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Becker, Rolf

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Gender and Survey Participation. An Event History Analysis of the Gender Effects of Survey Participation in a Probability-based Multi-wave Panel Study with a Sequential Mixed-mode Design

Rolf Becker

University of Bern

Abstract

In cross-sectional surveys, as well as in longitudinal panel studies, systematic gender differences in survey participation are routinely observed. Since there has been little research on this issue, this study seeks to reveal this association for web-based online surveys and computer-assisted telephone interviews in the context of a sequential mixed-mode design with a push-to-web method. Based on diverse versions of benefit–cost theories relating to deliberative and heuristic decision-making, several hypotheses are deduced and then tested by longitudinal data in the context of a multi-wave panel study on the educational and occupational trajectories of juveniles. Employing event history data on the survey participation of young panelists living in German-speaking cantons in Switzerland and matching them with geographical data at the macro level and panel characteristics at the meso level, none of the hypotheses is confirmed empirically. It is concluded that indirect measures of an individual's perceptions of a situation, and of the benefits and costs as well as the process and mechanisms of the decision relating to survey participation, are insufficient to explain this gender difference. Direct tests of these theoretical approaches are needed in future.

Keywords: Gender; survey participation; nonresponse; event history analysis; societal environment; panel study; web-based online survey; sequential mixed-mode design; push-to-web method

Against the background of decreasing response rates in modern societies with a high level of prosperity, the number of empirical studies on survey participation and nonresponse in the social sciences is increasing (e.g. Leeper, 2019; Beullens et al., 2018; Dutwin & Lavrakas, 2016; Keusch, 2015; Tourangeau & Plewes, 2013; Brüggen et al., 2011; Stoop et al., 2010; Groves & Peytcheva, 2008; Groves, 2006; Groves et al., 2001; de Heer, 1999; Smith, 1995; Goyder & Leiper, 1985; Steeh, 1981). One of the main findings is that the decrease in response rates is generally observed for cross-sectional surveys, while the participation rate within longitudinal studies, such as panel studies, remains high (Becker et al., 2019; Brick & Williams, 2013; Schoeni et al., 2013: 84–85). Among these studies, a constant *gender effect in survey participation and nonresponse* is observed as a social phenomenon (Slauson-Blevins & Johnson, 2016: 428; Keusch, 2015: 186; Busby & Yoshida, 2013; Dykema et al., 2012; Laguilles et al., 2011; Stoop et al., 2010: 10, 20; Couper et al., 2008: 260; Marcus & Schütz, 2005; Patrick et al., 2013; Porter & Whitcomb, 2005; Kwak & Radler, 2002: 259; Curtin et al., 2000: 419; Singer et al., 2000: 180; Green, 1996: 176; Dalecki et al., 1988: 54). Particularly for mail or web surveys, it is frequently found that women are more likely to respond than men (Green, 1996: 176; Becker & Glauser, 2018). Furthermore, women seem to be more likely than men to respond promptly after the invitation to take part in an online survey (Becker, 2021; Becker et al., 2019). Finally, over the last several years, it has been found for different survey modes and survey topics that the gender effect on the rate of survey participation remains clear, even though response rates are declining overall (Slauson-Blevins & Johnson, 2016). However, it is still not known whether the gender difference in participation rates changes across surveys in a multi-wave panel.

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The data for the first seven waves of the panel study are available as Scientific Use Files at FORS in Lausanne and can be found in the online catalogue under the reference number 10773 (https://forsbase.unil.ch/project/study-public-overview/15802/0/). The data of Wave 8 will be available in 2021. These scientific use files include the paradata of the fieldwork periods.

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Direct correspondence to

Rolf Becker, University of Bern, Department of Sociology of Education,
Fabrikstrasse 8, CH–3012 Bern, Switzerland
E-mail: rolf.becker@edu.unibe.ch

In this respect, Green (1996: 176) states there is too little research on gender as it relates to surveys to reach a conclusion. However, there are several "ad-hoc explanations" of the effects of gender on response rates. Slauson-Blevins and Johnson (2016), for example, emphasize that the lower inclination of men to take part in scientific surveys might cause the decrease in their rate of response. "Gender differences in survey participation are partially attributable to the difficulty of contacting male participants rather than outright refusals to participate (…). Yet while survey researchers, often conclude that gender differences exist, there has been little effort to conceptually understand this difference" (Slauson-Blevins & Johnson, 2016: 428). Another explanation that seems plausible attributes gender disparities in survey response to differences in socialization regarding norms around helping, or differences in susceptibility to social influence. External circumstances, such as access to the Internet in a prosperous country like Switzerland, do not contribute to the explanation of these gender disparities since there is no "digital divide" in Internet use across the genders (BFS, 2021).

Focusing on self-administered survey modes, such as an online questionnaire or administered computer-assisted telephone interview (CATI), the question is still unsolved regarding *why* gender has been found to play a significant role in survey participation and response to questionnaires or interviewers, with women responding in greater proportion than men (Porter & Whitcomb, 2005). Likewise, it is unclear *why* female and male online panelists are motivated differently (Slauson-Blevins & Johnson, 2016; Göritz & Stieger, 2009). Are there gender-specific motivations, resources, and circumstances that drive male and female invitees to participate in different ways? Against the theoretical background of a diverse variety of rational action theories that take heuristic decision-making process into account, the *main question* asked in this empirical contribution is as follows: Are gender differences in survey participation a fundamental phenomenon or are they epiphenomenal to other factors, such as social origin and class-related socialization in terms of educational level and achievement? In other words: are gender differences a singular phenomenon observed for cross-sectional surveys or in early waves in a multi-wave panel study? Do gender disparities in surveys disappear when we control for a number of covariates, which correlates with the propensity toward survey participation?

To answer these research questions, longitudinal data on survey participation are needed. The optimal type of longitudinal data would be the observation of a target person's survey participation across their life course, including time-variant information on their resources, circumstances and preferences. Since such data combining individual information on target persons with survey paradata are rare, the measurement of survey participation in a panel study provides a suboptimal surrogate. Therefore, data on the survey participation of female and male panelists collected since 2012 in an event history design are utilized in this contribu-

tion. This type of data, collected in the context of a multi-wave panel study on educational and occupational trajectories of juveniles born around 1997 and living in German-speaking cantons in Switzerland, makes it possible to analyze gender differences in overall survey nonresponse, the development of these gender differences during the fieldwork, and changes in them across surveys for a single target sample familiar with Internet and mobile devices.

In the remainder of this contribution, the next section outlines the theoretical background, as well as the hypotheses to be tested. The following section comprises a description of the data, design, statistical procedures, and the variables. After then, the empirical findings are presented. The final section gives a summary and conclusion.

Theoretical Background

Despite the fact that there is no theoretical vacuum regarding survey methodologies, Singer (2011: 379) concluded that, although various theories of survey participation exist, we know comparatively little about *why* individuals are willing or are not willing to participate, and about *how* they decide to take part in (or refuse to take part in) a scientific survey. Although different versions of rational action theories – such as social exchange theory (Dillman, 2000), the theory of subjective utility (Becker & Mehlkop, 2011), leverage-salience theory (Groves et al., 2000) or the social-psychological approach on habitual-heuristic action (Groves et al., 1992) – all assume that survey participation is based on a deliberative assessment of the benefits and costs of survey participation, or on an automatic-spontaneous decision, there is no comparative test of these approaches in theoretical and empirical respects. However, such a systematic test is needed to confirm Singer's (2011: 388) conclusion that the general benefit-cost theory of survey participation can be seen as a synthesis of principles derived from these other theories (Goyder, Boyer, & Martinelli, 2008). Thus, it is unclear whether gender differences in survey participation can be explained by a target person's reasoned judgment that the benefits of acting outweigh the costs, or by an almost instantaneous cognitive procedure with the help of heuristics (Singer, 2011: 381).

According to these approaches, survey participation is a function of subjective perceived costs and benefits of survey participation, as well as the subjective expected probability of successful realization of perceived benefits p: $f(sp) = p \cdot B - C$. The decision regarding participation or refusal is based on a subjective assessment of subjective expected utilities *SEU(.)* of different alternatives *da*, other than survey participation *sp*. If $SEU(sp) = p_{sp} \cdot B_{sp} - C_{sp} > SEU(da) = p_{da} \cdot B_{da} - C_{da}$, it is likely an eligible individual will indeed take part in the survey.

However, what gender-specific costs or, in particular, gender-specific benefits of survey participation might there be? According to Singer (2011), a potential

respondent's decisions depend mainly on benefits, not on costs or perceptions of risk or harm. Why should female target persons systematically perceive increased benefits resulting from survey response than their male counterparts? A plausible answer might be that it is the *gender-specific expectations of success probability* that result in gender differences regarding the benefits of survey participation. These expectations might be based on an individual's skills – such as literacy or computer skills – and the related confidence in their own abilities (e.g. persistence; decisiveness; internal or external control beliefs). In theoretical respects, this assumption is based on empirical evidence that girls and young women have better educational achievement, higher language proficiency and more advanced literacy and educational attainment than boys and male adolescents (DiPrete & Buchmann, 2013; Beck et al., 2010; Becker & Müller, 2011; Buchmann et al., 2008). However, it has to be taken into account that there is a stark correlation between educational success, educational attainment and social origin among the genders. These educational advantages in favor of female target persons indicate that cognitive burden, uncertainty in interview situations and insufficient language ability and proficiency are much lower for women compared to men. Since the transaction costs of survey response are relatively lower for women, they are more likely to take part in a scientific survey than male potential respondents.

Hypothesis 1: Controlling for social origin, educational attainment and achievements (indicating language proficiency and language ability, as well as educational success and motivation, mostly in favor of women) are positively correlated with survey participation. Due to the advantage of female panelists in educational success and achievements, the gender effect becomes insignificant when these dimensions are taken into account.

Furthermore, the correlations between gender, educational attainment, social origin and the rural-urban divide in educational opportunity are evident (Glauser & Becker, 2016; Sixt, 2013). In sum, according to Green (1996), education, intelligence and achievement, as well as socioeconomic status and living in rural areas, were found to correlate positively with survey response rate (Becker, 2021; Groves & Couper, 1998; Dalecki et al., 1988: 54).

Hypothesis 2: By controlling additionally for regional opportunity structures in terms of a potential respondent's place of residence in a rural or urban area, the gender difference in survey participation diminishes in multivariate estimations.

Success in educational attainment is correlated with favorite educational returns in an individual's working life. Although women profited from educational expansion (e.g. Becker & Mayer, 2019; Becker & Müller, 2011), recent research has argued that the opportunity costs of survey participation are higher for men, as women are more likely to stay at home (Stoop et al., 2010: 20). Women are therefore more likely to be reachable and ready to take part in a survey. But this line of reasoning might not be valid for self-administered web-based online interviews, since

for these invitees can decide themselves whether and when they will start completing the questionnaire – e.g. after the working day, at the weekend or at another point in time suitable for them. This might be also true for CATI due to widespread availability of mobile devices. For juveniles in particular, it is confirmed that most possess a smartphone instead of a fixed phone line (BFS, 2021).

If there are gender-based preferences for survey modes – i.e. that men are more likely to prefer computer-assisted web-based interviews (CAWI) (due to their technical affinity) and women the CATI mode (due to their language abilities) – it could be assumed that there is no gender difference of response in surveys with a sequential mixed-mode design. Since it is often observed, even for online surveys, that women tend to respond earlier than men after survey launch (e.g. Göritz, 2014; Göritz & Stieger, 2009), a sequential mixed-mode design offering CAWI and CATI modes could have the potential to compensate for the gender-based likelihood of participation in different survey modes in the long run of the fieldwork period.

Hypothesis 3: In a sequential mixed-mode design, the gender difference in survey participation diminishes across the running fieldwork period and the offered survey modes.

Furthermore, Green (1996) argues that gender differences may exist in survey response due to differences in (primary) socialization regarding differences in susceptibility to social influence or helping norms. These aspects correspond with findings by Porst and von Briel (1995: 11) that, besides personal and situative aspects, women are more likely to respond to surveys due to altruism (Porst & von Biel, 1995: 15). In line with theoretical arguments on gender-based secondary and tertiary socialization across the life course, it seems that girls and women display a different social character than boys and men (e.g. Grunow, 2013). For example, compared to their male counterpart, they are more likely to have learned to carry out a task – such as the request of another person or completing a questionnaire – in an autonomous, precise and persistent way (e.g. Quenzel & Hurrelmann, 2010). According to Green (1996: 181), women are therefore more communicative and interested in sharing opinions with others.

Hypothesis 4: Gender differences in survey participation disappear in multivariate estimations when controlling for personality traits and individual beliefs, indicating at least some facets of gender-specific socialization.

For male youth and adults oriented toward traditional "*masculinity norms*" or the "*male breadwinner model*", it has been observed they are less interested in tasks such as reading and writing, as well as in constructive communication with other persons and authorities (e.g. Hadjar, 2011). On the one hand, this again means that personality traits (such as persistence and decisiveness or internal and external control beliefs) could help explain the gender differences in survey participation (e.g. Porst & von Briel, 1995). One the other hand, it seems that the gender differences result from the low propensity toward survey participation observed for male

target persons oriented toward the traditional gender stereotypes and gendered life courses.

Hypothesis 5: Gender differences in survey participation are statistically dissolved by taking a panelist's orientation toward gender roles into account, as well as their personality traits and other individual skills.

Data, Design, Variables and Statistical Procedures

Data set

The empirical analysis is based on longitudinal data of a probability-based multiwave panel study about the determinants of educational choice and training opportunities (for details, see Becker et al., 2020). This project started in 2012. The last survey was realized in May/June 2020. Data and paradata were collected in a sequential mixed-mode design with a push-to-web method (see also: Kreuter, 2013). The first mode was an online survey, followed by a CATI and, in a selected number of surveys, a paper-and-pencil interview (PAPI) by mail survey. The initial target population comprised eighth-graders in the 2011/12 school year (born around 1997), who were enrolled in regular classes in public schools in German-speaking cantons of Switzerland. The panel data are based on a random and 10 per cent stratified gross sample of 296 school classes, out of a total universe of 3,045 classes. A disproportional sampling of school classes from different school types, as well as a proportional sampling of school classes regarding share of migrants within schools, was applied. At the school level, a simple random sample of school classes was chosen. The initial probability sampling was based on data obtained from the Swiss Federal Statistical Office (FSO) (for details, see Glauser, 2015).

In the first three waves, the contacted panelists ($n \approx 3{,}800$) were interviewed in the context of their school class. After leaving the compulsory school, the panelists were pursued individually after the fourth wave. Each of the eligible and contactable panelists was invited for the surveys, even when they had skipped a wave. To improve the response rate, the panelists received unconditionally prepaid material incentives or cash in hand (Becker et al., 2019). Across the panel waves, the overall response rate was constant at about 80 per cent (*Table 1*). The response rate for online survey increased from 46 per cent in Wave 4 to 76 per cent in Wave 8, while the response rate for the CATI decreased from 38 per cent to 5 percent.

The proportion of women among the invitees was rather constant, at 50 per cent in Waves 4 and 5, 51 per cent in Wave 6 and 52 per cent in the Waves 7 and 8 at the start of survey launch. At the start of the risk time for CATI, about 47 per cent of the nonrespondents, i.e. invitees who had not taken part in the CAWI before, were female in Wave 4. Their share decreased to 43 per cent in Wave 6 and remained constant for the recent waves.

Table 1 Samples and response in the DAB panel

	Wave 4 Oct–Nov 2014	Wave 5 Jun–Aug 2016	Wave 6 May–Jun 2017	Wave 7 May–Jun 2018	Wave 8 May–Jun 2020
Sample size					
Contactable individuals	2,655	2,799	2,712	2,488	2,492
Type of survey					
Online survey	yes	yes	yes	yes	yes
CATI survey	yes	yes	yes	yes	yes
PAPI survey	no	no	yes	yes	no
Incentive	voucher	voucher	pen	money	money
Realized interviews					
Individuals	2,235	2,228	2,053	1,957	2,016
of whom: online	1,227	1,329	1,375	1,645	1,884
CATI	1,008	899	597	287	132
PAPI	0	0	81	25	0
Response rate in %					
Contactable individuals	84%	80%	76%	79%	81%
Online	46%	47%	51%	66%	76%
CATI	38%	32%	22%	12%	5%
PAPI	–	–	3%	1%	–

Source: DAB (own calculation)

For the analysis of gender effects on survey participation, the empirical analysis focuses on the online and CATI modes only since the number of participants in the PAPI mode was rather low (106 cases out of 13,145 target persons across six panel waves, i.e. a response rate of 3% in Wave 6 and 1% in Wave 7). The observation window was standardized to 52 days for methodological reasons, such as comparability between waves, low number of participants after seven weeks of fieldwork and right-censored data due to survey nonresponse. In the case of both survey modes, non- and under-coverage was rather low for this sample. About 93 per cent of the Swiss population has access to the Internet and they mostly use this medium every day of the week. Each of the young interviewees in this panel study had daily access to the Internet or possessed a telephone or other mobile device (BFS, 2021).

In total, 13,145 complete cases were available for analyzing gender-specific patterns of participation in at least one of the five surveys. Since time stamps – collected automatically by the online survey software *Unipark* or by the CATI software – indicated exact time references for the invitation sent by email or SMS and

the start of a panelist's response, it was possible to calculate the exact duration of episodes since survey launch on a daily basis (Becker, 2021; Durrant et al., 2013). For the analysis of participation in the CATI by nonrespondents in the initial survey mode, the waiting time was calculated on a daily basis by the difference between the invitation to the CATI mode and the data of the telephone interview. For the invitees who did not take part at all until the end of the fieldwork period, i.e. the censored cases, the waiting time was 52 days. The number of skipped events was negligible.

The distribution of these waiting times from invitation until an individual started the survey participation as a *stochastic event* was analyzed using the techniques and procedures of *event history analysis* (Blossfeld, Rohwer, & Schneider, 2019). This means that episodes of survey participation are the units to be analyzed. In this respect, it was possible simultaneously to analyze an individual's intention to participate in the survey and the timing of when they did so. At the aggregate level, the development of the response rate was observed across different points in time during the field period.

For our purpose, this data set provides additional advantages due to the survey design. Multiple waves, for example, ensure that a constant gender effect on survey participation is not random. These waves are associated with different prepaid incentives, but with the same features of survey management; it is therefore possible to reveal if a gender effect depends on the type of an incentive by controlling for cover letters (including the incentive), digital invitation and reminders. The sample consisted of members belonged to a single birth cohort. Therefore, their survey participation did not depend on the age of the panelists. The survey topic – their own educational and occupational trajectory – was a general one and not related directly to gender. The number of items on gender-related issues, such as gender-based socialization or gender-based inequalities, was rather limited because the primary task of the panel was the reconstruction of their educational trajectories and careers in the labor market. Each of the target persons was involved in training or employment so different states and time constraints in this regard did not matter for survey participation. In respect of sponsorship and authority, it was emphasized in the advance letter that the project was in receipt of a grant from a governmental agency and was conducted by the same researchers at a Swiss university. Furthermore, for the sampling, 106 regions – characterized by a certain spatial homogeneity and reflecting small partially cross-cantonal labor market areas with functional orientation toward centered and peripheral opportunities and living standards, in addition to urbanicity, population density and a lack of social cohesion (Couper & Groves, 1996: 174) – were considered (Glauser & Becker, 2016: 20). This allowed for an analysis of the rural-urban divide in gender-specific survey participation in terms of Internet access and living conditions. In sum, the data allowed for a dynamic longitudinal analysis by considering the macro, meso and micro level –

i.e. social environmental attributes, survey characteristics and respondent attributes – at the same time.

Dependent and independent variables

The *dependent variable* was the *time-dependent likelihood of participation* in the CAWI. In general, the participation rate was defined by the ratio of contacted target persons who completed the questionnaire or the telephone interview (RR1 according to AAPOR, 2016: 61; Tourangeau & Plewes, 2013: 11; Bethlehem, 2009: 213; Singer, 2006: 637). This variable was coded in the following way: "1" for participation in online survey, "2" for participation in the CATI mode and "0" for nonresponse or incomplete response. Across the five panel waves, a maximum of 0.1 per cent of respondents canceled their completion of the questionnaire in a survey.

The main *independent variable* was a panelist's *gender.* It was considered as a dummy variable, with men as the reference category. Another *covariate* was the individual's *educational level*, indicated by the *school type* in which they were enrolled in their compulsory schooling. The school type was a proxy for the individual's appreciation of the utility of social-scientific research and information-gathering activities associated with their education (Groves & Couper, 1998: 128). The following school types were distinguished along their basic, extended and advanced requirements: low, intermediate and academic level. The target person's *achievement* was measured by the (z-standardized) grade point average (GPA) in German taught at school; this covariate indicated their *cognitive resources* and *language proficiency* (Wenz, Al Baghal & Gaia, 2021). Using a dummy variable, it was controlled for that German was the first language, indicating the target person's *language ability* (Kleiner, Lipps & Ferrez, 2015). By the way, this indicator measured the impact of migration background – net of German mother tongue, educational level and social origin – on survey response (Kalter, Granato & Kristen, 2007). *Social origin* was taken into account as a proxy for the socioeconomic conditions in which the target persons grew up, including welfare, integration and environment (Groves & Couper, 1998: 30). This was indicated by the well-established class scheme suggested by Erikson and Goldthorpe (1992). Personal characteristics – such as *persistence*, *internal and external control belief* and *decisiveness* – were controlled for (Marcus & Schütz, 2015; Saßenroth, 2013). They were extracted

from a number of items by factor analysis.[1] The *gender role models* for women and men were considered – after their extraction by factor analysis – for the indication of gender-specific socialization.[2]

Another covariate was the *current panel wave*, indicating the effect of different prepaid incentives, such as vouchers (worth 10 Swiss Francs), a ballpoint pen (worth 2 Swiss Francs) or cash (10 Swiss Francs), as well as the panelist's experiences with this panel. The *opportunity structure of the region* in which the panelists live was measured by macro data on regional levels delivered by the Swiss FSO. In order to reduce complexity and to control for the high correlation of regional contextual characteristics, factor scores were extracted from these data (for details: Glauser & Becker, 2016). The 106 regions in the German-speaking cantons were characterized by a certain spatial homogeneity and reflected the principle of small, partially cross-cantonal labor market areas with functional orientation toward centered and peripheral opportunities and living standards, in addition to urbanicity, population density and a lack of social cohesion.

Statistical procedures

Overcoming the limits of comparative-static estimations of survey response, the techniques and statistical procedures of *event history analysis* were utilized (Bloss-

1 They were measured in the first and second waves. *Persistence* was measured by the respondent's agreement with the following five statements: "I do not like unfinished business"; "If I decide to accomplish something, I manage to see it through"; "I complete whatever I start"; "Even if I encounter difficulties, I persistently continue"; and "I even keep at a painstaking task until I have carried it through". The *control beliefs* were measured by six items indicating the respondent's internal and external locus of control, as suggested by Jakoby and Jacob (1999): "I like to take on responsibility"; "Making my own decisions instead of relying on fate has proved to be good for me"; "In the case of problems and resistance, I generally find ways and means to assert myself"; "Success depends on luck, not on performance"; and "I feel like I have little influence over what happens to me". *Decisiveness* was based on a question about the respondent's decision certainty: "Life is full of decisions that need to be taken. Which of the six statements apply to you?" The wordings of these statements were: "I am really unsure as to what I should decide and often waver back and forth"; "Others unsettle me in my decision"; "After making a decision, I have great doubts as to whether I really made the right decision"; "It is very hard for me to decide because there are so many possibilities"; and "When I make a decision, I stick to it". For each of these items, the agreement itself consisted of a scale of discrete values from 1 for "I strongly disagree" to 5 for "I strongly agree". In order to reduce complexity and to avoid multicollinearity, three factors – persistence, control beliefs and decisiveness – were extracted by factor analysis (*Table A-1* in the Appendix).

2 The items of gender role stereotyping are measured in the third wave. Separately for the genders, the respondents were asked their subjective view of whether it was interesting for women or men to be employed, to earn much income, to be successful in their career, to have children, to take care of the household and to be responsible for childcare. The possible answers ranged from "1" for complete rejection to "5" for complete agreement (*Table A-2* in the Appendix)

feld et al., 2019). In this contribution, the aim is to model the likelihood of survey participation – that is, the hazard rate – as a stochastic and time-variant function of individual resources, the settings of the survey and societal factors. This rate $r(t)$ is defined as the marginal value of the conditional probability of such an event occurring – namely the start of completing the questionnaire in a web-based online survey – in the time interval $(t, t + \Delta t)$ given that this event has not occurred before time t (Blossfeld et al., 2019: 29). Using this statistical procedure, it is possible to reveal impacts of x for the probable occurrence of survey participation as the event y to be investigated: $\Delta X_t \rightarrow \Delta \Pr(\Delta Y_{t'})$, whereby $t < t'$ by taking the timing of events into account.

Due to the *sequential mixed-mode design*, specialties of the timing of events had to be considered for the bivariate and multivariate analyses. In the sequential mixed-mode design of the DAB panel study, access to the online mode was possible for each of the invitees during the complete field period. Nonrespondents were asked to take part in the CATI mode about two weeks after survey launch. There was then a competing risk of taking part in one of the two offered modes, which are mutually exclusive during an overlapping risk period. A competing risk is an event – such as participation in one of the two survey modes – that either hinders the occurrence of the primary event of interest (e.g. participation in the online survey instead of CATI) or that modifies the chance that this event (e.g. participation in CATI) will occur (Noordzij et al., 2013: 2670). When eligible panelists prefer one mode or another, the unchosen mode cannot be realized at another point in time due to censoring. Panelists who have not started completing the questionnaire have the "*chance*" to take part in the CATI or online mode at a point in time that is convenient for them.

In the case of competing risks, the traditional survival analysis is inadequate for methodological reasons. Therefore, the *cumulative incidence competing risk method* was used to describe panelist participation patterns across the field period. For example, the *cause-specific cumulative incidence function* (CIF), which is the probability of survey participation before the end of field period, was estimated to reveal the risk of choosing one of the competing survey modes (Lambert, 2017). The CIF describes the incidence of the occurrence of an event while taking competing risks into account (Austin & Fine, 2017: 4293).

Furthermore, *parametric regression procedures* were used to estimate the impact of independent variables on the likelihood of interesting events. For this purpose, the *subdistribution hazards approach* by Fine and Gray (1999) was seen as the most appropriate method to use for analyzing competing risks (see also Schuster et al., 2020; Noordzij et al., 2013). By taking competing risks into account, the coefficients estimated by the *stcrreg* module implemented in the statistical package *Stata* could be used to compute the cumulative incidence of participation in one of the survey modes and to depict the hazards in a CIF plot (Austin & Fine, 2017).

Finally, non-parametrical procedures were utilized to describe gender differences in survey participation. On the other hand, the parametrical procedures were used in the sense of residual analysis. This means it was necessary to test whether the gender difference in survey participation "disappeared" when controlling for theoretically based variables. In this way, it was possible to decide if the gender difference was fundamental or based on other factors correlated with gender, such as educational level, language proficiency or socialization.

Empirical Results

Description of gender-specific participation rates

If one measures both the timing and the quantity of participation in the online survey across several panel waves, the gender disparity becomes obvious. In the left-hand panel in Figure 1, it is apparent for each of the panel waves that the likelihood of survey participation in terms of cumulative incidences was significantly higher for female panelists than for their male counterparts. In particular, the differences in speed and rates increased in the initial stage after the survey launch. After about two weeks, the development of these incidences was rather similar for both genders.

For Waves 4 and 5, the same patterns different for genders were observed for the cumulative incidence of participation in the consecutive CATI mode since it was offered to the nonresponding panelists (right-hand panel in *Figure 1*). While there were no gender differences in taking part in this mode for Wave 6, men were more likely to respond to CATI than women in the both most recent Waves 7 and 8.

It is evident for the CAWI mode that women started to complete the questionnaire earlier than male panelists. Across each of the waves, after 10 days, 50 per cent of the female panelists had taken part in the online survey, while after 15 days half of the male risk sample had completed the online questionnaire.[3] The situation was different for the CATI mode. For women, the median value for the CATI mode was 15 days since this survey mode was offered to the panelists; this value was 16 days for their male counterparts. For this survey mode, except for Waves 5 and 7, there were no systematic gender differences in participation. In sum, while 62 per cent of the female panelists took part in the online survey and 39 per cent of female nonrespondents, who do not responded in the CAWI mode yet, took part in the

3 For the CAWI mode, each of the tests – such as the *Wilcoxon-Breslan-Gehan* test, sensitive at the beginning of the process time, or the *Generalized Savage Log-rank* test, stressing increasing differences at the end of the process time – provided significant differences between the compared units, such as gender and waves (Blossfeld et al., 2019: 83). The null hypothesis that the timing and quantity of survey participation do not differ across genders and waves must therefore be rejected for the initial survey mode.

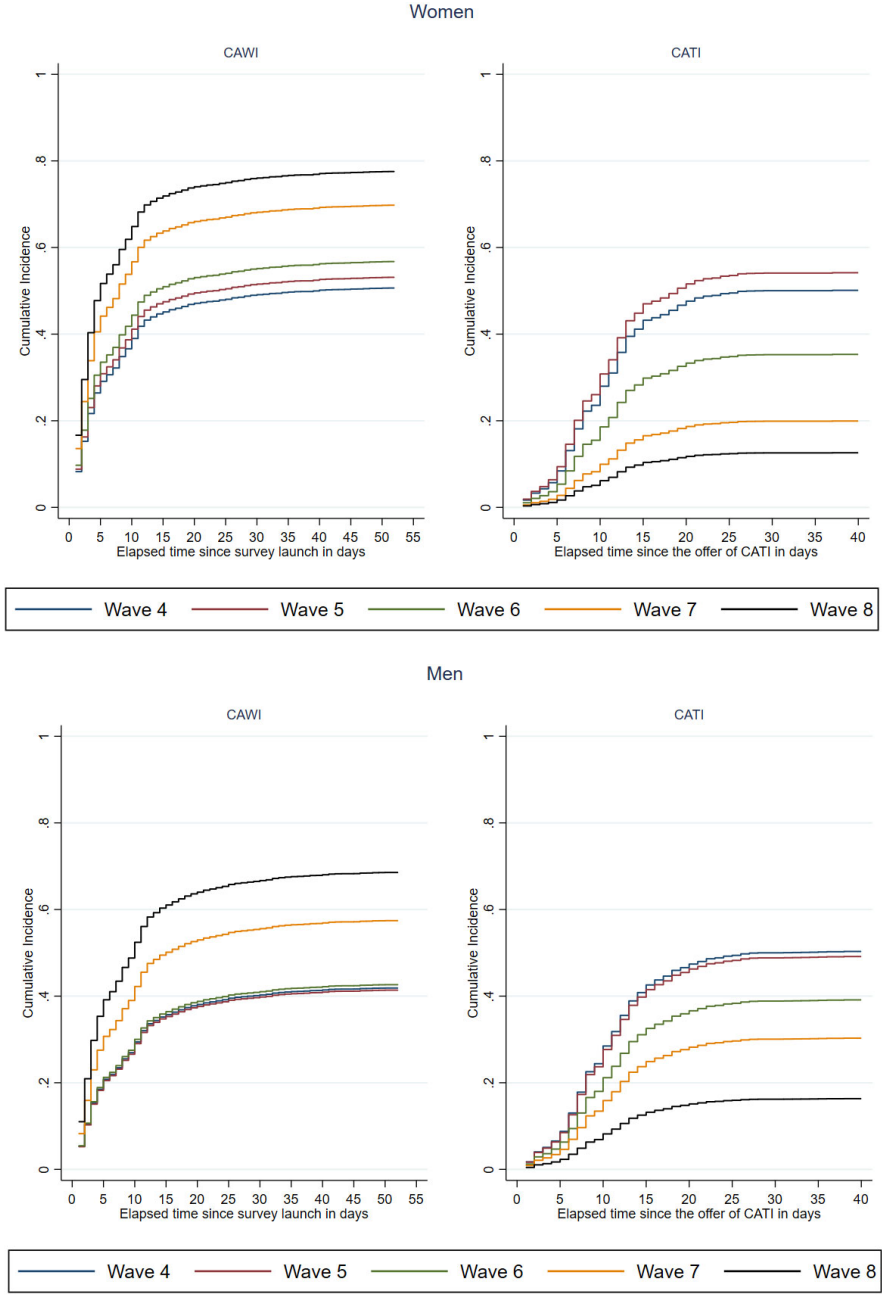

Figure 1 Gender disparities in survey participation across panel waves

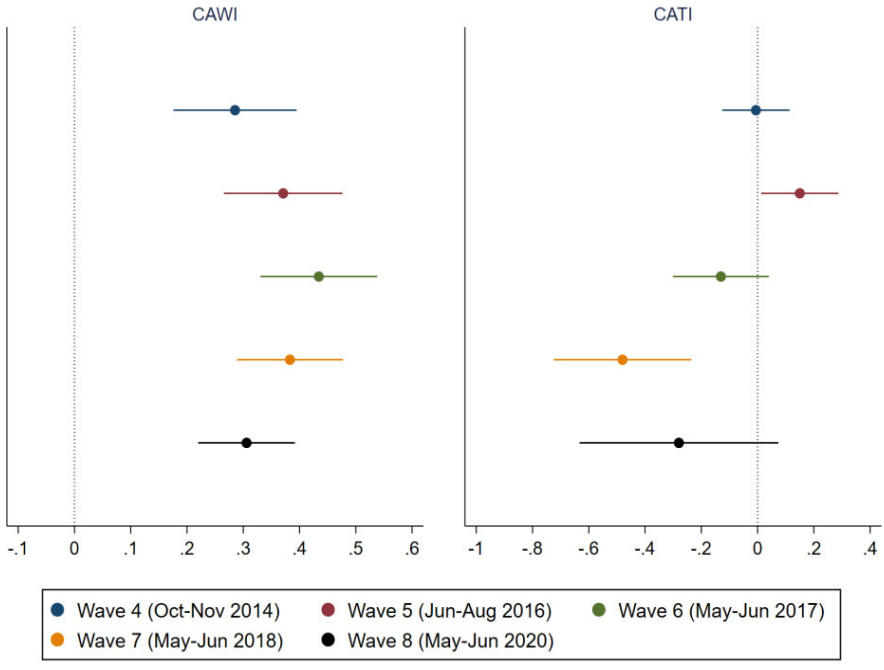

Figure 2 Gender disparities in survey participation across survey modes (estimated by competing risk model)

CATI mode, 51 per cent of the male panelists completed the online questionnaire and 40 per cent of them who did not respond in the initial survey mode took part in the CATI. The overall participation rate across the fieldwork period of 52 days was 82 per cent for women and 76 per cent for male panelists.

Finally, this gender disparity in survey participation was confirmed for each of the waves by multivariate analysis. For each of the waves, so-called β-coefficients for gender estimated by competing risk analyses are depicted in *Figure 2*.[4] In sum, this finding again provides evidence for gender disparities of participation different for the survey modes offered in a sequential mixed-mode design with a push-to-mode strategy. They are significant for each of the waves in the CAWI mode. For the CATI mode, it was observed that young women were more likely to participate at the survey, while there was a reverse gender disparity in Wave 7. Overall, this finding does not confirm *Hypothesis 3* proposing that gender disparities in survey participations diminish in a sequential mixed-mode design across the surveys and

4 The whiskers in the plot present the 95-% confidence interval of the coefficients. If they cross the vertical zero line, these effects are insignificant.

panel waves. Finally, it became obvious that an extension of the fieldwork period did not always result in decreasing gender differences in survey participation. In spite of three digital reminders in the CAWI mode and a sequence of reminders in the CATI mode after three call attempts, the participation rate declined completely to zero after four or five weeks.

Parametric analysis of gender-related participation rates

Utilizing a competing risk model, stark and statistically significant gender differences in survey participation were confirmed again for the initial online mode (*Table 2*). On average, by controlling for panel wave and regional opportunity structure, the inclination of female panelists to take part was () 53 per cent higher than men's (Model 1.1).

For the CATI mode, however, there were no significant gender differences in survey response (Model 1.2). Among the nonrespondents to whom the CATI mode was offered, there was no gender disparity in the timing and quantity of survey response for the entire number of panel waves. Furthermore, as described above, the differentiation of survey participation again made it obvious that participation in the CAWI increased across the panel waves, while the propensity toward response in the CATI mode decreased for recent panel waves. Finally, the effect of regional opportunity structure was only significant for the initial survey mode, where the response rates were lower in urban areas compared to the rural context. Living in urban areas resulted in a lower rate and speed of survey participation after the survey launch. This result does not confirm *Hypothesis 2*, since gender disparities remain constant.

Additionally, there was an impact of social origin on survey participation (Models 2.1-2.2). The selectivity of survey participation in terms of social origin was characterized by the fact that panelists from the middle and upper social classes had a greater inclination to complete the questionnaire than children of less skilled and unskilled blue-collar workers. Working class children were more likely to postpone their response and not take part in the CAWI or CATI than panelists from the other social classes. In contrast to *Hypothesis 1*, the gender differences in survey response were not explained by the social origin of panelists.

Panelists with a high educational level were more likely to take part in the online surveys than individuals enrolled in lower secondary schools with basic requirements. High language proficiency and ability in German language was correlated with starting early to complete the online questionnaire, while these achievements and skills were insignificant for participation in the CATI. By controlling for social origin, educational level and language, there were still gender disparities in survey participation in the initial survey mode. Therefore, *Hypothesis 1* is not in line with these findings.

Table 2 Gender and participation in different panel waves of the DAB panel study

Survey mode	CAWI	CATI	CAWI	CATI	CAWI	CATI
Models	1.1	1.2	2.1	2.2	3.1	3.2
Gender						
Female	0.356 (0.022)***	–0.046 (0.038)	0.273 (0.023)***	–0.052 (0.038)	0.290 (0.023)***	–0.038 (0.039)
Waves (Ref.: Wave 4)						
Wave 5	0.034 (0.039)	0.035 (0.046)	0.045 (0.040)	0.063 (0.046)	0.046 (0.040)	0.064 (0.046)
Wave 6	0.109 (0.039)**	–0.396 (0.053)***	0.124 (0.039)**	–0.359 (0.054)***	0.125 (0.039)**	–0.359 (0.054)***
Wave 7	0.502 (0.037)***	–0.848 (0.066)***	0.505 (0.037)***	–0.822 (0.067)***	0.507 (0.037)***	–0.822 (0.067)***
Wave 8	0.757 (0.036)***	–1.476 (0.092)***	0.772 (0.036)***	–1.442 (0.092)***	0.774 (0.036)***	–1.441 (0.092)***
Macro factor						
Regional opportunity structure	–0.037 (0.011)**	–0.016 (0.018)	–0.046 (0.012)***	–0.016 (0.019)	–0.045 (0.012)***	–0.014 (0.019)
Social origin (Ref.: Upper service class*)*						
Lower service class			0.012 (0.039)	–0.067 (0.067)	0.007 (0.039)	–0.068 (0.067)
Routine non-manual employees			–0.011 (0.037)	–0.029 (0.062)	–0.008 (0.037)	–0.034 (0.062)
Farmers, small proprietors			–0.066 (0.054)	–0.002 (0.092)	–0.061 (0.054)	–0.002 (0.092)
Foremen, skilled manual workers			–0.153 (0.042)***	–0.152 (0.067)*	–0.143 (0.042)***	–0.146 (0.067)*

Survey mode	CAWI	CATI	CAWI	CATI	CAWI	CATI
Models	1.1	1.2	2.1	2.2	3.1	3.2
Semi- and unskilled manual workers			–0.139 (0.057)*	–0.027 (0.094)	–0.137 (0.057)*	–0.027 (0.093)
Missing value			–0.140 (0.045)**	–0.224 (0.075)**	–0.138 (0.045)**	–0.226 (0.075)**
School type (Ref.: Basic requirements*)*						
Extended requirements			0.508 (0.032)***	0.146 (0.045)**	0.494 (0.032)***	0.132 (0.045)**
Advanced requirements			0.915 (0.038)***	0.240 (0.066)***	0.896 (0.038)***	0.217 (0.066)**
Missing value			0.382 (0.042)***	0.002 (0.067)	0.373 (0.042)***	–0.007 (0.067)
Language						
Language proficiency (GPA)			0.128 (0.013)***	–0.032 (0.021)	0.124 (0.013)***	–0.037 (0.021)
Language ability (German vs. others)			0.225 (0.034)***	0.060 (0.052)	0.228 (0.034)***	0.052 (0.052)
Personality traits						
Persistence			0.054 (0.013)***	–0.015 (0.020)	0.057 (0.013)***	–0.010 (0.020)
Control belief			0.035 (0.012)**	0.015 (0.020)	0.036 (0.012)**	0.017 (0.020)
Decisiveness			0.049 (0.012)***	0.046 (0.019)*	0.045 (0.012)***	0.042 (0.019)*
Gender role orientation						
Female role model					–0.086 (0.014)***	–0.045 (0.023)*

Survey mode	CAWI	CATI	CAWI	CATI	CAWI	CATI
Models	1.1	1.2	2.1	2.2	3.1	3.2
Male role model					0.054 (0.015)***	−0.013 (0.022)
Number of episodes	13,145	6,898	13,145	6,898	13,145	6,898
Number of events	7,460	2,744	7,460	2,744	7,460	2,744
Number of competing risks	2,923	1,392	2,923	1,392	2,923	1,392
Number of censored cases	2,762	2,762	2,762	2,762	2,762	2,762
Wald chi^2 (d.f.)	1,016.2 (6)	446.7 (6)	2178.6 (20)	510.6 (20)	2222.8 (22)	516.6 (22)

* $p<0.05$; ** $p<0.01$; *** $p<0.001$; β-coefficients, estimated by competing risk model (in brackets: robust standard error; clustered for individual units).

Source: DAB (own calculations)

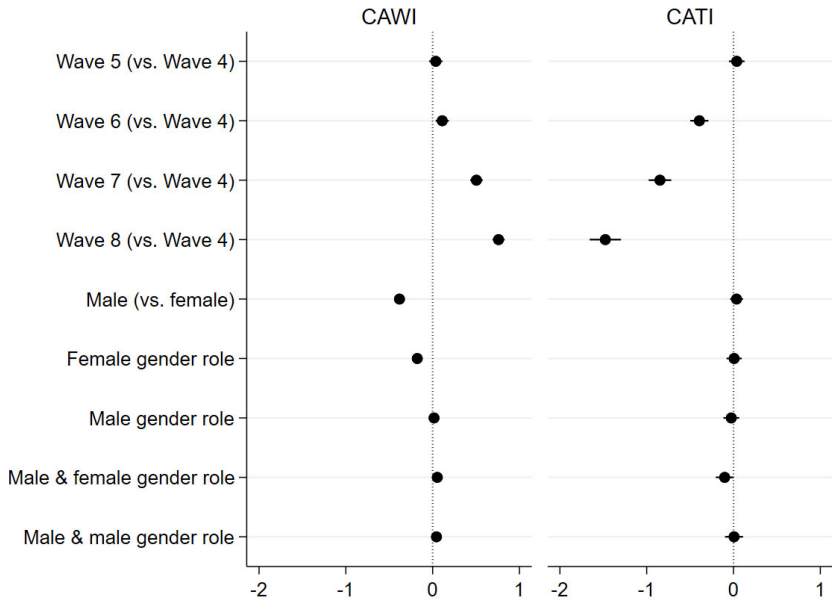

Figure 3 Impact of gender role orientation on survey participation (estimated by competing risk model)

The effects of personal traits were also straightforward. Panelists with high persistence, distinct primary or internal control belief and pronounced decisiveness were more likely to take part in the CAWI than individuals with external or secondary control belief, or individuals who were indifferent or characterized by remissness (Model 2.1). It was also found that panelists who postponed their response were more likely to take part in the CATI provided they had pronounced decisiveness (Model 2.2). However, since the gender difference was still significant, *Hypothesis 4* – stressing that personality traits explain the gender differences in survey participation – is not supported empirically.

While a panelist's orientation toward a traditional female role model made them less likely to respond to an invitation to the CAWI (Model 3.1) and to the CATI (Model 3.2), it was obvious that panelists who agreed with the "male breadwinner model" were more likely to be motivated in (early) survey participation (Model 3.1). However, if interaction effects of gender and gender role orientation are taken into account, by controlling for the same variables as in the models 3.1 and 3.2, there was no significant effect of them on survey response (*Figure 3*). This was true for the online mode (left-hand panel) as well as for the CATI mode (right-hand panel). Overall, these interaction effects on response were very small and did not dissolve the gender differences in survey participation at all. Therefore, *Hypothesis 5* is not

confirmed empirically, proposing that the effects of gender role orientation on survey response explain the gender differences in survey participation.

Finally, this issue was also true for the interactions effect of gender and each of the other covariates considered in model estimations, such as panel experience, social origin, educational level, language ability and proficiency, and regional opportunity structure. Each was insignificant; therefore, they are not reported or discussed in detail.

Discussion

In the dynamic analysis of the likelihood and timing of survey participation, the empirically evident gender differences could not be discounted by taking theoretically proposed processes and mechanisms into account, at least indirectly. Even if factors at the macro level of societal environment, at the meso level of survey characteristics and at the micro level of an interviewee's resources, abilities and beliefs were considered in the event history analysis, the gender effect on the timing and quantity of survey participation remained significant. None of the different hypotheses considering gender-based processes and mechanisms at each of the analytical levels was confirmed empirically. It seems that there are unobserved heterogeneities in gender-specific preferences and circumstances, and those perceptions of benefits and costs of responses in surveys of a multi-wave panel are not taken into account in a way that would support the assumptions of the theory of subjective expected utility and the heuristic logic of habitual action regarding scientific surveys.

Summary and Conclusions

The manifest aim of this empirical analysis has been to contribute to an evidence-based explanation of systematic gender disparities in survey participation. The latent aim is to relaunch this issue as a matter of interest in the research on survey methods. Regarding survey methodology, this research issue is still notoriously under-investigated in contemporary survey methodology (Becker, 2021: 20; Green, 1996). Thus, the question to be answered by this analysis was *why* we continuously observe differences between the genders regarding survey participation and, in particular, in its timing and quantity. Why are female target persons more likely to take part in social-scientific surveys than men?

Utilizing event history data on the likelihood of young panelists participating in surveys within a single-cohort and multi-wave panel study conducted in German-speaking cantons of Switzerland, the analysis has attempted to explain the gender differences in survey participation by hypotheses deduced from an advanced version of reasoned action theory and heuristic decision-making (Singer, 2011). According to Green (1996), it is assumed that, among other influences, the

gender difference is mainly based on gender-specific abilities, skills and achievements, which can be indicated by an invited potential respondent's language proficiencies and abilities, as well as by their educational success and attainment. Since girls and women have become advantaged in this respect due to educational expansion, it seemed plausible that a male target person's lower propensity toward survey participation might be correlated with their educational level and skills, resulting in gender disparities of participation. Even when social origin – providing a direct influence on an individual's educational achievement and attainment – was taken into account, the gender differences remained constant in each of the surveys. In the panel with a sequential mixed-mode design and a push-to-web-method, the gender differences were obvious for the initial online mode. However, even when other influences (such as personality traits, agreement with traditional gender roles or living in a rural or urban region) were taken into account, the gender disparities remained unsolved.

This result could be based on some limitations of this contribution. First of all, there is no elaborated theory explaining gender differences in survey participation. Ad-hoc arguments dominate a coherent explanation. Ideally, this theory should be a special case of a rational action approach. Second, the data provided less information on the mechanisms relevant for explaining response in general (e.g. benefit-cost calculation) that should be integrated into the statistical models. There was also a lack of information regarding different circumstances for genders that were essential for assessing the likelihood of survey participation. Third, the target population was limited to juveniles of a single birth cohort living in a small area in a small country. However, it could be argued that an explanation of gender-based survey response should be universal.

While none of the different hypotheses was confirmed empirically (and have not been confirmed in previous studies), and since the residual analysis conducted in the context of a multi-wave panel study on the educational and occupational trajectories of juveniles born around 1997 was not successful at all, the search for an empirically tested answer on the association between gender and survey participation must continue. Future studies may more profitably address the incremental effects of gender by directly measuring individual preferences, expectations and motivations, as well as perceived benefit-cost balance and everyday life. The social mechanisms emphasized in the wide variety of rational action theories and approaches to heuristic decision-making must also be observed directly with systematic reference to gender. As a by-product of such an endeavor, the different theories attempting to explain survey participation per se could be tested. Such a comparative test of theories on survey participation is overdue.

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Appendix

Table A–1: Varimax-rotated three factor structure of personality traits items

Items (value range: 1 = disagree – 5 = agree)	Factor 1 Persistence	Factor 2 Control belief	Factor 3 Decisiveness
Persistence			
I hate to leave something unfinished.	0.5882	0.0287	–0.0029
When I have made up my mind, I manage to keep it up.	0.7192	–0.0581	–0.0455
What I‘ve started I‘ll finish.	0.7353	–0.0640	0.0038
Even when I encounter difficulties at work, I persist in it.	0.7373	–0.0528	–0.0649
Even with a tedious task, I don‘t give up until I‘m done.	0.7264	–0.0167	–0.0152
Control belief			
I am happy to take responsibility.	0.5238	–0.1482	0.2326
It has proven to be good for me to make decisions on my own instead of turning to fate.	0.5408	–0.1443	0.1740
When there are problems and resistance, I usually find ways and means to assert myself.	0.5807	–0.1498	0.1827
Success depends on luck, not performance.	0.0124	0.0878	0.8260
I feel like I have little control over what happens to me.	–0.0059	0.2084	0.7648
Decisiveness			
I am very unsure of how to decide and often fluctuate back and forth.	–0.0487	0.8017	0.0809
I let other people confuse me in my decision.	–0.0871	0.7768	0.1132
After a decision, I have great doubts as to whether I have really made the right decision.	–0.0607	0.8109	0.0931
There are so many options that I have a hard time deciding which one to choose.	–0.0161	0.7772	0.0549
When I have made a decision, I hold on to it.	0.4613	–0.0437	–0.0111

	N	Minimum	Maximum
Persistence	3,680	–5.0302	2.4407
Control belief	3,680	–3.0764	3.1386
Decisiveness	3,680	–4.4313	2.5783

Table A–2: Varimax-rotated one factor structure of gender role items

Items (value range: 1 = disagree – 5 = agree)	Mean	SD	Minimum	Maximum	Factor Gender role
Female gender role: I think it's important for a woman…					
to be employed.					0.6173
to earn much money.					0.7766
to have a successful career.					0.7675
to have children.					0.5039
to take care of the household.					0.4947
to be responsible for childcare.					0.5105
Female gender role orientation	–3.54e-09	0.9655	–3.8443	2.5000	
Male gender role: I think it's important for a man…					
to be employed.					0.7244
to earn much money.					0.8087
to have a successful career.					0.8004
to have children.					0.5809
to take care of the household.					0.4666
to be responsible for childcare.					0.5724
Male gender role orientation	–2.51e-09	0.9655	–4.6210	1.9810	

Table A-3: Descriptive statistics (all respondents across five waves)

	N	%	Mean	SD	Minimum	Maximum
Gender	13,145	51.0			0	1
Waves	13,145					
Wave 4	2,654	20.2			0	1
Wave 5	2,799	21.3			0	1
Wave 6	2,712	20.6			0	1
Wave 7	2,488	18.9			0	1
Wave 8	2,492	19.0			0	1
Regional opportunity structure	13,145		0.2218	0.9804	–1.6488	3.6225
Social origin (EGP)	13,145					
I	1,863	14.2			0	1
II	2,453	18.7			0	1
IIIa/b	3,173	24.1			0	1
IVa/b/c	805	6.1			0	1
V/VI	2,132	15.2			0	1
VIIa/b	704	5.4			0	1
Missing values	2,024	15.4			0	1
School type	13,145					
Basic requirements	3,383	25.7			0	1
Extended requirements	5,467	41.6			0	1
Advanced requirements	2,068	15.7			0	1
Missing values	2,227	16.9			0	1
Language proficiency (z-standardized GPA)	13,145		–0.0992	0.9089	–3.3773	1.3327
Language ability (German vs. other languages)	13,145	85.5			0	1
Persistence	13,145		0.0182	0.9192	–5.0302	2.4407
Control belief	13,145		–0.0235	0.9449	–3.0764	3.1386
Decisiveness	13,145		0.0361	0.9264	–4.4313	2.5783
Female gender role	13,145		–3.54e-09	0.9656	–3.8443	2.5000
Male gender role	13,145		–2.51e-09	0.9656	–4.6210	1.9810