bearman et al. 1999), has already been shown to moderate the influence of peer pressure on, among others, smoking (Paek and Gunther 2007), alcohol consumption (Yanovitzky, Stewart, and Lederman 2006), and physical activity (Randazzo and Solmon 2018).

The lack of explanatory power of social influences might also be explained by the difference between short-term and long-term effects of life events. Time constraints due to work or family responsibilities have an immediate effect on day-to-day planning, but it takes more than a day to build social networks. For instance, regarding childbirth, it is assumed that children create more possibilities in terms of social contacts and social integration as parents usually have larger social networks created through their children (Bost et al. 2002). Social network engagement, however, has been found to be dependent on the children’s age (Einolf 2018), which may either promote social isolation or social integration (Rotolo and Wilson 2007): Preschool-aged children need their parents’ attention, making it difficult for parents to be actively engaged, while

school-aged children need less attention, creating opportunities to be involved in extended social networks (Nesbit 2012; Oesterle et al. 2004). To unravel behavioral change and its consequences, we should not only focus on relatively short-term effects of life events but also recognize lifelong processes of change by investigating how life events influence behavior in later years.

### *The Role of Health-Related Events*

In further exploring the mediating role of resources and networks, we found that donors who experienced a blood transfusion or death in the family were slightly more likely to continue donating blood. It remains unclear, however, why these events have an influence on donor behavior as none of the hypothesized variables mediated these relations. Perhaps blood donation in these cases is not a result of social interactions but of internal motivational processes as donors are reminded of the need for blood products and the difference they can make by donating. Experimental studies on charitable giving show how giving behavior is promoted by manipulating people’s awareness of need (Bekkers and Wiepking 2011b). Yet, maintaining a level of awareness is also important, especially in behaviors that require repeated decisions over time, such as blood donation or other health-related behaviors. Campaigns targeting health awareness have already shown promising results in promoting behavioral change toward a healthier lifestyle (Peralta, Jones, and Okely 2009).

### *Strengths and Limitations*

One of the main strengths of this study is that it draws on registry data from the Dutch donor database, containing objective and reliable information on blood donations and donor lapse. Linking survey and registry data enabled a longitudinal design to study the dynamic nature of blood donor behavior, shifting the focus from static donor behavior to dynamic donor careers. On a more general note, our study adds to the existing literature as it widens our knowledge of prosocial behavior and tested the explanatory value of variables derived from human and social capital theories. Going beyond descriptive accounts of donor behavior, a theoretical understanding of prosocial behavior forms the basis for more effective, evidence-based practical applications.

The current study also has limitations that need to be addressed. First, survey questions about life

events are susceptible to recall bias (Coughlin 1990). When asked about donating blood, it is more likely that people remember the most salient life events—those that actually motivated them to stop or to keep on donating—leading to possible overestimations of the effect sizes (Bekkers and Wierking 2011a). The study design is open to self-selection bias, making it impossible to determine whether nonresponse to the DIS-II questionnaire is the result of the (non)occurrence of specific life events.

As life events may be influenced by endogenous factors occurring in relation to other person-specific characteristics, the present results may be biased by omitted variables. The data structure also makes it difficult to ascertain the exact order of events; for example, did the lapsed donors perceive themselves to be less healthy after they lost their job, or were they already worse in their perceived health status before they lost their job? We solved these issues to the best of our data's ability by including a number of potentially confounding variables to the models and measuring the mediating variables after the occurrence of the life event (i.e., at the time of DIS-II). Nonetheless, our study is among the first to examine blood donor behavior across the life course, providing valuable insights in blood donor careers.

### *Future Directions for Research and Blood Collection Agencies*

Despite these limitations, the current study findings may well serve as a basis for several future

directions both in the specific field of blood donor studies and the general field of prosocial behavior. For instance, the likelihood of being involved in prosocial behavior is susceptible to change across the life course, yet driving factors underlying these behavioral changes have remained relatively unknown. More indicators of human and social capital need to be examined to investigate their explanatory value.

In the field of blood donor studies, we would encourage research groups from other countries to conduct similar donor career studies to enable cross-country comparisons of relations between life events and blood donor behavior. Beyond individual and social resources such as time constraints and social connectedness, contextual factors such as different cultures and collection regimes might also be considered “resources” affecting donor behavior (Healy 2000). Previous studies have indeed shown cultural differences to be associated with blood donor attitudes across Europe (Merz et al. 2016).

If we want to put our knowledge to use, it is worthwhile to explore people's motivational change after they experienced a life event, especially in behavior that requires repeated decisions throughout the life course. Once we have a better understanding of these motivational changes, non-profit organizations such as BCAs can design interventions to test whether promotional materials can make a differences in donors' decisions to keep donating blood at decisive moments in their lives.

## APPENDIX A: NONRESPONSE ANALYSIS

**Table A1.** Independent-Sample *t*-test between Respondents ( $n = 31,338$ ) and Nonrespondents ( $n = 18,525$ ) from the First Wave of the Donor InSight Study.

	Respondents		Non-respondents		t-test	
	M	SD	M	SD	t	p Value
Age	45.59	12.75	43.98	13.22	11.07	<.001***
Sex <sup>a</sup>	1.53	.50	1.48	.50	16.55	<.001***
Total number of blood donations	31.79	30.10	26.44	26.77	13.43	<.001***

Note: M = mean, SD = standard deviation.

<sup>a</sup>Sex was coded as 1 = male, 2 = female.

\*\*\* $p < .001$  (two-tailed tests).

## APPENDIX B: CORRELATION MATRIX

**Table B1.** Correlation Matrix Including Pearson Correlations (*r*) between All Study Measures.

Measure <sup>a</sup>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Blood donor lapse	—																
2. Transfusion	-.02*	—															
3. Serious disease	.00	.18***	—														
4. Death	-.02*	.10***	.25***	—													
5. Childbirth	.10***	-.02*	-.09***	-.08***	—												
6. Starting a job	-.02*	-.04	-.18***	-.14***	.12***	—											
7. Losing a job	.03**	.00	.01	.01	-.01	.00	—										
8. Working hours	-.11***	.01	-.03***	-.04***	.07***	.88***	-.52***	—									
9. Difficulty to plan	.21***	.00	-.04***	-.07***	.20***	.34***	.07***	.25***	—								
10. Health status	.11***	.01	.05***	.03***	-.04***	-.11***	.06***	-.08***	.07***	—							
11. Talk about donation	-.02*	.01	.03***	.02**	-.05***	-.03	-.01	-.05***	-.15***	-.02**	—						
12. Know other donors	-.06***	.01	-.01	-.01	.03***	.04	-.03***	.04***	-.03***	-.04***	.14***	—					
13. Age	.01	.02*	.16***	.19***	-.38***	-.59***	.08***	-.43***	-.35***	.11***	.07***	-.08***	—				
14. Sex	.08***	.02*	-.02**	-.06***	.07***	-.24***	.06***	-.25***	.05***	-.05***	-.03***	.02*	-.24***	—			
15. Education	.03***	.01*	-.04***	-.06***	.14***	.26***	-.08***	.18***	.18***	.00	-.10***	-.03***	-.17***	-.03***	—		
16. Religion	-.02**	.00	.04***	.04***	-.03***	-.12***	.03**	-.08***	-.09***	.00	.04***	.04***	.13***	-.02**	-.09***	—	
17. Previous donations	-.10***	.01	.07***	.06***	-.11***	-.24***	-.01	-.04***	-.14***	.01	.05***	-.03***	.33***	-.16***	.00	.04***	—

<sup>a</sup>Measures ordered by category: blood donor lapse (1), life events (2–7), mechanisms (8–12), and control variables (13–17).  
\**p* < .05, \*\**p* < .01, \*\*\**p* < .001 (two-tailed tests).

## APPENDIX C: A-PATH ESTIMATES FOR MEDIATION ANALYSES

**Table C1.** Results for the Regression Analyses of the Hypothesized Mechanisms on Life Events.<sup>a</sup>

Life Events and Mechanisms <sup>b</sup>	B <sup>c</sup>	SE	OR <sup>d</sup> (95% CI)
Transfusion			
Talk about donation	.06	.06	1.06 (.95, 1.19)
Know other donors	.08	.06	1.08 (.97, 1.21)
Serious disease			
Talk about donation	.07	.04	1.07 (.99, 1.14)
Know other donors	.02	.03	1.02 (.96, 1.09)
Death			
Talk about donation	.01	.04	1.01 (.92, 1.09)
Know other donors	.01	.04	1.01 (.93, 1.09)
Childbirth			
Perceived difficulty to plan donation	.43***	.05	1.54 (1.40, 1.69)
Perceived health status	-.07	.05	.93 (.85, 1.02)
Start job			
Increased working hours	21.49***	.54	—
Perceived difficulty to plan donation	.41**	.12	1.50 (1.18, 1.92)
Lose job			
Perceived health status	.36***	.07	1.43 (1.24, 1.65)
Know other donors	-.30**	.09	.74 (.62, .89)
Talk about donation	-.17	.10	.86 (.71, 1.05)

Note: CI = confidence interval; OR = odds ratio; SE = standard error.

<sup>a</sup>Effects are estimated separately for each life event, only when the donor is at risk for experiencing the life event: childbirth ( $n = 11,695$ ); transfusion, serious disease, and death ( $n = 20,560$ ); start job ( $n = 1,713$ ); lose job ( $n = 15,356$ ).

<sup>b</sup>Results adjusted for donors' sex, age, educational level, religious denomination, and the total number of previous blood donations.

<sup>c</sup>Estimated unstandardized regression coefficients.

<sup>d</sup>OR indicates the odds of lapsing compared to the reference category, reported only for logistic/ordinal regression analyses.

\*\* $p < .01$ , \*\*\* $p < .001$  (two-tailed tests).

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