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Does divorce change your personality? Examining the effect of divorce occurrence on the Big Five personality traits using panel surveys from three countries

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ABSTRACT

Experiencing a divorce can be challenging and have a lasting impact on people's lives, but does it change your personality? By making use of large panel surveys from Australia, Germany, and the United Kingdom, intra-individual change in the Big Five personality traits of those who separated during a four-year observation, was compared to that of those who remained married. We tested the replicability of divorce-induced personality change across the three country samples, while also examining gender differences and separation duration. Latent difference score models mostly indicated that divorce is not a consistent predictor of personality change, as only isolated effects were found, and these could not be replicated across samples. Aside from the overall lack of replicable effects a few isolated effects were detected that offer some support for a modified version of the social investment principle. Nonetheless, the overall finding of this study suggests that experiencing a divorce is unlikely to lead to permanent personality change.

1. Introduction

Although personality development stabilizes during adulthood, change continues throughout the lifespan, albeit to a lesser extent than during earlier life stages (Roberts et al., 2006). This begs the question of what causes adult personality change. Some scholars have argued that the experience of divorce may hold some answers, but relevant studies remain scarce and divorce has therefore been largely ignored as a potential disrupter of personality stability (but see Allemand et al., 2015; Asselmann & Specht, 2020; Costa Jr. et al., 2000; Denissen et al., 2019; Pusch et al., 2019; Specht et al., 2011). Similarly, the literature regarding the consequences of divorce has focused on a range of outcomes, such as well-being (Kalmijn, 2010), income (Gadalla, 2008), or health (Hughes & Waite, 2009), but overlooked its effect on personality. The current research aims to combine both fields by addressing the following research question: 'Does marital separation lead to changes in the Big Five personality traits?' Acknowledging the strengths of the seminal work of Specht et al. (2011), the latent structure of personality traits is incorporated into the analysis, using latent growth modelling to investigate the effect of marital separation on personality change. In line with more recent research by Denissen et al. (2019) and Asselmann and Specht (2020) we also examined anticipation and temporary effects that could influence divorce-induced personality change.

The current study contributes to the existing literature in several ways. To date, the personality stability of divorcees has only been compared to those who were recently married (Costa Jr. et al., 2000) or to all nondivorcees (Asselmann & Specht, 2020; Denissen et al., 2019; Specht et al., 2011). In contrast to the latter, the current research directly compares married individuals who divorced during an observation time of several years, to those who remained married during this time. Starting from the same married population at the moment of the first personality measurement leads to a more efficient isolation of the effect under investigation than regarding the entire population of nondivorcees as the reference group. The reason for this is that the latter includes a great variety of individuals, such as widowers, never-married individuals, students, etc.

A second contribution consists of testing the replicability of divorce-induced personality change across different samples. This is enabled by the growing inclusion of the Big Five traits in nationally representative panel studies. Consequently, the opportunity exists to examine whether potential effects can be replicated across multiple countries (Dyrenforth et al., 2010). However, one should note that this examination is restricted to testing the replicability of the effect, rather than a direct comparison of personality change between different countries, which is

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not appropriate, due to the lack of measurement invariance. Nevertheless, replicability is a pillar of scientific research and therefore the inclusion of multiple samples constitutes a significant addition to the existing literature, even when direct comparison is not feasible.

2. Background

2.1. Social investment principle

Personality develops throughout the lifespan, with most change occurring during the early life stages. Later in life, during adulthood, personality stabilizes, but not completely. Although moderate levels of personality stability exist, small changes occur, as people become, on average, less neurotic, while simultaneously increasing in conscientiousness, agreeableness, and social dominance as they move through adulthood (Roberts et al., 2008, p. 376).[1] As these changes can be interpreted as a sign of greater maturity, researchers have dubbed this process the maturity principle and demonstrated that it continues far into adulthood, as was shown in a meta-analysis of 92 studies by Roberts et al. (2006), consisting of more than 50,000 participants. The maturity principle is regarded by proponents of essentialist theories as strict internal maturation due to genetic predispositions (McCrae & Costa, 1999). By contrast, the neosocioanalytic model acknowledges these genetic predispositions, but also ascribes special importance to investment in age-graded social roles (Roberts & Wood, 2006; Roberts et al., 2005, p. 173). This social investment principle suggests that the increasing maturity is partially due to individuals' fulfilling normative social roles, related to work, family, and friends, that come with a set of societal expectations, which promote and reward mature behaviour (Roberts & Nickel, 2017). For example, starting a relationship in young adulthood is associated with lower levels of neuroticism and shyness, and increased self-esteem, conscientiousness, and extraversion (Neyer & Lehnart, 2007).

Although the social investment principle can explain the maturation effect of some social role transitions, such as entering the labour force or starting a romantic relationship in young adulthood, it has been less successful to explain personality changes in family roles that occur later in life, such as marriage and parenthood. Counterintuitively, the transition into these two social roles (i.e., spouse and parent) is associated with less mature personality development, as marriage seems to lower agreeableness, openness, and extraversion (Specht et al., 2011), and parenthood decreases conscientiousness and openness (van Scheppingen et al., 2016).[2] Consequently, one is left to wonder why certain life events seem to evoke greater maturation and others do not. Neyer and Lehnart (2007) argue that the maturation principle reflects mean level change and thus hides individual differences: a personality trait may increase for the population on average, while, at the same time, a group of individuals, who have experienced a specific life event, stay unaffected or even see that trait decrease. Therefore, it is possible that certain life events cause a drop in some mature personality traits when those traits no longer seem rewarding in the new social role. This is a more economical interpretation of the social investment principle, whereby maturation is regarded as labour-intensive and therefore becomes less attractive to continue this process when the rewards become too small. This may explain the finding by Specht et al. (2011) that marriage seems to lead to a drop in agreeableness, extraversion, and openness, while Lavner et al. (2018) also found a decrease among newlyweds in those same three traits. We argue that these personality traits become less rewarding when entering a marriage, because people tend to spend more time with their partner and less with friends and peers. Being extraverted, open, and agreeable are traits that are advantageous when building and maintaining a social network of friends and peers. Harris and Vazire (2016) reviewed the literature and concluded that extraversion and openness facilitate the maintenance of larger social networks, extraverts also tend to select more friends, and agreeable individuals are themselves more often selected as friends by others.

2.2. Divorce-induced personality change

Contrary to marriage, divorce is not a normative life event, nor an age-graded social role since it can occur at any age during the adult lifespan. Therefore it is even less likely that divorce is part of the general personality maturation process. Instead, divorce can be interpreted as a non-normative 'loss-based event' that 'involves the loss of a previously held social role' (Denissen et al., 2019, p. 614). In other words, divorcees can be regarded as a subpopulation of individuals (temporary) exiting the social role of marriage. This should be accompanied by higher rewards concerning those personality traits that are useful to connect to new people and strengthen existing relationships (Specht, 2017); therefore one can expect agreeableness, extraversion, and openness to increase when experiencing marital separation (Hypothesis 1). Empirical support is offered by the aforementioned study by Specht et al. (2011), who found divorce to lead to higher conscientiousness and agreeableness and relationship separation to increase agreeableness and openness for men. Other studies have found no effect (Denissen et al., 2019; Pusch et al., 2019) or decreases in mature personality traits (Allemand et al., 2015). However, the design of these studies varies greatly, with Pusch et al. (2019) focusing on first separation during emerging and young adulthood, while Allemand et al. (2015) examined personality change that took place during the years after divorce. The latter also meant that there was no personality measurement before divorce.

Some authors argue that divorce changes personality differently for men and women. Costa Jr. et al. (2000) found an increase in women's extraversion and openness following divorce, while conscientiousness seemed to decrease for men. However, this study did not measure intra-individual change directly but rather compared recently divorced to recently married individuals. Asselmann and Specht (2020) did study intra-individual change and their findings showed that following formal divorce both men and women experience an increase in neuroticism, but during the first months after marital or relationship separation women increased in extraversion and openness while men became less emotionally stable. The researchers argued that women tend to be more proactive when adjusting to separation and 'more strongly engage in novel social activities', whereas men tend to focus on their partner (Asselmann & Specht, 2020, p. 1813). In other words, the aforementioned re-investment into mature traits was only performed by women. Based on these findings we hypothesized that women are more likely than men to increase in mature personality traits following a marital separation (Hypothesis 2).

2.3. Divorce as a process

Treating divorce as a process rather than as a discrete event has become increasingly popular among researchers studying divorce, as exemplified by the divorce-stress-adjustment perspective (Amato, 2000). Although this perspective is focussed on stress, we extrapolate its process approach to personality change and hypothesize that as time passes, it becomes increasingly likely that divorcees will have repartnered or found other ways to adapt to their altered situation. If a postseparation personality measurement were to happen closer to the separation date, then the personality change might be more intense, whereas if the postseparation measurement were to happen several years after a separation, then there would be a good chance that the effects have faded out because the divorcee will have already repartnered or adapted in other ways. Therefore, when the personality

[1] Not all of these changes are linear.

[2] We acknowledge that the interpretation of increasing openness and extraversion as mature development is debatable.

measurements take place matters greatly. Besides the importance of timing the postseparation personality measurements, the same principle applies to preseparation measurements. Based on the process approach to divorce, it is possible for personality change to start well before a separation takes place, as anticipation of the event could be a sufficient motivator. In accordance with our modified version of the social investment principle this would entail that mature traits can increase before the separation occurs in anticipation of the rewards that lie ahead, and over time these increases would disappear as people repartner or adjust their lives (Hypothesis 3). That being said, this hypothesis is not supported by recent studies that have been able to examine the trajectory of personality development before and after separation with the use of more than two measurement moments (Asselmann & Specht, 2020; Denissen et al., 2019). Denissen et al. (2019) examined multiple personality measurements with intervals of only one to two years and detected no anticipation or temporary effects associated with divorce, although the authors did not implement the same latent variable analysis techniques as Specht et al. (2011).

2.4. Selection effects

Previous research has also uncovered an effect in the reverse direction: namely, a selection effect of personality on divorce. Personality traits have been shown to affect divorce and relationship dissolution. Although this is not the main interest of this study, it is worth examining. Compared to the scarce literature on the socialization effect of divorce on personality change, the selection effect of personality on divorce has been researched as far back as the 1930s (Terman & Buttenwieser, 1935). Since then, a multitude of studies have examined the divorce risk associated with the Big Five traits, and although their findings vary, overall, neuroticism, extraversion, and openness seem to increase the risk of divorce, whereas conscientiousness and agreeableness have been found to lower it (Karney & Bradbury, 1995; Lundberg, 2012; Roberts et al., 2007; Solomon & Jackson, 2014). Conscientiousness, agreeableness, and low neuroticism (i.e., emotional stability) are signs of greater maturity, which could explain why these traits would stabilize a marriage. In contrast, extraversion and openness have been associated with infidelity (Orzeck & Lung, 2005). Based on the findings of the existing literature, we hypothesize that neuroticism, extraversion, and openness are associated with a higher divorce risk, whereas conscientiousness and agreeableness should decrease the risk (Hypothesis 4).

3. Materials and methods

3.1. Sample

We based the study on panel data from three countries: first, the harmonized version of the British Household Panel Study in combination with the Understanding Society survey in the UK, which contains approximately 40,000 households (University of Essex, 2019); second, the Socio-Economic Panel Study, which surveyed about 15,000 German households over the last 35 years (Goebel et al., 2019; Liebig et al., 2018); and third, the Household, Income and Labour Dynamics in Australia survey, a nationally representative panel study of more than 7600 Australian households (Watson & Wooden, 2012).

The multitude of measurement moments in the Australian (i.e., 2005, 2009, 2013) and German (i.e., 2005, 2009, 2013, 2017) samples enabled the formation of several observation periods (i.e. 2005–2009, 2009–2013, 2013–2017).[3] These observation periods were then pooled together within their country sample, resulting in periods being nested within individuals. Consequently, some individuals had one observation period within the sample, whereas others had multiple. Further aggregation by analysing the three countries within the same model was impossible, because measurement invariance could not be guaranteed due to the Australian Big Five questionnaire differing from the British and German questionnaire and the British observation time lasting 2 years longer (i.e., 2005 and 2011). Besides the requirement of participating in two consecutive personality measurement moments, the sample selection procedure required participants to be married at the first personality measurement moment. Individuals who separated before or in the same year as the first personality measurement were omitted from their country sample to make sure that personality was always measured before the separation.

The final three country samples contained 9111 Australian, 23,894 German and 4194 UK observations. The percentage of divorcees varied between 2.89% (DE), 4.13% (AU) and 4.34% (UK). The average age was 49.50 years (SD = 13.80) in the Australian sample, 53.84 years (SD = 13.44) in the German sample and 49.20 years (SD = 13.27) in the UK sample. The proportion of men and women was about equal, with the percentage of female respondents ranging from 50.68% (DE) to 51.72% (AU) and 53.8% (UK). About 35% of the German respondents had received some form of tertiary education. For the British and Australian samples, this figure was 40% and 39%, respectively.

We used Monte Carlo simulations to calculate which sample size was needed to detect an effect of divorce on personality change in using the multiple-indicator latent difference score models (Muthén & Muthén, 2002). Population estimates were based on previous research's results, including the variance of the latent change score and the selection effect of divorce on personality, which were derived from Specht et al. (2011). Furthermore, we set the starting values of the factor loadings to 0.7 (Losoncz, 2007) and the interitem correlations to 0.3. Specht et al. (2011) showed that the size of the divorce effect on personality change was small (i.e., $b \sim 0.2$). The smallest sample in Table 1 contained 4194 individuals and 4.34% divorcees (i.e., UK sample), which allowed the detection of small divorce effects on personality change, with a coverage of 95% and a statistical power of 84.9%.

3.2. Measures

Personality was defined by the traits of the five-factor model (McCrae & John, 1992). The British and German samples both included 15 indicators from the Big Five Inventory (BFI) survey (Lang et al., 2011). The Australian sample contained 36 personality indicators, mostly taken from the TDA-40 questionnaire (Saucier, 1994) and modified with additional items. Previous research by Losoncz (2007) had demonstrated that the additional items do no perform as well as those from the TDA-40 questionnaire. Consequently, we employed the authors' recommended indicator selection (Losoncz, 2007). All indicators were measured on a 7-point Likert scale. Due to the high number of categories and large sample size, these indicators were treated as continuous variables (Bollen & Barb, 1981). Items of traits with more than five indicators were parcelled into three composite indicators. Item-to-construct relations were examined in order to create balanced parcels (Little et al., 2002).

Divorce can be a lengthy process wherein the final change in legal marital status can occur long after a couple has separated. For this reason, we chose marital separation as the main predictor instead of formal divorce. The marital status variables from each wave were used to construct the divorce occurrence variable. A positive value was given to those who were married during the first personality measurement and divorced or separated-but-not-yet-divorced during the years leading up to the second personality measurement. The age of the respondents was treated as a continuous variable.

[3] It would be confusing to label these observation periods as cohorts, for it would automatically give the impression of a birth cohort and thus imply that everyone divorces at the same age.

Table 1
Divorce and personality change: initial personality (I) and personality change (C), predicted by divorce occurrence.

			Australia				Germany				UK			
			b	SE	p			b	SE	p		b	SE	p	
A	I	♀	0.110	0.060	0.068		♀	−0.023	0.040	0.562		0.035	0.043	0.418	
	C		−0.018	0.049	0.719			0.097	0.040	0.015	*	0.002	0.048	0.962	
		♂	−0.098	0.077	0.202		♂	−0.042	0.055	0.447					
			0.299	0.064	0.000	***		0.151	0.060	0.011	*				
O	I	♀	0.238	0.078	0.002	**		0.108	0.041	0.008	**	0.021	0.100	0.836	
	C		0.047	0.051	0.352			0.021	0.038	0.582		0.057	0.092	0.532	
		♂	0.150	0.085	0.079										
			0.144	0.056	0.011	**									
C	I	♀	0.095	0.073	0.196			−0.039	0.038	0.308		−0.002	0.077	0.983	
	C		−0.116	0.054	0.031	*		0.005	0.038	0.896		−0.066	0.076	0.387	
		♂	−0.097	0.088	0.271										
			0.091	0.064	0.153										
E	I		−0.006	0.066	0.931			0.071	0.030	0.019	*	0.142	0.048	0.003	**
	C		0.021	0.045	0.637			0.005	0.025	0.849		0.000	0.043	0.995	
N	I		0.193	0.060	0.001	**		0.012	0.038	0.751		−0.013	0.068	0.854	
	C		−0.086	0.053	0.102			−0.033	0.037	0.372		−0.074	0.067	0.267	
N total				9111					23,894				4194		
N sep.				376					691				182		
% sep.				4.13					2.89				4.34		

Note: b = unstandardized effect; control variables of gender, age and higher polynomial age are included in the models but not shown; * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$; sep. = separated. Multigroup analyses were only reported when a significant effect on the difference score was detected for either men or women.

3.3. Statistical analyses

The measurement models of this study consisted of two latent factors, namely the personality measurements at the start and end of the observation window. In line with previous research, we constructed separate models for each trait (Asselmann & Specht, 2020; Denissen et al., 2019; Specht et al., 2011). As is often the case when variables are measured using Likert scales, the personality indicators were slightly nonnormally distributed. Therefore, a maximum likelihood estimator with robust standard errors (i.e., MLR in Mplus) was employed, which was capable of handling nonnormal as well as missing data (Muthén & Muthén, 2017). As a consequence of the pooling of observation periods that belong to the same country the data consisted of time periods being nested within individuals. To account for this, standard errors were clustered according to ID number.

The differences in personality traits between the measurement moments needed to reflect true changes in the latent constructs and not be the result of mere differences in the measurement instrument (Nye et al., 2016). Consequently, the models were constructed to contain scalar invariance (i.e., strong invariance). This constrained the models to have the same number of factors and same patterns of factor–-indicator relationships in each wave, while holding the intercepts and factor loadings of the corresponding factor indicators equal (Meredith & Teresi, 2006). Because the personality indicators were repeated measures, their measurement errors were allowed to correlate across time points (McArdle, 2009). We tested scalar invariance by comparing the hierarchical levels of measurement invariance. Cheung and Rensvold (2002) cautioned against use of the chi^2 difference test because of its dependence on sample size and advised the adoption of alternative fit indices in the decision to choose a more restrictive model (Brannick, 1995; Kelloway, 1995).

Afterwards, we constructed latent difference score models. As Fig. 1 shows, this type of model set fixed values so that a personality measurement taking place after a potential separation could be conducted by adding the initial score and the change in that score (McArdle, 2009). To test whether a significant effect of divorce was not merely a maturation effect, we first regressed the difference score and initial score (i.e., first personality measurement) on age. The latter was done to check the effect on the initial levels of personality. If a statistically significant age effect was found, we proceeded by examining whether its higher order polynomial could also be included. Besides age, we also regressed the difference and initial scores on gender to control for differences between men and women in general personality levels and change.

When these demographic variables were set, we continued by regressing the initial and difference scores on divorce occurrence (i.e., marital separation). Regressing the difference score allowed us to test Hypothesis 1, whereas the initial score (i.e., first personality measurement) allowed for examining the validity of Hypothesis 4. In addition, we also performed multigroup analyses, differentiating on the basis of gender to check for possible gender effects regarding the personality-changing ability of divorce (Hypothesis 2).

Finally, we controlled for anticipation effects by examining the impact of separation duration (i.e., time between separation and the postseparation personality measurement) on the initial personality score. This was achieved by replacing the divorce predictor by separation duration in models that only contained divorcees. Similarly, the presence of short temporary effects hidden within the four-year observations was examined by regressing the difference score onto separation duration (Hypothesis 3). These analyses could not be performed on the UK sample due to the small number of divorcees (N = 110).

4. Results

4.1. Measurement models

The fit indices of the longitudinal measurement models containing scalar measurement invariance achieved adequate fit for the Australian models (i.e., CFI > 0.985; RMSEA < 0.055; SRMR < 0.027), the German models (i.e., CFI > 0.958; RMSEA < 0.057; SRMR < 0.040) and the UK models (i.e., CFI > 0.930; RMSEA < 0.065; SRMR < 0.040) (Hu & Bentler, 1999; Steiger, 2007). The omega coefficients of the personality traits in the Australian sample demonstrated sufficient internal consistency: ωN = 0.817; ωC = 0.811; ωO = 0.790; ωA = 0.786; ωE = 0.724 (McDonald, 1999). The German (i.e., ωN = 0.639; ωC = 0.590; ωO = 0.616; ωA = 0.504; ωE = 0.673) and UK (i.e., ωN = 0.724; ωC = 0.557; ωO = 0.673; ωA = 0.571; ωE = 0.616) traits showed less adequate levels, which could be attributed to the smaller number of items of the BFI-S used in the UK and

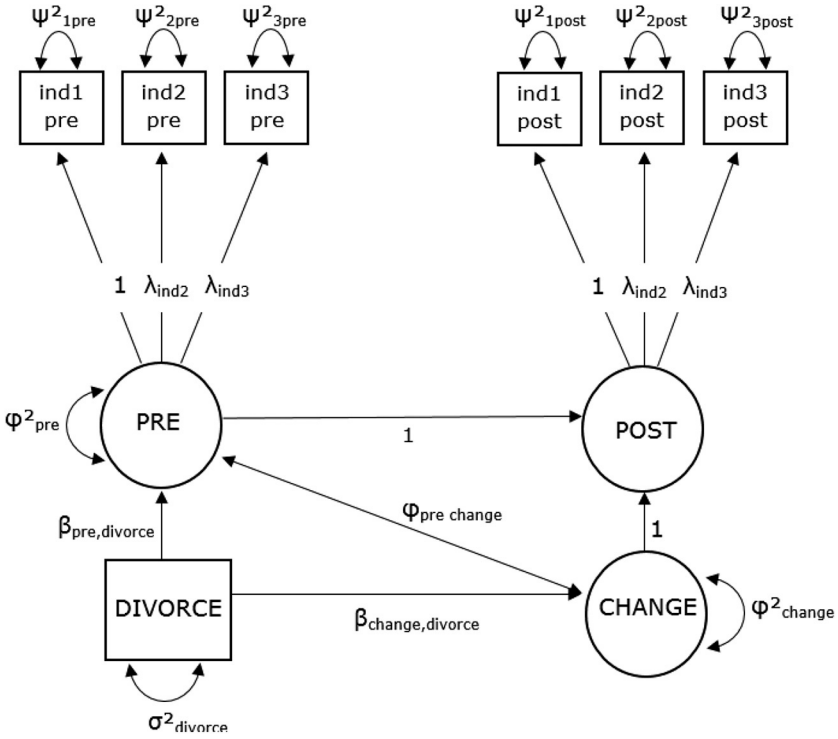

Fig. 1. Multiple indicator latent difference score models, based on McArdle (2009) and measured separately for each of the Big Five traits. Each trait was measured before and after a possible marital separation and based on multiple personality indicators. This observation period lasted 4 years (6 years for the UK sample). Scalar measurement invariance was imposed. In each model, indicator errors were allowed to correlate across time points. The latent prescore (i.e. initial score) and latent difference score (i.e., latent change) were predicted by divorce occurrence, gender, and age in different models. Higher polynomial functions of age were also included when significant ($p < 0.05$).

German samples that were chosen to safeguard the validity of the scale. Nevertheless, Hahn et al. (2012) demonstrated that the BFI-S does contain sufficient internal consistency, test-retest stability, and convergent and discriminant validity with the facets of the NEO-PI-R.

4.2. Change effect

Table 1 shows the unstandardized effect of marital separation on the first measurement score — that is, the initial score (= I) — and on the difference score (= C) when we controlled for gender, age, and significant higher-order polynomials (i.e., not shown in table). When examining the main interest of this study, the difference score, we detected limited change in personality following marital separation. Of the 15 differences scores, only four proved statistically significant. These included an increase in openness (i.e., $b = 0.144$; $p = 0.011$; 95% CI [0.033, 0.254]), which was limited to men in the Australian sample. The standardized effect β equalled 0.241, which means that men who separated increased in openness afterwards by 24.1% of a standard deviation. Women also reported a divorce-induced change in the Australian sample, namely a decrease in conscientiousness (i.e., $b = -0.116$; $p = 0.031$; 95% CI [−0.221, −0.010]; $\beta = -0.214$). The replicability of the significant effects was extremely limited, as only the agreeableness change effect could be replicated in more than one sample: the significant effect in the German sample for women (i.e., $b = 0.097$; $p = 0.015$; 95% CI [0.019, 0.175]) had a standardized effect of 0.202, and for men (i.e., $b = 0.151$; $p = 0.011$; 95% CI [0.034, 0.268]) a standardized effect of 0.270, and the Australian effect for men was $b = 0.299$; $p = 0.000$; 95% CI [0.174, 0.425]; $\beta = 0.455$. Agreeableness was therefore the Big Five trait that showed the strongest change in experiences of union dissolution. Thus, overall, divorce appeared unable to predict consistent changes in the Big Five personality traits, and we could only find some slight evidence of a replicable maturation effect for agreeableness, with two out of three countries confirmed. Consequently, Hypothesis 1 could not be supported.

Men and women demonstrated a similar divorce-induced change in agreeableness in the German sample, but not in the Australian sample. Since the only replicable personality change was found for men, we concluded that even though there is limited support for divorce-induced personality change, men seem to show somewhat more consistent change than women. And because these results indicated an increase of a mature personality trait (i.e., higher levels of agreeableness) for men but not for women, Hypothesis 2 was rejected.

4.3. Separation duration

Similar to the findings of Table 1 we found little effect of separation duration on personality change in Table 2. Significant results were limited to three isolated effects. Women in the Australian sample whose separation date and postseparation measurement occurred further apart in time, and thus had less time between their separation and preseparation measurement, were more agreeable (i.e., $b = 0.109$; $p = 0.038$; 95% CI [0.006, 0.211]; $\beta = 0.162$). This result could be interpreted as an anticipatory change where women already increased their agreeableness when faced with an impending marital separation. However, one needs to exercise caution when interpreting this finding because intra-individual change was examined via interindividual differences based on a sample size of 352 divorcees. The remaining two isolated effects consisted of significant effects of the separation duration on the change in women's openness in the German sample (i.e., $b = -0.230$; $p = 0.000$; 95% CI [−0.325, −0.136]; $\beta = -0.410$) and in men's neuroticism in the Australian sample (i.e., $b = -0.196$; $p = 0.007$; 95% CI [−0.338, −0.055]; $\beta = -0.261$). In both cases more time between separation and postseparation measurement was associated with more negative change. In other words, the more recent the separation the larger the increase in openness and neuroticism for German women and Australian men respectively. That being said, the main finding remained the absence of any replicable effect and thus Hypothesis 3 was not supported.

4.4. Selection effects

With regard to the selection effect of divorce, Table 1 shows that divorcees were at the start of the observation time more open, extraverted and neurotic than those who remained married. Although these

Table 2
Personality change of divorcees: initial personality (I) and personality change (C), predicted by years since separation in the divorced sample.

			Australia					Germany			
			b	SE	p			b	SE	p	
A	I	♀	0.109	0.052	0.038	*		−0.030	0.030	0.327	
	C		−0.067	0.041	0.106			−0.005	0.029	0.850	
		♂	0.036	0.064	0.571						
			0.021	0.051	0.675						
O	I		−0.030	0.058	0.605		♀	0.002	0.054	0.968	
	C		0.030	0.034	0.381			−0.230	0.048	0.000	***
							♂	0.045	0.054	0.408	
								−0.001	0.054	0.980	
C	I		0.074	0.050	0.141			−0.016	0.037	0.663	
	C		−0.053	0.035	0.131			0.042	0.040	0.288	
E	I		0.031	0.061	0.616			−0.017	0.034	0.616	
	C		0.048	0.040	0.232			−0.037	0.027	0.172	
N	I	♀	−0.064	0.078	0.412			0.027	0.038	0.476	
	C		0.013	0.065	0.844			−0.011	0.034	0.745	
		♂	−0.027	0.077	0.721						
			−0.196	0.072	0.007	**					
N separated				352					641		

Note: years since separation = 0–3 years between separation and postseparation personality measurement; b = unstandardized effect; control variables of gender, age and higher polynomial age are included in the models but not shown; * = $p < 0.05$; ** = $p < 0.01$; *** = $p < 0.001$; Multigroup analyses were reported when a significant effect on either the initial score or difference score was detected for either men or women.

isolated effects are in line with Hypothesis 4, similarly to the socialization effect, they had limited replicability. The higher extraversion level was found in the German sample and in the UK. The openness effect was also confirmed in the German and Australian samples. Furthermore, there was a selection effect of neuroticism present in the Australian sample. Consequently, the findings demonstrated two replicable selection effects, in contrast to only one replicable socialization effect.

5. Discussion

5.1. The nonnormativeness of divorce

As we mentioned before, comparing countries within the same model was methodologically unfeasible, because of the lack of measurement invariance across countries. However, this approach did enable us to compare the samples separately, which revealed that the effects were not replicable, and thus we concluded that divorce overall does not lead to consistent personality change. The only exception might be agreeableness, which significantly increased in two different countries. Contrary to these socialization effects of divorce on personality, we found somewhat more consistent selection effects of personality on divorce, although these were also mostly isolated. Still, the detection of twice as many replicable selection effects as socialization effects somewhat supports the transactional approach of Neyer et al. (2013). This approach incorporates the normativeness of the life event as a deciding factor regarding personality–relationship transactions and offers an explanation for the inability of divorce to affect personality change. The authors argued that nonnormative life events such as divorce are more likely to cause selection effects than socialization effects because such events are less regulated by social expectations. In contrast, normative life events should be characterized by socialization effects rather than selection effects.

5.2. The social investment principle revisited

Although we found no consistent personality change associated with divorce, we did detect a few isolated effects that were largely positive changes. These positive personality changes could help explain why another life event, i.e. marriage, seems to contradict the classical interpretation of the social investment principle as it is associated with a decrease in mature personality traits. We argued that mean-level maturation can hide diverging intra-individual change and advocated for a modified version of the social investment approach whereby investment is halted when the rewards become too small. Empirical evidence has shown that marriage is a life transition wherein the rewards for some traits that can be deemed mature disappear (Lavner et al., 2018; Specht et al., 2011). These traits are mostly beneficial with regard to building social networks and are therefore less needed in marriage, as the number of a married person's friends tends to shrink. However, when marriage ends, these traits become highly rewarding again. The results of this study partially support this reasoning, as we found some evidence for increases in agreeableness.

Besides modifying the classical social investment principle, the findings of the current research also dispute other principles of the neosocioanalytic model. First, it contradicts the role continuity principle, according to which stability in personality traits is due to consistent social roles (Roberts & Nickel, 2017). A change in the social role of being married should have caused consistent change in personality, which we did not find. Second, the results go against the corresponsive principle, which is that 'certain life experiences accentuate the traits that led to them in the first place' (Neyer et al., 2013, p. 541; Roberts & Nickel, 2017). We found replicable selection effects that show that high extraversion and openness could lead to a higher risk of divorce, yet our results did not show any replicable effects that divorce increases these two traits.

5.3. Comparison with previous research

The increase in agreeableness that the current study detected aligns with the findings of the existing literature, as Specht et al. (2011) found a similar increase by using the same sample. However, there are some discrepancies between the findings for the German sample in our study and those of Specht et al. (2011), who found rising agreeableness and conscientiousness levels following divorce as well as increased agreeableness and men's openness after respondents separated from their partner. Although we detected a similar agreeableness effect, we saw no change in openness or conscientiousness in the German sample. This could be attributed to the pooling of multiple time periods, or to our operationalization of divorce as marital separation, which does not equal formal divorce or relationship separation but can be regarded as something situated between those two events. Consequently, it is

possible that marital separation entails the common effect of those two life events (i.e., increased agreeableness). A third explanation for the divergence from previous findings might be the use of a different reference group (i.e., stable marriages) from that of Specht et al. (2011), who selected all nondivorcees into their reference group. The overall finding that divorce does not seem to lead to consistent personality change resembles the results of Denissen et al. (2019) whose study contained detailed trajectories of personality development.

5.4. Country discrepancies

Some countries demonstrated personality effects while others did not. These country discrepancies might be attributed to differences in personality indicators. Most of the isolated effects of personality change were found for the Australian samples, which also employed the most extensive indicator list and were therefore better equipped to capture the latent traits. A second possible cause is the diversity in observation duration. The United Kingdom seems the most immune to effects of marital separation on personality, as it showed the lowest number of effects, but its observation window was 2 years longer. Since people remarry on average within 4 years (Wilson & Clarke, 1992), a longer interval between measurements increases the chance that divorcees will already have entered a new relationship and thus no longer be motivated by the personality reward. As we mentioned before, most effects were found for Australian respondents. Because the country's divorce system has a 1-year waiting period between separation and application for divorce (Family Court of Australia, 2016), the system could prolong the process of divorce, slowing down the formation of new relationships and thus extending the period in which the personality reward remains active. A fourth possibility is that the differences between countries are due to distinct national divorce institutions. Even seemingly similar European countries, such as Germany and the United Kingdom, vary in their net divorce rates (Kalmijn, 2007). Moreover, the United Kingdom still has to implement a no-fault divorce law. A direct comparison of divorce's effect on personality in multiple countries has never been carried out, but Kalmijn (2009) did find national differences regarding the effect of divorce on well-being. These differences were limited to the strength of the effect and not the direction. Future cross-country research should examine if the same discrepancy applies to personality change while guaranteeing measurement invariance across all countries.

5.5. Limitations

This study contains some important limitations. As we mentioned before, the dissimilarities among measurement instruments and observation duration prevented direct comparison between countries. Secondly, the German and UK personality traits did not exhibit the same level of internal consistency as the Australian traits, which could have made it more difficult to find replicable effects across multiple samples.

The lack of sufficient information regarding first-time or higher-order divorces also poses a severe limitation. Individuals who have already been divorced once are more prone to separate when problems arise (Booth & Edwards, 1992), and thus remarriages are known to be more unstable than first marriages (Zahl-Olsen et al., 2019). When a second marriage ends, it is not a completely new event for at least one person who has undergone the divorce process before. Although Specht et al. (2011) confirmed that first divorces are identical to divorce in general, they did not directly compare first-time divorcees against higher order ones. Luhmann and Eid (2009) showed that divorcing a first time seems to lower life satisfaction more than divorcing a second time. It is therefore not unreasonable to presume that if divorce changes personality, such changes should be greater for first-time than for higher order divorcees. Though the Australian sample differentiated between these two types of divorcees, the frequencies of higher order divorces were too low to achieve reliable estimates.

Another limitation is that we could not test whether personality change might be caused by the loss of a stabilizing spouse. Homogamy tends to be the norm, and this also seems to apply to personality. Rammstedt and Schupp (2008) found not only that people are more likely to marry someone with similar personality traits but also that married couples grow even more alike with time. Consequently, divorce could mean the loss of a personality-stabilizing force and thus a higher chance of personality change. Also, there could be differences in personality change between partners who initiate divorce and those who do not, as the former are likely to adapt more quickly to the changes that will take place (Amato, 2000).

6. Conclusion

Married individuals in Australia, Germany, and the United Kingdom were observed for 4 to 6 years to examine if marital separation changed their personality. Latent difference score models that controlled for gender differences and separation duration offered several noteworthy findings, which mostly confirmed previous studies that divorce is not associated with permanent personality change, as we found only isolated effects that could not be replicated across samples. The only trait that showed some slight replicability was agreeableness, and its effect is in line with previous research by Specht et al. (2011), demonstrating a decrease in agreeableness following divorce. This supports a more economical approach to the principle whereby social investment can be pulled back when the rewards are small and increased when the gains are large. We argue that divorce leads to a greater need for rebuilding one's social network and thus can increase investment in personality traits, including agreeableness, that facilitate this goal. Nevertheless, the main finding remains that divorce does not seem to result in any permanent personality change.

CRediT authorship contribution statement

Sascha Spikic: Conceptualization, Methodology, Software, Formal analysis, Writing - original draft, Writing - review & editing. **Dimitri Mortelmans:** Resources, Writing - review & editing, Supervision, Project administration, Funding acquisition. **Inge Pasteels:** Software, Formal analysis.

Declaration of competing interest

None.

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References

Allemand, M., Hill, P. L., & Lehmann, R. (2015). Divorce and personality development across middle adulthood. *Personal Relationships, 22*(1), 122–137. https://doi.org/10.1111/pere.12067.

Amato, P. R. (2000). The consequences of divorce for adults and children. *Journal of Marriage and the Family, 62*(4), 1269–1287. https://doi.org/10.1111/j.1741-3737.2000.01269.x.

Asselmann, E., & Specht, J. (2020). Taking the ups and downs at the rollercoaster of love: Associations between major life events in the domain of romantic relationships and the Big Five personality traits. *Developmental Psychology, 56*(9), 1803–1816. https://doi.org/10.1037/dev0001047.

Bollen, K. A., & Barb, K. H. (1981). Pearson's R and coarsely categorized measures. *American Sociological Review, 46*(2), 232–239.

Booth, A., & Edwards, J. (1992). Starting over: Why remarriages are more unstable. *Journal of Family Issues, 13*(2), 179–194. https://doi.org/10.1177/019251392013002004.

Brannick, M. T. (1995). Critical comment on applying covariance structure modeling. *Journal of Organizational Behavior, 16*(3), 201–213. https://doi.org/10.1002/job.4030160303.

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal, 9*(2), 233–255. https://doi.org/10.1207/S15328007SEM0902_5.

Costa, P. T., Jr., Herbst, J. H., McCrae, R. R., & Siegler, I. C. (2000). Personality at midlife: Stability, intrinsic maturation, and response to life events. *Assessment, 7*(4), 365–378. https://doi.org/10.1177/107319110000700405.

Denissen, J. J. A., Luhmann, M., Chung, J. M., & Bleidorn, W. (2019). Transactions between life events and personality traits across the adult lifespan. *Journal of Personality and Social Psychology, 116*(4), 612–633. https://doi.org/10.1037/pspp0000196.

Dyrenforth, P. S., Kashy, D. A., Donnellan, M. B., & Lucas, R. E. (2010). Predicting relationship and life satisfaction from personality in nationally representative samples from three countries: The relative importance of actor, partner, and similarity effects. *Journal of Personality and Social Psychology, 99*(4), 690–702. https://doi.org/10.1037/a0020385.

Family Court of Australia (2016). *Family law matters. Separation and divorce*.

Gadalla, T. M. (2008). Impact of marital dissolution on men's and women's incomes: A longitudinal study. *Journal of Divorce & Remarriage, 50*(1), 55–65. https://doi.org/10.1080/10502550802365714.

Goebel, J., Grabka Markus, M., Liebig, S., Kroh, M., Richter, D., Schröder, C., & Schupp, J. (2019). The German socio-economic panel (SOEP). *Jahrbücher für Nationalökonomie und Statistik, 239*, 345.

Hahn, E., Gottschling, J., & Spinath, F. M. (2012). Short measurements of personality—Validity and reliability of the GSOEP Big Five Inventory (BFI-S). *Journal of Research in Personality, 46*(3), 355–359. https://doi.org/10.1016/j.jrp.2012.03.008.

Harris, K., & Vazire, S. (2016). On friendship development and the Big Five personality traits. *Social and Personality Psychology Compass, 10*(11), 647–667. https://doi.org/10.1111/spc3.12287.

Hu, L.t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118.

Hughes, M. E., & Waite, L. J. (2009). Marital biography and health at mid-life. *Journal of Health and Social Behavior, 50*(3), 344–358. https://doi.org/10.1177/002214650905000307.

Kalmijn, M. (2007). Explaining cross-national differences in marriage, cohabitation, and divorce in Europe, 1990–2000. *Population Studies, 61*(3), 243–263. https://doi.org/10.1080/00324720701571806.

Kalmijn, M. (2009). Country differences in the effects of divorce on well-being: The role of norms, support, and selectivity. *European Sociological Review, 26*(4), 475–490. https://doi.org/10.1093/esr/jcp035.

Kalmijn, M. (2010). Country differences in the effects of divorce on weil-being: The role of norms, support, and selectivity. *European Sociological Review, 26*(4), 475–490.

Karney, B. R., & Bradbury, T. N. (1995). The longitudinal course of marital quality and stability. A review of theory, method, and research. *Psychological Bulletin, 118*(1), 3–34. https://doi.org/10.1037/0033-2909.118.1.3.

Kelloway, E. K. (1995). Structural equation modelling in perspective. *Journal of Organizational Behavior, 16*(3), 215–224. https://doi.org/10.1002/job.4030160304.

Lang, F. R., John, D., Lüdtke, O., Schupp, J., & Wagner, G. G. (2011). Short assessment of the Big Five: Robust across survey methods except telephone interviewing. *Behavior Research Methods, 43*(2), 548–567. https://doi.org/10.3758/s13428-011-0066-z.

Lavner, J. A., Weiss, B., Miller, J. D., & Karney, B. R. (2018). Personality change among newlyweds: Patterns, predictors, and associations with marital satisfaction over time. *Developmental Psychology, 54*(6), 1172–1185. https://doi.org/10.1037/dev0000491.

Liebig, S., Goebel, J., Richter, D., Schröder, C., Schupp, J., Bartels, C., ... Zimmermann, S. (2018). *German socio-economic panel study (SOEP)*. https://doi.org/10.5684/soep.v34.

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling: A Multidisciplinary Journal, 9*(2), 151–173. https://doi.org/10.1207/S15328007SEM0902_1.

Losoncz, I. (2007). *Personality Traits in HILDA. Paper presented at the HILDA survey research conference 2007*. University of Melbourne.

Luhmann, M., & Eid, M. (2009). Does it really feel the same? Changes in life satisfaction following repeated life events. *Journal of Personality and Social Psychology, 97*(2), 363–381. https://doi.org/10.1037/a0015809.

Lundberg, S. (2012). Personality and marital surplus. *IZA Journal of Labor Economics, 1*(1), 1–21. https://doi.org/10.1186/2193-8997-1-3.

McArdle, J. J. (2009). Latent variable modeling of differences and changes with longitudinal data. *Annual Review of Psychology, 60*(1), 577–605. https://doi.org/10.1146/annurev.psych.60.110707.163612.

McCrae, R. R., & Costa, P. T., Jr. (1999). A five-factor theory of personality. In L. A. Pervin, & O. P. John (Eds.). *Handbook of personality: Theory and research* (pp. 139–153). (2nd ed.). New York: Guilford Press.

McCrae, R. R., & John, O. P. (1992). An introduction to the five-factor model and its applications. *Journal of Personality, 60*(2), 175–215. https://doi.org/10.1111/j.1467-6494.1992.tb00970.x.

McDonald, R. P. (1999). *Test theory: A unified treatment*. Mahwah, NJ: Lawrence Erlbaum.

Meredith, W., & Teresi, J. A. (2006). An essay on measurement and factorial invariance. *Medical Care, 44*(11), S69–S77.

Muthén, L. K., & Muthén, B. O. (2002). How to use a Monte Carlo study to decide on sample size and determine power. *Structural Equation Modeling: A Multidisciplinary Journal, 9*(4), 599–620. https://doi.org/10.1207/S15328007SEM0904_8.

Muthén, L. K., & Muthén, B. O. (2017). *Mplus User's Guide 1998–2017* (8 ed.). Los Angeles, CA: Muthén & Muthén.

Neyer, F., & Lehnart, J. (2007). Relationships matter in personality development: Evidence from an 8-year longitudinal study across young adulthood. *Journal of Personality, 75*(3), 535–568. https://doi.org/10.1111/j.1467-6494.2007.00448.x.

Neyer, F., Mund, M., Zimmermann, J., & Wrzus, C. (2013). Personality-relationship transactions revisited. *Journal of Personality, 82*. https://doi.org/10.1111/jopy.12063.

Nye, C. D., Allemand, M., Gosling, S. D., Potter, J., & Roberts, B. W. (2016). Personality trait differences between young and middle-aged adults: Measurement artifacts or actual trends? *Journal of Personality, 84*(4), 473–492. https://doi.org/10.1111/jopy.12173.

Orzeck, T., & Lung, E. (2005). Big-five personality differences of cheaters and non-cheaters. *Current Psychology, 24*(4), 274–286. https://doi.org/10.1007/s12144-005-1028-3.

Pusch, S., Mund, M., Hagemeyer, B., & Finn, C. (2019). Personality development in emerging and young adulthood: A study of age differences. *European Journal of Personality, 33*(3), 245–263. https://doi.org/10.1002/per.2181.

Rammstedt, B., & Schupp, J. (2008). Only the congruent survive - personality similarities in couples. *Personality and Individual Differences, 45*(6), 533–535. https://doi.org/10.1016/j.paid.2008.06.007.

Roberts, B. W., Kuncel, N. R., Shiner, R., Caspi, A., & Goldberg, L. R. (2007). The power of personality: The comparative validity of personality traits, socioeconomic status, and cognitive ability for predicting important life outcomes. *Perspectives on Psychological Science, 2*(4), 313–345. https://doi.org/10.1111/j.1745-6916.2007.00047.x.

Roberts, B. W., & Nickel, L. B. (2017). 11 - a critical evaluation of the neo-socioanalytic model of personality. In J. Specht (Ed.). *Personality development across the lifespan* (pp. 157–177). Academic Press.

Roberts, B. W., Walton, K., & Viechtbauer, W. (2006). Patterns of mean-level change in personality traits across the life course: A meta-analysis of longitudinal studies. *Psychological Bulletin, 132*(1), 1–25.

Roberts, B. W., & Wood, D. (2006). *Personality development in the context of the neo-socioanalytic model of personality Handbook of personality development*. Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers11–39.

Roberts, B. W., Wood, D., & Caspi, A. (2008). The development of personality traits in adulthood. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.). *Handbook of personality: Theory and research* (pp. 375–398). (3 ed.). New York, NY: Guilford.

Roberts, B. W., Wood, D., & Smith, J. L. (2005). Evaluating Five Factor theory and social investment perspectives on personality trait development. *Journal of Research in Personality, 39*(1), 166–184. https://doi.org/10.1016/j.jrp.2004.08.002.

Saucier, G. (1994). Mini-markers: A brief version of Goldberg's unipolar big-five markers. *Journal of Personality Assessment, 63*(3), 506–522.

Solomon, B. C., & Jackson, J. J. (2014). Why do personality traits predict divorce? Multiple pathways through satisfaction. *Journal of Personality & Social Psychology, 106*(6), 978–996.

Specht, J. (2017). 21 - personality development in reaction to major life events. In J. Specht (Ed.). *Personality development across the lifespan* (pp. 341–356). Academic Press.

Specht, J., Egloff, B., & Schmukle, S. C. (2011). Stability and change of personality across the life course: The impact of age and major life events on mean-level and rank-order stability of the big five. *Journal of Personality and Social Psychology, 101*(4), 862–882. https://doi.org/10.1037/a0024950.

Steiger, J. H. (2007). Understanding the limitations of global fit assessment in structural equation modeling. *Personality and Individual Differences, 42*(5), 893–898. https://doi.org/10.1016/j.paid.2006.09.017.

Terman, L. M., & Buttenwieser, P. (1935). Personality factors in marital compatibility. *The Journal of Social Psychology, 6*(2), 143–171. https://doi.org/10.1080/00224545.1935.9921635.

University of Essex, I. f. S. a. E. R (2019). *Understanding society: Waves 1–9, 2009–2018 and harmonised BHPS: Waves 1–18, 1991–2009. [data collection]* (12th ed.). UK Data Servicehttps://doi.org/10.5255/UKDA-SN-6614-13 SN: 6614.

van Scheppingen, M. A., Jackson, J. J., Specht, J., Hutteman, R., Denissen, J. J. A., &

Bleidorn, W. (2016). Personality trait development during the transition to parenthood:A test of social investment theory. *Social Psychological and Personality Science, 7*(5), 452–462. https://doi.org/10.1177/1948550616630032.

Watson, N., & Wooden, M. (2012). *The HILDA survey: A case study in the design and development of a successful household panel survey.* 20123, 13. https://doi.org/10.14301/llcs.v3i3.208 (3).

Wilson, B. F., & Clarke, S. C. (1992). Remarriages: A demographic profile. *Journal of Family Issues, 13*(2), 123–141. https://doi.org/10.1177/019251392013002001.

Zahl-Olsen, R., Thuen, F., & Espehaug, B. (2019). Divorce and remarriage in Norway: A prospective cohort study between 1981 and 2013. *Journal of Divorce & Remarriage, 60*(8), 600–611. https://doi.org/10.1080/10502556.2019.1619378.