Schneider, Sebastian O.; Sutter, Matthias

Conference Paper

Higher Order Risk Preferences: Experimental Measures, Determinants and Related Field Behavior

Beiträge zur Jahrestagung des Vereins für Socialpolitik 2020: Gender Economics

Provided in Cooperation with:
Verein für Socialpolitik / German Economic Association

Suggested Citation: Schneider, Sebastian O.; Sutter, Matthias (2020) : Higher Order Risk Preferences: Experimental Measures, Determinants and Related Field Behavior, Beiträge zur Jahrestagung des Vereins für Socialpolitik 2020: Gender Economics, ZBW - Leibniz Information Centre for Economics, Kiel, Hamburg

This Version is available at:
https://hdl.handle.net/10419/224643

Higher Order Risk Preferences: Experimental Measures, Determinants and Related Field Behavior*

Sebastan O. Schneider

Max Planck Institute for Research on Collective Goods, Bonn

Matthias Sutter

Max Planck Institute for Research on Collective Goods, Bonn; University of Cologne, Germany & University of Innsbruck, Austria

This version: March 1, 2020
Click here to get the newest version of this paper.

Abstract

Higher order risk preferences are well-known for their relation with precautionary saving or portfolio allocation. Theoretically, they are also connected with other important behavior, such as health-related or eco-friendly behavior, but these relations have never been investigated with field data. In a large-scale experiment with 658 adolescents, we relate experimental measures of higher order risk preferences with field behavior. Field behavior is collected in an extensive survey, where we focus on general risk taking, the environmental and the health domain, particularly on addictive behavior. Using a novel method allowing the experimental elicitation of intensities of prudence and temperance, we find females behaving more risk averse, prudent and temperant, and high-ability students behaving less risk averse and temperant. We confirm previous findings on financial decision making and higher order risk preferences, and find that prudence is a strong predictor for health-related behavior: An index capturing the obsessive use of smartphones is predicted significantly by prudence, but not by risk aversion or temperance.

Keywords: Higher order risk, prudence, temperance, field behavior, adolescents, health, addictive behavior, smartphone addiction
JEL classification: C93, D81, D91, J13

*The authors thank Gary Charness, Glenn Harrison, and participants at the CREED/MPI workshop in Bonn 2018, IMEBESS 2019 in Utrecht, M-BEPS 2019, TIBER Symposium 2019, European and North American ESA 2019 in Dijon and Los Angeles, Post-ESA 2019 Workshop on Experiments with Children and Non-Standard Subjects, NCBEE 2019 in Kiel, BEH-net Workshop 2020 in Innsbruck, as well as seminar participants at George Mason University, Mainz University, and UCSB for helpful comments and suggestions.

1 Introduction

Risk is an inherent part of life: Decisions about occupation, education, finances or health behavior, to name just a few, regularly involve at least some degree of risk. Consequently, measuring risk is important for both, theory and applications. However, commonly used experimental measures regularly fail in predicting field behavior under risk (Sutter et al., 2013; Charness et al., 2019; Samek et al., 2019) and are usually found to correlate rather weakly with standard survey questions on risk tolerance (see, e.g., Crosetto and Filippin (2015), or Crosetto (2019) for a meta study), calling into doubt their external validity. For example, in a large-scale experiment with a representative sample of the Dutch population, Charness et al. (2019) find that none of the five commonly used measures of risk attitudes that they employ predicts field behavior in the financial, health and occupational domain.[1] Given that many decisions in these domains are undoubtedly connected with risk, this seems surprising.

However, risk comes in different forms, and a growing literature going back already to Leland (1968) suggests that for explaining certain behavior, including financial decision making and health-related behavior, higher order risk preferences might be more relevant than standard risk aversion (Kimball, 1990, 1992; Gollier and Pratt, 1996; Courbage and Rey, 2006; Attema et al., 2019), and consequently, not accounting for appropriate measures might be a reason for the observed results. Prudence, the third order risk preference, is often defined as the preference to accept a mean-zero risk in the state of higher wealth instead of the state of lower wealth (Eeckhoudt and Schlesinger, 2006), and a measure of prudence is interpreted as measure of left-skewness aversion or equivalently preference for right-skewness (Modica and Scarsini, 2005).[2] Under expected utility theory, prudence is equivalent to downside risk aversion (Menezes et al., 1980). Temperance, the fourth order risk preference, can be defined as the preference to disallocate two independent mean-zero risks across two states of the world opposed to accepting both of them in the same state of the world (Eeckhoudt and Schlesinger, 2006), and a measure of temperance is interpreted as measure of kurtosis aversion (Denuit and Eeckhoudt, 2010). Thus, via the skewness preference and the kurtosis aversion measures, higher order risk preferences capture important aspects of the distribution of a risk – beyond its mean and variance –, which, in addition to all model-based relations, corroborates that they deserve attention when studying risky behavior in the field.[3]

[1] Specifically, they measure risk by the methods proposed by Gneezy and Potters (1997); Tanaka et al. (2010); Eckel and Grossman (2008); Holt and Laury (2002); Dohmen et al. (2011).

[2] Note that their derivation of this finding has a sign error.

[3] See also Ebert (2012) on the moment characterizations of higher order risk preferences.

So far, surprisingly, no study has empirically considered higher order risk preferences for explaining field behavior with respect to risk taking in general or any specific behavior under risk except for financial decision making (Trautmann and van de Kuilen, 2018). Theoretically, links have been established to a wide range of domains in addition to financial decision making, covering eco-friendly behavior (e.g., Bramoullé and Treich, 2009) over prevention effort to lower the probability of occurrence of an undesired event (Eeckhoudt and Gollier, 2005; Menegatti, 2009) to health-related behavior (e.g., Courbage and Rey, 2006; Attema et al., 2019).

In this paper, we measure the higher order risk preferences prudence and temperance as well as risk aversion in a novel way that also allows identifying intensities in a sample of 658 children and adolescents, aged 10 to 21 years. We then relate these individual experimental measures to self-reported behavior in the field, focusing on general risk taking, financial decision making, general prevention, eco-friendly behavior and health-related behavior, and in this area particularly addictive behavior.

The method used for the elicitation of higher order risk preferences was proposed by Schneider et al. (2019) and bases on the elicitation of utility points, which are subsequently non-parametrically connected to a utility function with a spline smoothing approach. Based on estimated utility functions and their derivatives, intensity measures of higher order risk preferences are computed, allowing for an interpretation as measures of preference for right-skewness (Modica and Scarsini, 2005) and kurtosis aversion (Denuit and Eeckhoudt, 2010). These measures are complemented with a time preference measure and test scores from cognitive ability tasks, specifically from a matrix test and a symbol-digit-correspondence task (Dohmen et al., 2010).

Health-related behavior in this study mainly comprises addictive behavior: Besides smoking and drinking behavior, we particularly focus on a relatively new phenomena, namely excessive smartphone usage, as this has, especially among adolescents, increasingly been linked to mental health issues and poor well-being in general (Twenge et al., 2018; Orben and Przybylski, 2019; Przybylski and Weinstein, 2017). Nesi and Prinstein (2015) document that this relation is partly due to technology based social comparison and feedback seeking, and Cheever et al. (2014) and Clayton et al. (2015) find that separating participants from their smartphones leads to increased feelings of anxiety, heart rate and blood pressure, illustrating the potential difficulties in decreasing smartphone usage. We elicit problematic smartphone usage with a self-designed scale that includes aspects of feedback seeking and social comparison, as well as feelings of anxiety, where we ask e.g., whether, in the moment of experiencing a special situation or taking a photo, participants immediately think about how to post this on social media, whether they feel uneasy if unable to use

their smartphone, or whether participants check their smartphone for notifications during family lunch.

General prevention effort in the respective literature (e.g., Menegatti, 2009) and also in our questionnaire is understood as effort to decrease the likelihood of an unwanted event; for example, we asked about packing some food for a longer trip in order to avoid being hungry or toothbrushing in order to avoid caries.

To address eco-friendly behavior, we ask for example whether participants turn off the heating or the light once they leave a room, or whether they use reusable coffee mugs.

The first contribution of this paper is to provide a unified experimental framework to measure time and (higher order) risk preferences for a large sample of children and adolescents, relying on non-parametric intensity measures. While risk aversion and impatience are by now well studied in this age group (Sutter et al., 2019), for prudence and temperance the evidence is scarce or non-existent. Heinrich and Shachat (2018) study prudence among 362 Chinese children and adolescents aged 8 to 17 years by counting the number of prudent decisions from three binary choice tasks, investigate determinants of their decisions and examine transmission of choices from parents to their children. They do not account for time preferences nor an absolute measure of cognitive ability when investigating the determinants of prudent choices. Moreover, they do not measure intensities of prudence. Temperance has never been studied with children or adolescents. Therefore, also intensity measures of higher order risk preferences remain unstudied among this age group; even for adults, there is hardly evidence on intensity measures of higher order risk preferences.[4] Therefore, we are the first to study temperance with this age group, but also the first to study intensities of higher order risk preferences and to investigate the existence of mixed risk averters, i.e., individuals who are risk averse, prudent, and temperant, or those who are risk seeking, prudent, and intemperant (Crainich et al., 2013), via correlations between the different orders among children and adolescents.

The second contribution of our study is to link elicited attitudes of children and adolescents from the incentivized experiment to their field behavior. We are the first to connect higher order risk preferences with field behavior among adolescents. Additionally, we investigate behavior such as abusive smartphone usage that has,

[4]We are aware of only two studies that have investigated non-parametric intensity measures of higher order risk preferences at all: Ebert and Wiesen (2014) and Schneider et al. (2019). Standard parametric approaches, such as maximum likelihood estimation of the parameter of a power utility function, are unable to account for all empirically observed combinations of (higher order) risk preferences (e.g., a subject being prudent and risk seeking) and are thus not flexible enough for their study. The alternative so far has thus mostly been to report the number of decisions in binary decision tasks that are consistent with a certain trait, thus equating intensity with consistency in choice.

as far as we know, never been addressed in the risk literature before since it is a relatively new phenomena. However, as laid out above, it has gained considerable interest for being related with depression (e.g., Twenge et al., 2018; Kelly et al., 2019). Lastly, many of the consequences of higher order risk preferences have been theoretically established without an empirical validation to date, as also mentioned above. So far, only the relation between higher order risk preferences and saving (Noussair et al., 2014; Schneider et al., 2019) as well as risky investment (Noussair et al., 2014) has been investigated empirically with field data. Contrary to Noussair et al. (2014), who use a count measure of categorization to assess the strength of higher order risk preferences, we use non-parametric utility-based intensity measures and control for time preferences.

A third contribution that we make is to investigate the relation between intensity measures of higher order risk preferences and cognitive abilities. Previous studies have connected cognition measures to the number of choices that is consistent with a certain trait (Breaban et al., 2016; Noussair et al., 2014). Given the relative complexity of the elicitation task they employ (Eeckhoudt and Schlesinger, 2006), this might confound results.

Investigating the external validity of experimental measures for risk preferences is especially important for the age group we study. Adolescents are faced with many risks while growing up, and some habits might lead to bad educational and health outcomes up to depression, where targeted interventions e.g., for the ones particularly prone to addictive behavior might have a great impact on their future development. Similarly, addressing pupils that are least likely to behave eco-friendly with targeted information material could be cheap and effective. Our results might thus inform policy design on how to identify students for whom interventions could be particularly needed or fruitful.

Our experimental results with respect to classification of higher order risk preferences are in line with findings on adult populations; see e.g., the review by Trautmann and van de Kuilen (2018). In the aggregate, children and adolescents are risk averse, prudent, and temperant. We find no age effect on the intensity of any higher order risk preference, which replicates earlier findings on risk aversion with the age group of 10- to 18-years olds; see e.g., the review by Sutter et al. (2019) and is in line with earlier findings on classification of higher order risk preferences with adults (Noussair et al., 2014). It thus seems that also higher order risk preferences are stable in the age group we study. Moreover, we replicate the standard finding with respect to gender (Croson and Gneezy, 2009; Sutter et al., 2019): girls are more risk averse than boys. Our findings indicate that this pattern extends to higher orders of risk, as girls are also more prudent and more temperant than boys, which has also

been reported with adult populations (Ebert and Wiesen, 2014). High-ability students (measured by a test using raven's matrices and a symbol correspondence task) are less risk averse and less temperant, replicating a common finding with respect to risk aversion; see the review by Dohmen et al. (2018). Turning to the predictive power of experimental decisions for behavior in the field, we find that prudence (and, to a lesser extent, temperance) complements risk aversion in predicting general risk taking behavior or financial decision making, but also predicts behavior that empirically seems to be unrelated with classical risk aversion, such as health-related behavior. For example, our index capturing obsessive use of smartphones is predicted significantly by prudence, but not by risk aversion or temperance. We make the same observation when complementing this index with other addictive behavior (smoking and drinking), or forming a general health index that also includes e.g. the body mass index or information on the regularity at which participants practice sports. In general, our measures of risk aversion and prudence are strong predictors of the field behavior we study.

In the next section, we describe our subject pool and general features of the experiment. Section 3 is devoted to the specific measurement of higher order risk attitudes, and their determinants. We also discuss our results in this regard and compare them to other findings in the literature. Section 4 studies the relation between our measures of higher order risk preferences and field behavior, where we focus on general risk taking, financial decision making, health-related behavior, general prevention and eco-friendly behavior. Section 5 discusses our main results and concludes the paper.

2 Methods and Experimental Design

2.1 General Setup

Subject Pool

We run our experiment in four German schools in the federal states Baden-Württemberg, North Rhine-Westphalia and Rhineland-Palatinate in September and October 2018. In every school, at least one class per grade of grades six, eight, ten, and twelve, were selected to participate in the experiment. In total, 658 children and adolescents, aged 10 to 21 years, took part in our experiment. The distribution of students across grades and gender is summarized in Table 1. We obtained IRB approval for our study in July 2018, and principals and teachers of the participating schools supported us to conduct the experiment in class during regular school

Table 1: Characteristics of Participants: Age and Gender

Average Age (in years)	Grade	Total	Girls	Boys
11.6	6th	153	70	83
13.6	8th	168	80	89
15.7	10th	173	91	82
17.6	12th	162	89	73
Total		656	330	327

hours. We informed parents about both the experiment, and the collection of survey data. Schools made sure that all participating children obtained their parents' permission to participate. In schools, from which we have detailed information about participation rates, more than 93% of pupils participated, about 4% opted out, and the remaining 3% were absent independently of the study. Students also were asked whether they would be willing to participate in the experiment and no student opted out.

General Experimental Setup

Decisions were connected with real payoffs and payoffs ranged from €2.75 for the youngest participants to €15.50 for the twelfth graders (see also Section 3). The payment was determined by students' decisions, and, if applicable, by chance. They were clearly instructed that they could earn money and that their choices would influence their payoffs. In the experiment, outcomes were expressed in our experimental currency "Taler". The conversion rate between a Taler and Euros was explained extensively with examples involving the full range of possible outcomes before any decision was taken. We varied the conversion rate depending on the grade such that the maximal amount participants could earn in the experiment corresponded to the recommended weekly amount of pocket money according to the German Federal Ministry of Family Affairs, Senior Citizens, Women and Youth. This was done in order to comply with school requests and to hold constant the meaning of a Taler to the different age cohorts. For example, 280 Taler, the highest possible payout in our study, correspond to €5.50, €7, €10 and €15.50 for grades 6, 8, 10 and 12. In addition to the payoffs from the experiment, each participant received a show-up fee of 70 Taler and up to 70 Taler for the cognitive ability tasks, depending on performance.[5] We paid all participants in cash before they left the classroom, with the exception of future payments in the time preference experiment. These payments

[5] We always paid 70 Taler to the best student in the classroom; this determined the amount of Taler paid for a correctly solved cognitive ability task.

were administered by teachers or headmasters at a prespecified date in the future, which was carefully explained.

All experimental sessions were run by the first author with the help of assistants during regular school hours in students' schools. Instructions were the same in every session and were orally delivered (see Online Appendix B for instructions used). After the experiment, additional survey data including demographic variables were collected (see Section 2.3 for a description and Online Appendix B for the entire questionnaire). Participants could enter their choices and their answers to the questionnaire privately on a tablet computer that was placed on their desk.

The elicitation of both, risk and time preferences in our experiment is based on the elicitation of indifference values. For risk preferences, we elicit the certain amount of money that makes participants indifferent between playing the lottery and receiving the certain amount of money. Similarly, for time preferences, we elicit the amount of money that makes them indifferent between receiving the money at the day of the experiment or with a three weeks delay. We elicit indifference values using a bisection approach, sometimes referred to as staircase method. This approach is widely used in the economics literature (e.g., Abdellaoui et al., 2007; Falk et al., 2018) and very easy to understand for participants. Participants are faced with one decision between two options at a time. For risk elicitation, subjects are presented a choice between a sure payoff and a lottery with two equally likely outcomes, illustrated by a rotating coin with a black and a white side; see Figure 1. If a subject chose the sure payoff (the left option in Figure 1), in the next iteration, the amount of the sure payoff would be decreased, whereas if she chose the lottery (the right option in Figure 1), the sure payoff would be increased for the next decision to take. From three such iterations, we deduce indifference values for a lottery, the so-called certainty equivalents. In total, we elicit six certainty equivalents. For time preferences, one option consists of a certain amount at the day of the experiment, and one option consists of a certain amount with a three weeks delay. Depending on the choice, the amount paid with a three weeks delay is either increased or decreased, and the decision is repeated. For time preferences, we iterate this step four times.

We have devoted priority and considerable care to the understanding of our experimental tasks since noise in elicited preferences obviously impedes precise prediction of field behavior and because complexity of a elicitation task can affect measured preferences, even to the extent that it masks existing patterns in the sample: For example, Charness et al. (2018) show that multiple price lists produce enough noise through confusion and inconsistencies to mask a gender difference in risk taking that is found when only a single decision of the choice list is used. Therefore, we do

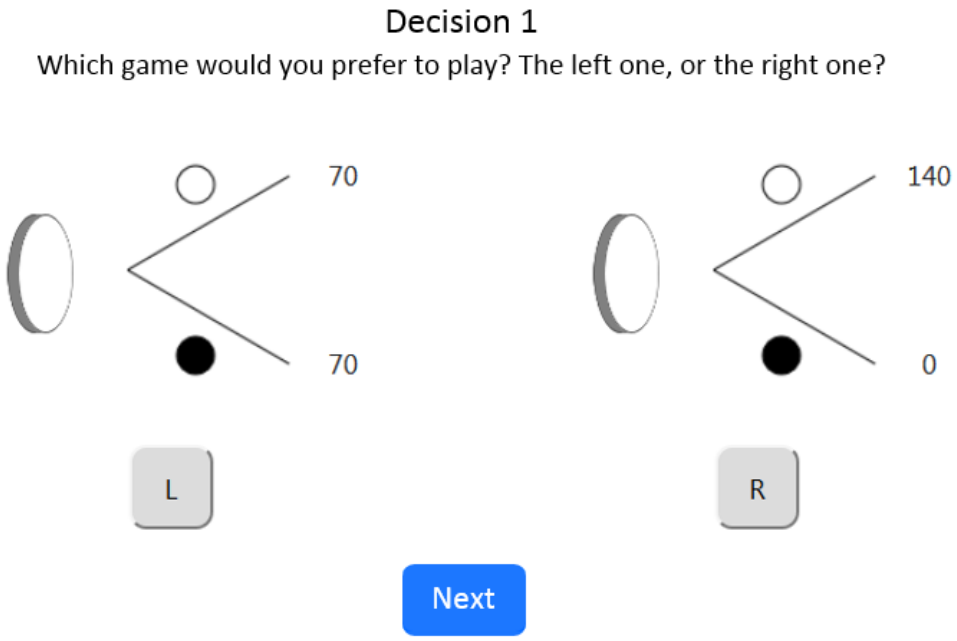

Figure 1: Elicitation of (Higher Order) Risk Preferences via Certainty Equivalents: Exemplary Decision Screen

not apply choice lists but ask for one decision at a time.[6] Moreover, they find that giving examples and reading out instructions decreases noise and inconsistencies; a finding that we incorporated in our experimental procedures and instructions.

In total, subjects made 18 decisions between a sure amount of Taler and a lottery with two equally likely outcomes, and four decisions between an earlier payoff and a later payoff. Among all decision tasks (i.e., decision tasks on risk and time preferences), one was randomly selected for payout by the computer. If one of the certainty equivalence tasks was selected for payout and the participant chose the lottery, a coin flip was simulated by the computer to determine the realization of the lottery. The payoffs in these tasks ranged from 0 to 140 Taler. If one of the time preference tasks was selected for payout and the participant selected the later payment, they received the corresponding payment of this task at the prespecified date; headmasters and teachers administered the payment, and this was announced before the experiment. The payoffs in these tasks ranged from 100 to 140 Taler. For conversion of Taler to Euros, see the previous section.

The measures applied for higher order risk preferences are explained in detail in the next section. For time preference or impatience, we compute the ratio of the

[6]It is sometimes argued that the staircase method could be gambled and that it is therefore not incentive compatible. Ex-post, by analyzing choice behavior, this concern can be ruled out, and indeed, in our data there is no evidence whatsoever pointing at individuals gambling the method.

future equivalent of the earlier payoff to the early payoff, i.e. future equivalent/early payoff. In all time preference questions, we used 100 Taler as the early payoff option.

The measures for cognition that we apply focus on fluid intelligence. Our first task, a commonly used matrix test, aims at reasoning, while our second task, a symbol-digit-correspondence task (Dohmen et al., 2010) aims at processing speed. Both tasks were conducted via tablets and were timed. For the first task, participants had five minutes to complete eight test items, whereas for the second, subjects were given 90 seconds to complete as many tasks as possible. We compute a single measure of cognitive ability from these tasks by weighting the successfully completed items in each task with the time given for a task, i.e. (number of matrices solved * 5*60 + number of correct symbol-digit pairs * 90)/(5*60+90). Finally, for comparison reasons, we center and standardize this measure.

2.2 Experimental Measurement of Higher Order Risk Preferences

Higher order risk preferences are now often defined as noted in the introduction, by preferences over the allocation of zero-mean lotteries (Eeckhoudt and Schlesinger, 2006). Under expected utility theory, these definitions are equivalent to definitions based on derivatives of the utility function. For example, just as risk aversion can be defined as a negative second, *prudence* is defined as a positive third, and *temperance* is defined as a negative fourth derivative of the utility function.[7]

Method

For the elicitation of intensity measures of (higher order) risk preferences, we use the method introduced by Schneider et al. (2019). This method builds on the elicitation of utility points, for which we use the certainty equivalent method with equally likely outcomes.[8] In the last section, we have described how we elicit the sure amount of money that makes participants indifferent between playing the lottery and receiving the sure amount of money, the so-called certainty equivalent. We now describe how, based on this procedure, utility points are elicited. If the utility

[7]Higher orders also exist, but we are not aware of any behavioral consequence that has been attributed to, for example, *edginess* (positive fifth derivative), nor have previous results on their prevalence shown encouraging patterns that call for further investigation (Deck and Schlesinger, 2014).

[8]Schneider et al. (2019) point out that the method also works with other methods to elicit utility points, such as the tradeoff method (Wakker and Deneffe, 1996), or the lottery equivalent method (McCord and de Neufville, 1986). Since our sample is not well acquainted with the concept of probabilities, we rely on equiprobable two-outcome lotteries such as a coin flip that they know from everyday life.

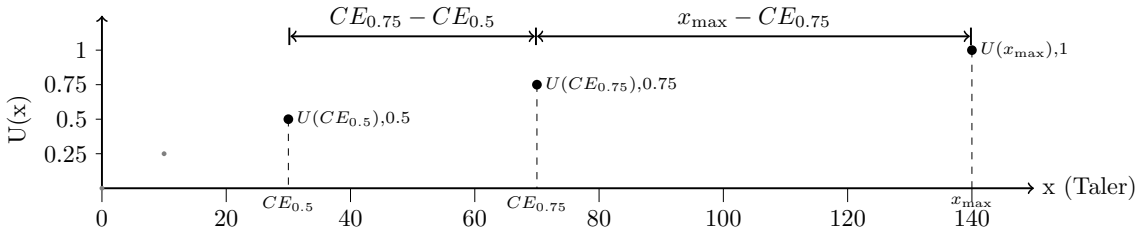

Figure 2: Adaptive Elicitation of Utility Points

function is normalized, such that for $x_{\max} = 140$ Taler, the highest possible outcome, $u(x_{\max}) = 1$ and for $x_{\min} = 0$ Taler, the lowest possible outcome, $u(x_{\min}) = 0$, the expected value of a lottery with these two equally likely outcomes is $0.5u(x_{\max}) + 0.5u(x_{\min}) = 0.5$. As the subject expressed indifference between the lottery and the elicited certainty equivalent $CE_{.5}$, their utility to her must be the same, thus we have for the utility of this certainty equivalent $u(CE_{.5}) = 0.5$. Iterating this procedure, and taking $CE_{.5}$ as either the high outcome of the lottery (where the low outcome remains $x_{\min} = 0$ Taler), or as the low outcome (where the high outcome remains $x_{\max} = 140$ Taler), for every participant we also elicited individual utility points $u(CE_x) = x$ for $x = .25$ and $x = .75$. Additionally, depending on the differences between certainty equivalents, we elicited either $CE_{.125}$ or $CE_{.375}$, and either $CE_{.625}$ or $CE_{.875}$; see Figure 2 for an example: the distance between $CE_{.5}$ and $CE_{.75}$ is smaller than the distance between $x_{\max}$ and $CE_{.75}$. Therefore, $CE_{.875}$ is elicited; otherwise, we woud have elicited $CE_{.625}$. We did so in order to decrease the differences in elicited utility points on the x-axis, or, put differently, to decrease the maximal difference in subsequent elicited certainty equivalents, to get decisions over a wide range of monetary amounts for every participant. Finally, a last point was elicited to decrease the then largest difference in certainty equivalents.[9]

To connect utility points to a non-parametric utility function, Schneider et al. (2019) propose a smoothing approach based on penalized spline regression (Eilers and Marx, 1996). From those utility functions, derivatives can be calculated analytically with a closed form solution without the need for additional numerical computation (De Boor, 1987). Based on the derivatives of the utility function, attitude measures can be calculated (see below).

[9]If, for example, up to this last step, the certainty equivalents $CE_{.125}, CE_{.25}, CE_{.5}, CE_{.625}, CE_{.75}$ have been elicited, this could be one of the following certainty equivalents: $CE_{.0625}, CE_{.1875}, CE_{.375}, CE_{.5625}, CE_{.6875}, CE_{.875}$.

Attitude Measures

We define measures of (higher order) risk preferences based on the elicited individual utility functions and their derivatives as outlined above.[10] As a measure of individual risk attitude, we use the Arrow-Pratt measure (Pratt, 1964):

$$r = -u''/u',$$

where positive (negative) values indicate risk aversion (risk loving) and risk neutrality corresponds to $r = 0$.[11] The theoretical importance of the measure is due to Pratt (1964), who shows that r is proportional to the risk premium and establishes that the measure is suitable to compare individuals regarding their risk attitude.

We measure an individual's prudence level with the measure popularized by Crainich and Eeckhoudt (2008):

$$p = u'''/u',$$

where positive (negative) values indicate (im)prudence.[12,13]

Theoretically, our measure is proportional to the prudence utility premium, i.e., the difference of utility between a prudent and an imprudent option, after conversion into monetary terms (Crainich and Eeckhoudt, 2008). Moreover, u'''/u' is also a measure of left-skewness aversion: Modica and Scarsini (2005) show that the increase (decrease) in premium that is due to an increase (decrease) in left-skewness (right-skewness) is proportional to this measure.[14]

As an individual measure of temperance, we use the measure due to Denuit and Eeckhoudt (2010):

$$t = -u^{iv}/u',$$

where again positive (negative) values indicate (in)temperance. [15]

[10] In order to aggregate the derivatives of the predicted utility function for further computation, for each derivative, we predict its value at 100 evenly spaced points in the interval from 0 to the highest outcome and build the mean.

[11] Positive values also correspond to aversion of mean-preserving spreads (Rothschild and Stiglitz, 1970), or an aversion to second degree risk in the terminology of stochastic dominance (Ekern, 1980).

[12] Positive values also correspond to downside risk aversion as defined by Menezes et al. (1980) or third-degree risk aversion (Ekern, 1980).

[13] Note that our measure is different from the well-known measure introduced by Kimball (1990) in order to be able to compare risk averse and risk seeking subjects: For a prudent individual, the Kimball measure $-u'''/u''$ might be positive or negative depending on her risk attitudes.

[14] Note the sign error in their derivation of this result.

[15] Positive values also correspond to an aversion to fourth-degree risk.

Denuit and Eeckhoudt (2010) show that this measure is proportional to the increase in premium due to an increase in fourth-order risk and thus the measure $-u^{iv}/u'$ is a measure for temperance and dislike of kurtosis alike.

2.3 Questionnaire on Field Behavior

To the best of our knowledge, the only two papers connecting higher order risk preferences and field behavior are Noussair et al. (2014) and Schneider et al. (2019). Yet, their papers exclusively focus on the financial domain, and additionally lack a measure of patience and intensity of higher order risk preferences (the first study) or consider only saving behavior (the latter study). Besides financial decision making, many real-world consequences of higher order risk preferences have been established theoretically, especially in, but not limited to, the health domain or with respect to sustainable or eco-friendly behavior. However, to the best of our knowledge, none of these has been studied empirically with field data.

We have collected data on field behavior regarding financial decision making, the health domain, pro-environmental behavior, prevention effort in a more general sense, sensitivity of optimal choice to risk and preference for competitive income via an extensive survey (see Appendix B for all questions with answer possibilities). Additionally, we gathered information on general risk taking via standard survey questions on risk and time preferences and with the DOSPERT questionnaire (Weber et al., 2002), which we adapted for our sample. For most of the questionnaire, we obtained data for all 658 students. Some questions, however, were only asked to older students, in accordance with our agreements with participating schools and to get meaningful results (see the respective column for a question in Appendix B).

We build indices for the different domains of behavior, involving between three (sensitivity of optimal choice to risk) and 25 questions (adapted DOSPERT catalogue). Importantly, all indices contain all information that we have obtained for an individual in the respective area; for example the index capturing environmentally friendly behavior is composed of all items that we have included in the questionnaire targeting at this kind of behavior. More details on the single items in the respective indices are reported below. To aggregate results for a varying number of questions across age cohorts with possibly also differing meaning and variation, we first build indices per age cohort using weights from a principal component analysis (PCA), which we then center and standardize for final aggregation.[16] Therefore, all of our

[16] One index, the preference for competitive income index, is not aggregated using PCA. As it consists of only 4 binary questions, the support of the index consists of only 16 elements. Here, using weights from a PCA per age cohort would shift the support for every age cohort marginally, thus

dependent variables are centered, standardized and continuous and we thus use least squares regression.

Some of our indices might be complemented with e.g., questions from the (adapted) DOSPERT questionnaire: For example, the question "Have you ever used an entire week's pocket money for a bet?", which is part of the DOSPERT questionnaire, could be interpreted as a preference for risky investment, although not part of the set of items that we intentionally included in the questionnaire to ask for that specific behavior. Using items like these, for some indices, we can build a second index, consisting of all items from the original index, and aditionally all other items that might be relevant for the behavior under study. We always perform our analysis for both indices: the one consisting of items that were included in the questionnaire with the respective behavior in mind, and the one additionally including further possibly related items. In the main text, we report results from regressions of the index consisting the maximal amount of information to illustrate the robustness of our results: Adding some additional items that target the behavior under study to the corresponding index yields qualitatively the same results (see Appendix A). Below, we provide more information on the items used in a specific index.

General Risk Taking and Patience Behavior

Consistency of risk elicitation methods across tasks and survey questions has gained considerable attention, probably partly due to recurrently less encouraging results (Pedroni et al., 2017; Crosetto and Filippin, 2015; Deck et al., 2013). As we use a novel, not yet established elicitation method for risk, we first study how well the method and our implementation perform in predicting standard survey questions. Specifically, we use the by now standard question, first included in the German SOEP (Wagner et al., 2007), on willingness to take risk in general (Dohmen et al., 2011; Falk et al., 2018). Moreover, we use a subsample of the Domain Specific Risk-Taking (DOSPERT) questionnaire (Weber et al., 2002), built to assess risk in the domains financial decisions, health/safety, recreational, ethical and social decisions. We use a subset of these questions to account for our underage sample: some questions (e.g., having an affair with a married person, cheating on one's tax return or betting a day's income at the horse races) would induce low variation and seem inappropriate to ask to adolescents at the age of 10. Moreover, we adapted some questions (e.g., using a helmet when riding a bike instead of riding a motor bike) and added some more that might be relevant to our sample (e.g., having a date with someone that

introducing noise in the measure when aggregating the indices rather than precision. Therefore, we compute z-Scores for every item and add them.

they have met via the internet/social media/apps). The questions we have used from the DOSPERT questionnaire and our adapted DOSPERT questionnaire are printed in Appendix B.2 in section DOS, together with the question on willingness to take risk (section SQ).

To check whether our measure of impatience actually measures impatience, we also added the standard time survey question from the SOEP/global preferences survey (e.g., Wagner et al., 2007; Falk et al., 2018) and three general questions on patience and self-control (e.g., "I always do my homework as early as possible."), see sections SQ and GIS of the questionnaire in Appendix B.2.

Financial Decision Making

A positive third derivative of the utility function was linked to financial decision making, in particular precautionary saving, by Leland (1968) long before Kimball (1990) coined the term prudence and introduced the now well-known measure for its strength. Temperance is theoretically related with less risky investment as reaction to greater background risk (Kimball, 1992; Gollier and Pratt, 1996). Lastly, the demand for insurance in presence of background risk has been connected to prudence and temperance at least since Eeckhoudt and Kimball (1992), while the relation with risk aversion is usually already discussed in basic economics text books. Many studies have tried to investigate e.g., precautionary saving without controlling for risk preferences and presented mixed results; Fuchs-Schündeln and Schündeln (2005) provide compelling evidence that this might introduce a considerable bias. Noussair et al. (2014) were the first to examine the mentioned relationships with experimental risk measures, although they cannot control for impatience. They explore higher order risk preferences and financial decision making among the general population in the Netherlands, and base their risk measures on the elicitation method by Eeckhoudt and Schlesinger (2006). While they find support for the relation between saving and prudence, and less risky investment and temperance, they report that there is no robust connection between insurance and their risk measures.

To study whether decision making in our sample follows the same pattern, we include questions on saving, risky investment and insurance coverage: To collect field behavior on saving, we ask students for example what fraction of a gifted 50 Euro bill they would save, or how they handle their pocket money, where possible answers range from "I spend everything quickly" to "I save everything". Preference for risky investment is assessed with questions like "Do you have stocks?", "Do you think you will buy some stocks in the future" or also "Have you ever used money that was originally intended for something else at a subsequent date (e.g. for holidays

or a present), for a bet or invested it in stocks"? To address insurance demand, we ask for the possession of a bike or phone insurance, and whether students bought it themselves. See sections SC, Inv, and Ins in Appendix B.2 for the full list of items included in the questionnaire to target the respective behavior.

Health Related Behavior

Prudence has been linked to the health domain e.g., by studying multivariate risk taking (e.g., Eeckhoudt et al., 2007; Attema et al., 2019), prevention effort[17] (e.g., Courbage and Rey, 2006), the demand for medical care (e.g., Dardanoni and Wagstaff, 1990), or medical treatment decisions (e.g., Bleichrodt et al., 2003; Krieger and Mayrhofer, 2012). Yet, we are not aware of any study connecting higher order risk preferences with behavior that may risk one's health status, such as smoking, drinking or also excessive use of smartphones. This is surprising given the interpretation of prudence as downside risk aversion (Menezes et al., 1980) and aversion to left-skewness (Ebert, 2012; Modica and Scarsini, 2005).

For example, as smoking increases the probability of cardiovascular diseases, it may be seen as a typical example of a downside risk, or where the distribution of risk is left-skewed: There may be a relatively small positive outcome with a high probability resulting from enjoyment of smoking, which, however, is combined with a low-probability but high-impact negative outcome due to a cardiovascular disease.

To test the importance of higher order risk preferences for behavior putting one's health status at risk, we include several questions in our questionnaire to capture this behavior. Notably, we include a novel, self-constructed scale consisting of 6 questions to capture smartphone and social media addiction, as this kind of addictive behavior has gained tremendous importance over the last decade. Yet, to our knowledge, it has been ignored in the risk taking literature. Behavior that generally is a risk to health is measured e.g. by the BMI or by physical inactivity. Abusive smarthpone usage is assessed with questions such as "When I feel bad or when I face a difficult task, I distract myself with my smartphone.", "I feel uncomfortable (e.g. nervous or fretful or disquiet or a bit sad) when I cannot use my smartphone for a considerable time, because of an empty battery, no signal, or because my smartphone was taken away.", or "I often check my phone while eating with my family to see if there are any news." In addtion to abusive smartphone usage, our addictive behavior index comprises smoking and drinking behavior, which is assessed by the respective

[17] See also the section on prevention, where some of our questions target prevention in the health domain.

frequency. See section H in Appendix B.2 for the full list of items addressing health-related behavior.

General Prevention and Environmentally Friendly Behavior

Prevention in the sense of self-protection is understood as effort that lowers the probability of occurrence of an adverse event (Ehrlich and Becker, 1972). It has been theoretically connected to prudence (Eeckhoudt and Gollier, 2005; Menegatti, 2009). In one-period models, the preventative effort and the potential loss are contemporaneous. Contrary to intuition, in this setting, prudence has a negative impact on the optimal level of prevention, since the prudent agent prefers to accumulate wealth to face future risks (Eeckhoudt and Gollier, 2005). In two-period models, the preventative effort precedes the potential loss. In that setting, the relation between prudence and the optimal level of prevention is positive (Menegatti, 2009). In the abstract setting of a laboratory experiment, Krieger and Mayrhofer (2016) find empirical support for the predictions of the one-period models in the literature: Prudent subjects invest significantly less money than nonprudent subjects to reduce the probability of a loss. We are unaware of any study empirically investigating prevention in a two-period framework.

Global Warming and climate change are among the adverse effects discussed in the literature on prevention. Yet, Bramoullé and Treich (2009) specifically address this problem outside the prevention context as a global commons problem under uncertainty, and relate it to risk preferences. In their model, an increase in risk aversion leads to a lower level of emission and so does an increase in risk for a risk-averse and prudent-neutral agent. The effect of prudence, however, is negative.[18]

For the purpose of studying real world preventative and pro-environmental efforts and their relation with prudence, we include several questions in our questionnaire. We distinguish between actions preventing an unwanted event that might arguably happen on the same day (one-period model) and those that aim to prevent events happening in the more distant future (two-period model). For example, agreement to the statement "Since I think of packing something to eat and drink during longer journeys by bus, train or car, I am not hungry or thirsty in such situations." indicates effort provision in order to prevent hunger, an event that is likely to happen on the same day. Contrarily, agreement to the statement "Since I do not know yet what I would like to become later, I try to get good grades to keep all possibilities open to me." indicates effort provision in order to prevent a missed chance to become,

[18] A prudent agent may still reduce her emission, if the risk-aversion effect dominates, which is, e.g., the case for an increase in "catastrophic risk". They define an increase in catastrophic risk as a decrease in probability of an increasingly bad event.

e.g., a medical doctor or a lawyer; an event that will happen only with considerable time delay in the future. Additionally, we add questions on environmentally-friendly behavior. For example, we ask whether students separate their waste, use reusable coffee cups and bottles, use reusable bags for shopping, take their bike when possible, or turn down the heating if leaving the room. See sections P and E in Appendix B.2 for the full list of items included in the questionnaire to target prevention effort and environmentally-friendly behavior.

Preference for Competitive Payment

In the context of the German reunification "experiment", Fuchs-Schündeln and Schündeln (2005) discuss self-selection of risk averse individuals into low-risk occupations and its importance for precautionary savings. They compare the difference in precautionary savings between civil servants and the remaining population in the East of Germany with this difference in the West of Germany. From a larger difference in the East of Germany, where all occupations were basically risk free, they infer that risk averse individuals self-select into jobs as civil cervants in the West of Germany. They explicitly mention that their argument builds on the assumption that – at least on average – risk aversion equals prudence.

As we have separate, direct measures of these preferences, we include two questions on occupational choice in our questionnaire ("Would you like to be self-employed (a civil servant)?") and two hypothetical questions to ask whether our participants would prefer fixed or tournament payment to a piece-rate payment for the cognitive ability tasks. See section C in Appendix B.2 for the exact wording of the items used.

Sensitivity of Optimal Choice To Risk

In his seminal paper on the "theory of the optimal response of decision variables to risk (which includes precautionary saving as a subcase)", Kimball *defines* prudence as the "sensitivity of the optimal choice of a decision variable to risk".

Using two questions (plus an additional question for the 12-th graders), we test if we find support for prudence in this more general sense as a measure of the sensitivity of optimal choice to risk. Specifically, the decision variable in our setting is time investment; either, to be optimally prepared for a class test, or to be on time for a meeting or handing in an assignment. We ask for the additional time investment if risk is introduced in the form of traffic lights, uncertainty about the scope of the class test, or incidents that may introduce a delay. See section O in Appendix B.2 for the exact wording of the items used.

Table 2: Influence Factors of (Higher Order) Risk Preferences

	Risk Aversion		Prudence		Temperance	
Age (in years)	−0.007	(0.019)	−0.017	(0.018)	−0.001	(0.018)
Cognitive Ability (comb.)	−0.142**	(0.049)	−0.053	(0.064)	−0.114**	(0.048)
Female	0.229**	(0.080)	0.213**	(0.095)	0.143**	(0.066)
Impatience	−0.726**	(0.257)	−0.511	(0.296)	−0.524	(0.278)
Other Factors	10		10		10	
School controls	yes		yes		yes	
R^2	0.08		0.07		0.05	
Observations	582		582		582	

Notes: Positive coefficients imply increasing risk aversion, prudence and temperance. Robust standard errors clustered at the session level in parentheses. Cognitive ability scores are standardized, such that above average scores are positive. Other possible influence factors controlled for are relative math grade, relative German grade (where positive variables imply above average performance relative to the grade), the amount of pocket money per week, the number of siblings, the religion, migration background, an indicator for mother and father having A-levels each, parents' occupation as well as relative BMI; see Tables A-1, A-2 and A-3 for detailed regressions results and Tables A-4, A-5, A-6 A-7 for regression results including participants that reported problems with handling their tablets during our study. P-values for factors omitted in this table and for impatience are corrected for multiple testing using the Romano-Wolf procedure (Romano and Wolf, 2016, 2005a,b).

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

3 Results on Higher Order Risk Preferences and Discussion

3.1 Results

As we have devoted priority to the elicitation of cognitive abilities, in the main text, we report results only from those participants that never reported any problem in handling their tablet.[19] Including these participants in the analysis might result in imprecise coefficients for cognitive abilities, if these were measured with noise. However, as Tables A-4 to A-7 in the Appendix show, results are robust to using the full sample for analysis, suggesting that problems that have been reported did not occur during the cognitive ability tasks, or did not affect their results considerably. Since all other parts of the experiment and the questionnaire were not timed, possible problems could be solved by our assistants without affecting results.

[19] In total, 54 subjects reported a problem in handling their tablet at any time during participation in our study. We alerted students to report any issue to make sure that entered decisions and answers were correct. The most reported problem was, for example, a non-responding touch-screen due to hardware problems with our tablets. In this case, a team of up to 8 helpers spread accross the room was prepared to replace their tablet within less than ten seconds.

Risk Aversion We find significant risk aversion in our sample. We estimate a mean (median) Arrow-Pratt coefficient of Risk Aversion, expressed in standard deviations, of $r = .46$ (.35), with 0 indicating risk neutrality ($p < 0.0001$, Wilcoxon signed-rank test,[20] testing whether r is different from 0). For 71% of our sample, we estimate a positive Arrow-Pratt coefficient, implying risk aversion. A regression including a measure for cognitive abilities and demographic background variables is shown in Table 2. The regression shows a gender and a cognitive ability effect: Girls are significantly more risk averse than boys. Individuals with higher cognitive abilities are significantly less risk averse. Age is unrelated with risk aversion, once we control for cognitive abilities. One additional influence factor, impatience, is significantly related with a lower degree of risk aversion. All other independent variables are not significant. Among them are relative math grade, relative German grade (where positive variables imply above average performance relative to the grade), the amount of pocket money per week, the number of siblings, the religion, migration background, an indicator for mother and father having A-levels each, parents' occupation as well as relative BMI; see Table A-1. Directional hypotheses for the relation with risk aversion are specified in our pre-analysis plan for age, cognitive ability as well as for gender. For all other possible influence factors, we correct p-values for testing their relation with the three different outcomes investigated in Table 2.

Prudence On the aggregate level, we find prudence in our sample. The mean (median) estimate of the Crainich-Eeckhoudt measure expressed in standard deviations is $p = .56$ (.22), where positive (negative) values indicate (im)prudence ($p < 0.0001$, Wilcoxon signed-rank test, testing whether p is different from 0). For 68% of our sample, we estimate a positive Crainich-Eeckhoudt measure of prudence, implying prudence. The regression including age, cognitive abilities, and gender shown in Table 2 only reveals a gender effect: Girls are significantly more prudent than boys. Neither cognitive abilities nor age are significantly related with prudence. All other dependent variables (the same as for risk aversion) are not significant once p-values are corrected for multiple testing; see Table A-2. As for risk aversion, this is done for all variables omitted in Table 2 and impatience, as for this subset of variables, no directional hypothesis with respect to prudence was specified in the pre-analysis plan. When using the full sample for analysis, also impatience and the weekly amount of pocket money are significant influence factors; see Table A-6.

[20] All tests reported in this paper are two-sided.

Table 3: Correlation Between (Higher Order) Risk Preferences

	Full Sample			Risk Seeking		Risk Averse	
	Risk Aversion	Prudence	Temperance	Risk Aversion	Prudence	Risk Aversion	Prudence
Prudence	0.559***			-0.876***		0.928***	
Temperance	0.867***	0.652***		0.846***	-0.878***	0.917***	0.954***
Impatience	-0.133***	-0.0926**	-0.112***				
Observations	658			198		460	

Notes: Pearson correlation coefficients reported; *** denotes significance at the 1 percent level.

Temperance In the aggregate, our sample exhibits temperance. For the Denuit-Eeckhoudt measure of temperance, our mean (median) estimate is $t = .3$ (.02), again expressed in standard deviations ($p < 0.0001$, Wilcoxon signed-rank test, testing whether t is different from 0). Derived from a positive Denuit-Eeckhoudt measure, 58% of our sample can be classified as temperant. The regression of temperance on demographic background variables reported in Table 2 shows the same pattern as the regression of risk aversion: Girls are more temperant than boys, and pupils with a higher value of our cognitive ability measure are less temperant. There is neither an age effect, nor is any other influence factor significant, once we correct p-values for multiple testing as done for risk aversion and prudence; see Table A-3. As for prudence, when using the full sample for analysis, also impatience is a significant influence factor; see Table A-7.

Relation between risk aversion, prudence and temperance The measures of risk aversion, prudence and temperance are significantly correlated in our sample ($p < 0.0001$ for all pairwise correlations). The correlation between risk aversion and temperance is the highest ($\rho = .87$). The correlations between prudence and risk aversion ($\rho = .56$) and prudence and temperance ($\rho = .65$) are still large, but a magnitude weaker.

Dividing the sample in risk seekers ($r < 0$) and risk averters ($r > 0$) reveals that the sign of the correlation between risk aversion and prudence changes: In the aggregate, the degree of prudence increases, as the degree of risk aversion and temperance decreases (increases) for the risk seekers (risk averters); note that for risk seekers, the coefficient of risk aversion is negative. The relation between risk aversion and temperance, however, is positive independent of risk aversion.

A principal component analysis reveals that 96 percent of the variation can be explained by only two components. Risk aversion and temperance have the highest and roughly equal loadings on the first component. Their loadings on the second

component are negative, whereas the loading of prudence is the highest on the second component (also in absolute terms).

Finally, also our measure of time preference is significantly correlated with the (higher order) risk measures ($p < 0.05$ for all pairwise correlations) and the correlation between risk aversion and impatience is the highest ($\rho = .13$).

3.2 Discussion

Overall, we find significant risk averse, prudent, and temperant behavior in our sample of children and adolescents. This is in line with earlier studies on risk aversion or prudence with adolescents (e.g., Sutter et al., 2019; Heinrich and Shachat, 2018). Among adults, prudence is wide-spread and has been documented in a number of studies (see, e.g., the review by Trautmann and van de Kuilen, 2018), where our finding – 68% subjects exhibiting prudent behavior – ranges roughly in the mean of the shares of prudent behavior reported, and is comparable to results e.g., by Tarazona-Gomez (2004) and Deck and Schlesinger (2010). For temperance, however, no study has investigated the prevalence among adolescents before, and among adults, results have been mixed. Most studies document temperance, although less prevalent than prudence (Trautmann and van de Kuilen, 2018), which is also what we observe.

The correlations between (higher order) risk preferences we find are higher than the ones reported by Noussair et al. (2014), Ebert and Wiesen (2014) and Schneider et al. (2019).[21] This is because we find a higher share of risk averters than Schneider et al. (2019) in their sample from Bogotá and because our measures are continuous, thus allowing for a higher precision. Notably, we also find support for the existence of mixed risk averters (Crainich et al., 2013) already among adolescents, which is not yet well documented among adults, but in line with findings by Deck and Schlesinger (2014) and Ebert and Wiesen (2014).

With respect to demographic correlates, we find a gender effect for all risk attitudes, but no age effect neither for risk aversion, prudence nor temperance. While also previous studies among adolescents report no age effect on risk aversion and females exhibiting more risk aversion (Sutter et al., 2019), the finding with respect to age and prudence as well as prudence and gender is in contrast with the only other study on prudence with adolescents (N = 289) we are aware of (Heinrich and Shachat, 2018). Yet, Heinrich and Shachat (2018) only use grade as a proxy for age, and they rely on binary comparisons of four-outcome lotteries without controlling

[21] The first two studies report rank correlations, whereas we, building on continuous measures, report Pearson correlation coefficients. However, also rank correlations between our measures are a magnitude higher and between .43 and .52, with the former being the correlation between risk aversion and prudence and the latter between risk aversion and temperance.

for an *absolute* measure of cognitive abilities with a sample of Chinese students aged 8 to 17 years. As their measure of cognitive ability, the math grade, which is *relative* to the age cohort, is a significant predictor of more prudent choices, this might hint to the fact that increasing cognitive abilities rather than age might drive results. However, as Sutter et al. (2019) note, notable changes in risk preferences might occur before the age of 10, and as Heinrich and Shachat (2018) include one grade with pupils below that age, they might observe significant effects due to this grade, although they include a dummy for this grade. Among adults, Noussair et al. (2014) find no age effect. Regarding the observation that females exhibit more risk averse, prudent and temperant behavior, our findings are in line with Ebert and Wiesen (2014). Noussair et al. (2014) document females exhibiting more risk aversion and temperance, but not prudence.

We have devoted special care to the relation between cognitive abilities and higher order risk preferences, as the relation has been of interest recently (Dohmen et al., 2010, 2018; Andersson et al., 2016) and as previous literature has documented a positive relation between prudence and cognitive abilities (Noussair et al., 2014; Breaban et al., 2016), but no relation between temperance and cognitive abilities (Noussair et al., 2014). Notably, Noussair et al. (2014) also fail in finding a significant relation between risk aversion and cognitive ability in their (student) sample (N=109), although a negative relationship is, in larger studies and when cognition measures "accentuate numeracy", well documented (see the review on experimental measures and cognitive abilities in Dohmen et al., 2018). Among adolescents, the relationship between risk aversion and cognitive abilities is unclear, and either no correlation has been observed, or a tendency towards risk-neutrality with increasing cognitive abilities (Sutter et al., 2019). In our sample, we also observe a tendency towards risk-neutrality with increasing cognitive abilities. Yet, and in contrast to previous results, prudence and cognitive abilities are unrelated in our sample, while for temperance, we observe the same pattern as for risk aversion, namely a tendency towards risk-neutrality. This differing finding might be in part due to reduced complexity in our elicitation method in combination with the way previous studies measure higher order risk preferences. Both, Noussair et al. (2014) and Breaban et al. (2016) measure prudence (as well as risk aversion and temperance, if applicable) by the number of choices consistent with the respective trait. Thus, strictly speaking, they find correlations between consistent behavior and cognitive abilities; a problematic issue that has been recognized in the literature on the relation between cognitive abilities and risk preferences in general (Dohmen et al., 2018; Andersson et al., 2016). As in Noussair et al. (2014) the complexity of the risk aversion task is lowest, and the complexity of the the temperance task is highest, we should see

an increasing influence of cognitive abilities on consistency would every participant be willing to express a preference for risk aversion, prudence and temperance. This obviously is not the case, since prudence is more prevalent than temperance and risk aversion. Thus, a majority could be willing to choose the prudent option, but only those with high enough cognitive abilities might manage to do so consistently. For risk aversion and temperance, a certain share of participants might also choose the risk loving or intemperant option, despite possessing the necessary cognitive abilities to understand the task. This would explain a positive relation for prudence, and no relation for temperance in earlier studies using count measures. Since our elicitation task is considerably easier, and since our measures are not measuring consistency, we should not expect a similar pattern. Instead, since our PCA analysis reveals that risk aversion and temperance share systematic variation, it is not surprising that we observe a similar result for risk aversion and temperance.

4 Experimental Measures of Higher Order Risk Preferences and Field Behavior

In this section, we present results on the relationship between higher order risk preferences and field behavior and discuss our findings. Motivating theory and hypotheses together with an overview over the items used to assess a specific area of behavior and how the single items are aggregated are summarized in Section 2.3. For the exact wording and the full list of items used in our questionnaire, see Appendix B.2.

For comparison reasons, we standardize our measures of risk and time preferences. This is, coefficients report the effect of a one standard deviation increase in these measures. Moreover, as reported in Table 3, our measures of risk and time preferences are correlated. Therefore, we orthogonalize these measures, i.e., we take one measure, usually the most important one according to theory for the respective index, and predict the others with this measure and the respective remaining ones.[22] We then take the difference between prediction of a measure and its true value to receive individual residuals for every measure, except for the most important one. In the regressions, we include the most important measure and the residuals of the others resulting from predictions using the remaining measures. Importantly, the change from non-orthogonalized to orthogonalized measures does not change the

[22] If theory does not suggest one measure as the most important one, we take prudence, as it has, on average, the lowest correlation with the other two measures, leaving a larger share of variation in the data.

regression coefficient as long as all measures are included, but decreases collinearity, as it takes out information that is already in the data.

Strictly speaking, our measures of (higher order) risk preferences are estimates and thus involve some degree of error. A way to deal with this is multiple imputation (e.g., Rubin, 1996; Horton and Lipsitz, 2001).[23] Originally, this procedure was developed for dealing with missing values, where – roughly speaking – the missing values are repeatedly replaced by any means of imputation using the remaining data in different combinations. For every imputation, the regression is run once. Then, from all these regression results on partly imputed data, accurate computation of standard errors is possible, accounting for the degree of uncertainty in the data. In our case, thus, instead of running each regression once, we run every regression several times, where the possibly noisily estimated regressors are repeatedly exchanged. We do so by producing 100 measures of (higher order) risk preferences for every individual, where, for estimating half of these measures, we delete one elicited utility point before estimating the utility curve. As our results are robust to using the multiple imputation approach described here, we report results from least squares regression in the main text.

4.1 General Risk Taking and Patience Behavior

Results on general risk taking and patience behavior ar summarized in Table 4. Our experimentally elicited Arrow-Pratt measure of risk aversion significantly predicts the willingness to take risk as elicited via the survey question at the 0.1% level. Notably, also our experimental Crainich-Eeckhoudt prudence measure and the experimental Denuit-Eeckhoudt temperance measure both significantly predict willingness to take risk; the former even at the same significance level. Our measures of prudence and risk aversion also significantly predict risk taking behavior as indicated by our adapted DOSPERT scale.

Interestingly, while the coefficient of risk aversion indicates that a one standard deviation lower risk aversion is associated with a one degree higher willingness to take risk on a scale from 0 to 10, the coefficient of prudence is about half as large and the coefficient of temperance about a quarter as large. This points to the fact that general risk taking behavior, as we understand it in everyday language, might only be insufficiently captured by risk aversion alone.

The results regarding patience show the hypothesized relations between single item survey question, a general patience scale and our experimental measure of

[23] We thank Glenn Harrison for suggesting this.

Table 4: (Higher Order) Risk Preferences and General Survey Questions/Questionnaires

	Risk tolerance (Survey)		DOSPERT (adapted)		Patience (Survey)		General Patience (all)	
				OLS regression results				
Risk aversion (AP)	-0.996****	(0.208)	-0.265***	(0.070)	0.074	(0.203)	0.086	(0.084)
Prudence	-0.488****	(0.087)	-0.087*	(0.047)	-0.033	(0.074)	0.117**	(0.046)
Temperance	-0.250*	(0.121)	-0.055	(0.046)	0.097	(0.118)	0.096	(0.055)
Impatience	0.088	(0.098)	0.168***	(0.046)	-0.521****	(0.087)	-0.144***	(0.044)
R^2	0.092		0.055		0.059		0.041	
Observations	653		658		653		658	
				Raw Pearson correlation coefficients				
Risk Aversion	-0.270****		-0.143****		0.022		0.135****	
Prudence	-0.202****		-0.087**		-0.017		0.116***	
Temperance	-0.192****		-0.089**		0.015		0.131****	
Impatience	0.075*		0.186****		-0.240****		-0.161****	
Risk tolerance (Survey)			0.265****					
Patience (Survey)							0.148****	

Notes: Positive coefficients imply increasing risk tolerance, increasing general risk taking behavior, and increasing patience in the upper panel ("OLS regression results") and positive correlations in the lower panel ("Raw Pearson correlation coefficients"). Experimental risk and time measures are expressed in standard deviations in the upper panel. Outcome indices are formed using PCA weights and are standard normalized (single item survey questions are included without transformation). Questions included in these indices are listed under sections SQ, DOS and GIS in the questionnaire in Online Appendix B.2. See Tables A-8, A-9 and A-10 for additional regression results. Robust standard errors clustered at the session level in parentheses.
****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

Table 5: (Higher Order) Risk Preferences and Financial Decision Making

	Saving (w./ Debt)		Risky Investment (all)		Fin. Insurance	
Risk aversion (AP)	0.093	(0.115)	-0.172**	(0.068)	-0.064	(0.073)
Prudence	0.062*	(0.032)	-0.100*	(0.050)	-0.063**	(0.025)
Temperance	0.110**	(0.049)	-0.054**	(0.022)	-0.009	(0.070)
Impatience	-0.222***	(0.036)	0.026	(0.029)	0.021	(0.041)
R^2	0.061		0.017		0.0054	
Observations	658		658		658	

Notes: Positive coefficients imply increasing likelihood to save, invest in risky assets or possess an insurance. Risk and time measures are expressed in standard deviations. Outcome indices are formed using PCA weights and are standard normalized. Questions included in these indices are listed under sections SC, Inv, and Ins in the questionnaire in Online Appendix B.2. See Tables A-11, A-13 and A-14 for additional regression results. Robust standard errors clustered at the session level in parentheses.
****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

impatience, all at a significance level of at least 1%. Interestingly, also prudence is positively related with our general patience scale.

Via the use of Pearson correlation coefficients and the meta study METARET (Crosetto, 2019), we can compare our method with alternatives. The interactive web interface of METARET makes it possible to compare different risk elicitation tasks with the SOEP question; our results with respect to this question are printed in the column "Risk tolerance (Survey)". Pearson coefficients range, on average, from .12 (N = 3463) for the Bomb Risk Elicitation Task (BRET) to -.04 (N = 983) for the Certainty Equivalent price list, when using raw choices. When estimating Arrow-Pratt risk aversion coefficients, no correlation coefficient exceeds .1. Interestingly, the probably most widely used Holt and Laury method performs, despite (or because?) its complexity, worse in this aspect than the BRET, with a correlation of .1 (N = 7552). Our method has a more than twice as large coefficient – namely .27 – than the pooled Pearson correlation of the best method surveyed by the METARET study.

As the correlation between SOEP question and the adapted DOSPERT catalogue is only .27 (compared to .43 in the pooled data of the METARET study), we conclude that risk taking among adolescents is only vaguely measured with the DOSPERT, even when adapting it. Still, the Pearson correlation coefficient between our Arrow-Pratt measure of risk aversion and the adapted DOSPERT is on the same level as the second highest coefficient reported in the METARET study.

Table 6: (Higher Order) Risk Preferences and Health-Related Behavior

	Unhealthy Behavior (main ext.)		Unhealthy Behavior (main)		Addictive Behavior		Smartphone Addiction	
Risk aversion (AP)	0.019	(0.093)	0.030	(0.086)	0.015	(0.086)	0.001	(0.087)
Prudence	-0.138***	(0.041)	-0.138***	(0.036)	-0.145***	(0.035)	-0.154****	(0.034)
Temperance	-0.019	(0.060)	-0.023	(0.065)	-0.016	(0.062)	0.001	(0.055)
Impatience	0.172***	(0.041)	0.161***	(0.039)	0.163***	(0.040)	0.154***	(0.038)
R^2	0.042		0.039		0.041		0.040	
Observations	561		561		561		561	

Notes: Positive coefficients imply increasing engagement in unhealthy or addictive behavior. Risk and time measures are expressed in standard deviations. Outcome indices are formed using PCA weights and are standard normalized. Questions included in these indices are listed under section H in the questionnaire in Online Appendix B.2. See Tables A-15, A-16, A-17 and A-18 for additional regressions results. Robust standard errors clustered at the session level in parentheses.
****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

4.2 Financial Decision Making

Results on financial decision making are reported in Table 5. Already for adolescents and as predicted by theory, prudence matters for (net) saving and temperance is negatively related to risky investment, even when controlling for our, as it appears, important measure of time preference. Financial insurance demand is negatively related with prudence, and unrelated with risk aversion. Moreover, temperance is significantly related to saving, as is impatience, and also risk aversion and prudence are negatively related with risky investment.

Although these results are in line with theory and previous findings, they should be interpreted with care, since young adolescents or adolescents in general may only have limited exposure to and experience in certain domains of financial decision making – among them probably insurance and investment. Thus, for example our questions on insurance demand asking about possession of a bike or mobile phone insurance, or our questions on possession or plans to acquire stocks might not be particularly meaningful to our sample. In this light, it might not be surprising that patience and temperance seem to be more important for saving than prudence, or that risk aversion and temperance seem to be more important for risky investment than temperance or also that the results regarding investment and insurance are not robust to inclusion of gender, age and financial control variables. However, in light of the mentioned limitations, it might be even more surprising that we find the predicted relations.

4.3 Health-Related Behavior

Results with respect to health-related behavior are summarized in Table 6. Prudence and patience are both positively correlated with healthy behavior. This is

Table 7: (Higher Order) Risk Preferences and Prevention and Environmentally-Friendly Behavior

	General Prevention (Short Term)		General Prevention (Long Term)		Eco-friendly behavior	
Risk aversion (AP)	0.178**	(0.079)	0.229**	(0.088)	0.188**	(0.075)
Prudence	-0.111**	(0.039)	0.033	(0.053)	0.031	(0.037)
Temperance	0.031	(0.039)	0.127**	(0.055)	0.048	(0.052)
Impatience	0.073**	(0.026)	-0.072*	(0.037)	-0.140****	(0.041)
R^2	0.026		0.031		0.034	
Observations	658		658		658	

Notes: Positive coefficients imply increasing prevention effort or increasing eco-friendly behavior. Risk and time measures are expressed in standard deviations. Outcome indices are formed using PCA weights and are standard normalized. Questions included in these indices are listed under sections P and E in the questionnaire in Online Appendix B.2. See Tables A-19, A-20 and A-21 for additional regressions results. Robust standard errors clustered at the session level in parentheses. ****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

independent of including all questions that may be seen as health related, including questions from the DOSPERT (first column of Table 6), or including just the ones that we have asked for this purpose (second column of Table 6). The results are mainly driven by addictive behavior (column three in Table 6), which in turn mainly consists of questions addressing addictive usage of social media and smartphones (last column, Table 6). This finding is robust to controlling for age and gender, amongst others; see Tables A-15 to A-18 for details. Notably, neither risk nor temperance are predictive for this kind of behavior.

4.4 General Prevention and Environmentally-Friendly Behavior

Genera Prevention and Environmentally-Friendly Behavior are summarized in Table 7. Risk aversion is positively correlated with pro-environmental and prevention effort, irrespectively of the period in which the possible adverse event might happen. The relation with prudence, however, depends on the timing, as predicted by theory. We can replicate the results by Krieger and Mayrhofer (2016) and find support for the prediction of the one-period model (Eeckhoudt and Gollier, 2005): For an adverse event that might happen in the same period, prudence is negatively correlated with prevention effort. For an adverse event that is separated from the preventative effort by some time delay, the coefficient of prudence is positive, but not significant. This is also the case for eco-friendly behavior, which might be seen as just a special case of a two-period prevention setting. Interestingly, temperance predicts long-term preventative effort, i.e., when effort precedes its effect. This is in line with our measure of temperance being interpreted as a measure for kurtosis

Table 8: (Higher Order) Risk Preferences, Preference for Competitive Income and Sensitivity to Optimal Choice

	Pref. for Comp. Income		Sensitivity of Optimal Choice	
Risk aversion (AP)	-0.092***	(0.023)	-0.033	(0.048)
Prudence	0.053*	(0.026)	0.043	(0.046)
Temperance	0.053	(0.049)	0.167***	(0.052)
Impatience	-0.017	(0.028)	-0.009	(0.039)
R^2	0.036		0.018	
Observations	649		658	

Notes: Positive coefficients imply increasing preference for competitive income or sensitivity of optimal choice to risk. Risk and time measures are expressed in standard deviations. Outcome indices are formed by adding z-Scores (preference for competetive income) or using PCA weights (sensitivity to optimal choice) and are standard normalized. Questions included in these indices are listed under sections C and O in the questionnaire in Online Appendix B.2. See Tables A-22 and A-23 for additional regression results. Robust standard errors clustered at the session level in parentheses.
****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

aversion (Denuit and Eeckhoudt, 2010), i.e., aversion against adverse outcomes. Another interesting observation is that patience seems to have a similar relation with prevention as prudence: It is positive for the long-term prevention efforts including environmentally friendly behavior, but negative for short-term prevention efforts.

In summary, we find support for the one-period model of optimal prevention (Eeckhoudt and Gollier, 2005) suggesting a negative relationship between optimal prevention and prudence, but cannot significantly confirm predictions of the two-period model suggesting a positive relationship (Menegatti, 2009). We find support for the predictions of the model by Bramoullé and Treich (2009) with respect to risk aversion, namely that risk aversion is associated with more sustainable behavior, but not for their prediction with respect to prudence. Yet, we also don't finde evidence against it.

4.5 Preference for Competitive Payment

Results on preference for competitive payment are reported in Column 1 of Table 8. While risk aversion is negatively correlated with a preference for a competitive income, the coefficient on prudence has the opposite sign and is half as large as the coefficient on risk aversion. These results are robust to controlling for age and gender, among others (see Table A-22). Being female is associated with a lower preference for competitive income, independent of risk preferences, and the size of this association is comparable to an increase of more than three standard deviations in risk aversion.

If adolescents and adults have similar preferences, this result empirically supports the identification strategy by Fuchs-Schündeln and Schündeln (2005) – on average. On the individual level, however, the mechanisms at play seem to be somewhat more nuanced, as prudence is not equal to risk aversion (see Section 3), and as the opposing signs of prudence and risk aversion indicate.

4.6 Sensitivity of Optimal Choice To Risk

The relation between higher order risk preferences and sensitivity of optimal choice to risk is reported in Column 2 in Table 8. As predicted by theory, prudence is positively correlated with a higher sensitivity to optimal choice measured in the additional time investment due to risk in the decision situation, however, this relation is not significant. Instead, the coefficient of temperance is positive and significant, even when controlling for age and gender (see Table A-23). As the coefficient of temperance that we use is a measure of kurtosis aversion (Denuit and Eeckhoudt, 2010), this result might be in line with participants deciding rather based on heuristics than on proper optimization: The more they dislike adverse outcomes, the more they prepare to avoid these situations. It is, moreover, in line with such an interpretation of our finding regarding prevention effort, where the effort precedes the possible adverse event (see Table 7).

5 Conclusion

In this paper, we have analyzed how experimentally elicited measures of the (higher order) risk attitudes risk aversion, prudence and temperance as well as of time preference relate to field behavior concerning decisions with uncertain outcomes such as health-related behavior, prevention effort in order to decrease the likelihood that an unwanted event will occur, eco-friendly behavior, and financial decision making. We have run our experiment in four different schools in three different German federal states, with sixth, eighth, tenth and 12th grades, and a total sample of 658 students, between the ages of 10 and 21.

We have found clear evidence for risk aversion, prudence and temperance in the aggregate. These findings are in line with studies on adult populations (e.g., Noussair et al., 2014; Ebert and Wiesen, 2014; Deck and Schlesinger, 2014). We have found no significant age effects for any of our preferences. Sutter et al. (2019), reviewing the literature on risk preferences among children and adolescents, conclude that age effects in risk preferences might happen before the teenage years. This could also explain how Heinrich and Shachat (2018) report a positive correlation between

age and prudence with a sample of Chines students between 8 and 17 years old, in contrast to our result. Yet, among adults, no age effects neither for prudence nor temperance have been found (Noussair et al., 2014; Trautmann and van de Kuilen, 2018). We find females exhibiting more risk averse, more prudent and more temperant behavior, which has been reported with adult populations (Ebert and Wiesen, 2014) and is a common finding in the literature on adolescents and risk aversion (Sutter et al., 2019). Yet, other studies were unable to find a relation between gender and prudence (Noussair et al., 2014; Heinrich and Shachat, 2018; Deck and Schlesinger, 2014) and gender and temperance (Noussair et al., 2014; Deck and Schlesinger, 2014).

Unlike in previous studies, cognitive abilities and prudence (Noussair et al., 2014; Breaban et al., 2016) are unrelated in our sample, while cognitive abilities and temperance (Noussair et al., 2014) are negatively related. The negative correlation between risk aversion and cognitive abilities, however, is in line with a broad body of evidence with adolescents and adult populations (Sutter et al., 2019; Dohmen et al., 2018). We have explained that the results in previous studies on higher order risk preferences might be due to equating consistency with intensity. As the tasks get more complicated with every order of risk attitude, an increasingly positive coefficient between risk attitude and cognitive abilities should be expected if all traits were equally prevalent. Yet, prudence is more prevalent than temperance, and so an U-shaped evolution of cognitive ability effects might be observed, which is consistent with the results reported in these studies. Our task, in contrast, is considerably easier and the level of complexity is held constant. Therefore, we should not observe this pattern in our data. As our finding with respect to risk aversion and cognitive abilities is in line with a much broader evidence, and as temperance and risk aversion seem to be related concepts, we believe our results are plausible.

The most important findings of our paper concern the relationship of experimental measures and field behavior and the importance of prudence and temperance in relation to risk aversion with respect to explaining risk taking behavior. In general, the correlation coefficients between our measures and the single-item willingness to take risk question (Dohmen et al., 2011) exceed common values in the literature by far. Prudence seems to have a half as large (and temperance a quarter as large) influence on general risk taking compared to risk aversion, suggesting that risky behavior is only insufficiently captured by risk aversion alone.

In summary, risk aversion is negatively correlated with general willingness to take risk and risky investment, and positively related with prevention including eco-friendly behavior, and a preference for competitive income. Prudence is posi-

tively related with saving, and negatively related with general willingness to take risk, with unhealthy and addictive behavior, in particular our smartphone addiction scale, with risky investment, insurance demand, and prevention effort for unwanted events possibly happening without time delay. Temperance is positively related with saving and prevention effort for unwanted events possibly happening with some time delay as well as sensitivity of optimal choice to risk (which might capture the same behavior), and negatively related with general willingness to take risk, and with risky investment.

We have been able to provide support for predictions related with risk preferences of several models. The model by Bramoullé and Treich (2009), for example, suggesting that uncertainty might alleviate the commons problem, posits that risk aversion decreases pollution due to uncertainty. We find support for the claim that risk averters behave more eco-friendly. Moreover, we provide support for the theoretical predictions related with risky investment and temperance (Kimball, 1992; Gollier and Pratt, 1996) as well as with saving and prudence (Leland, 1968; Kimball, 1990). Lastly, our results with respect to prevention effort of a possibly contemporaneous unwanted event are in line with theory (Eeckhoudt and Gollier, 2005), while we find indication (but not significantly) for the prediction that the relation flips when the possible unwanted event follows the effort only with some time delay (Menegatti, 2009).

In summary, our results are in contrast with studies finding no or very little predictive power of risk preferences for field behavior (e.g., Sutter et al., 2013; Charness et al., 2019). We find a considerable quality of prediction for field behavior already for risk aversion. Our results demonstrate, however, that some behavior is only predicted by prudence, such as health-related behavior, whereas other behavior seems to depend on a combination of risk aversion, prudence, and, to a lesser extent, temperance. Thus, whether or not a certain behavior is related to risk attitudes depends on the nature of the risk, and the absence of a correlation with the attitude towards a symmetric gamble, which would be captured by classical risk aversion, does not necessarily rule out that individuals perceive a certain behavior as risky. It might just also be the case that prudence is the better predictor for that kind of behavior.

As imprudence does not seem to have important positive effects, our results suggest, together with the results on time preferences, that these measures could be used for an efficient identification of adolescents that might be prone to problematic health-related, and in particular, addictive behavior. This makes our results particularly important, given the age of our sample, and future research could build on this finding: Policy interventions for prevention of addictive behavior might still be

very successful at this age in general, and, due to the absence of any age effect for prudence, target interventions could start already at a very young age.

References

Abdellaoui, M., H. Bleichrodt, and C. Paraschiv (2007). Loss aversion under prospect theory: A parameter-free measurement. *Management Science 53*(10), 1659–1674.

Andersson, O., H. J. Holm, J.-R. Tyran, and E. Wengström (2016). Risk aversion relates to cognitive ability: Preferences or noise? *Journal of the European Economic Association 14*(5), 1129–1154.

Attema, A. E., O. l'Haridon, and G. van de Kuilen (2019). Measuring multivariate risk preferences in the health domain. *Journal of Health Economics 64*, 15–24.

Bleichrodt, H., D. Crainich, and L. Eeckhoudt (2003). The effect of comorbidities on treatment decisions. *Journal of Health Economics 22*(5), 805–820.

Bramoullé, Y. and N. Treich (2009). Can uncertainty alleviate the commons problem? *Journal of the European Economic Association 7*(5), 1042–1067.

Breaban, A., G. van de Kuilen, and C. N. Noussair (2016). Prudence, emotional state, personality, and cognitive ability. *Frontiers in Psychology 7*, 1688–1698.

Charness, G., C. Eckel, U. Gneezy, and A. Kajackaite (2018). Complexity in risk elicitation may affect the conclusions: A demonstration using gender differences. *Journal of Risk and Uncertainty 56*(1), 1–17.

Charness, G., T. Garcia, T. Offerman, and M. C. Villeval (2019). Do measures of risk attitude in the laboratory predict behavior under risk in and outside of the laboratory? Institute for the Study of Labor (IZA) Discussion Paper 12395.

Cheever, N. A., L. D. Rosen, L. M. Carrier, and A. Chavez (2014, aug). Out of sight is not out of mind: The impact of restricting wireless mobile device use on anxiety levels among low, moderate and high users. *Computers in Human Behavior 37*, 290–297.

Clayton, R. B., G. Leshner, and A. Almond (2015, jan). The extended iSelf: The impact of iPhone separation on cognition, emotion, and physiology. *Journal of Computer-Mediated Communication 20*(2), 119–135.

Courbage, C. and B. Rey (2006). Prudence and optimal prevention for health risks. *Health Economics 15*(12), 1323–1327.

Crainich, D. and L. Eeckhoudt (2008). On the intensity of downside risk aversion. *Journal of Risk and Uncertainty 36*(3), 267–276.

Crainich, D., L. Eeckhoudt, and A. Trannoy (2013). Even (mixed) risk lovers are prudent. *The American Economic Review 103*(4), 1529–1535.

Crosetto, P. (2019). METARET: A Meta Analysis of the external validity of Risk Elicitation Tasks. *OSF. Accessed: 11/11/2019*.

Crosetto, P. and A. Filippin (2015). A theoretical and experimental appraisal of four risk elicitation methods. *Experimental Economics 19*(3), 613–641.

Croson, R. and U. Gneezy (2009). Gender differences in preferences. *Journal of Economic Literature 47*(2), 448–474.

Dardanoni, V. and A. Wagstaff (1990). Uncertainty and the demand for medical care. *Journal of Health Economics 9*(1), 23–38.

De Boor, C. (1987). *A practical guide to splines* (Applied Mathematical Sciences ed.), Volume 27. New York, NY: Springer.

Deck, C., J. Lee, J. A. Reyes, and C. C. Rosen (2013). A failed attempt to explain within subject variation in risk taking behavior using domain specific risk attitudes. *Journal of Economic Behavior & Organization 87*, 1–24.

Deck, C. and H. Schlesinger (2010). Exploring higher order risk effects. *The Review of Economic Studies 77*(4), 1403–1420.

Deck, C. and H. Schlesinger (2014). Consistency of higher order risk preferences. *Econometrica 82*(5), 1913–1943.

Denuit, M. M. and L. Eeckhoudt (2010). Stronger measures of higher-order risk attitudes. *Journal of Economic Theory 145*(5), 2027–2036.

Dohmen, T., A. Falk, D. Huffman, and U. Sunde (2010). Are risk aversion and impatience related to cognitive ability? *The American Economic Review 100*(3), 1238–1260.

Dohmen, T., A. Falk, D. Huffman, and U. Sunde (2018). On the relationship between cognitive ability and risk preference. *Journal of Economic Perspectives 32*(2), 115–134.

Dohmen, T., A. Falk, D. Huffman, U. Sunde, J. Schupp, and G. G. Wagner (2011). Individual risk attitudes: Measurement, determinants, and behavioral consequences. *Journal of the European Economic Association 9*(3), 522–550.

Ebert, S. (2012). Moment characterization of higher-order risk preferences. *Theory and Decision 74*(2), 267–284.

Ebert, S. and D. Wiesen (2014). Joint measurement of risk aversion, prudence, and temperance. *Journal of Risk and Uncertainty 48*(3), 231–252.

Eckel, C. C. and P. J. Grossman (2008). Forecasting risk attitudes: An experimental study using actual and forecast gamble choices. *Journal of Economic Behavior & Organization 68*(1), 1–17.

Eeckhoudt, L. and C. Gollier (2005). The impact of prudence on optimal prevention. *Economic Theory 26*(4), 989–994.

Eeckhoudt, L. and M. Kimball (1992). Background risk, prudence, and the demand for insurance. In G. Dionne (Ed.), *Contributions to Insurance Economics*, pp. 239–254. Dordrecht: Springer Netherlands.

Eeckhoudt, L., B. Rey, and H. Schlesinger (2007). A good sign for multivariate risk taking. *Management Science 53*(1), 117–124.

Eeckhoudt, L. and H. Schlesinger (2006). Putting risk in its proper place. *The American Economic Review 96*(1), 280–289.

Ehrlich, I. and G. S. Becker (1972). Market insurance, self-insurance, and self-protection. *Journal of Political Economy 80*(4), 623–648.

Eilers, P. H. and B. D. Marx (1996). Flexible smoothing with B-splines and penalties. *Statistical Science 11*(2), 89–102.

Ekern, S. (1980). Increasing nth degree risk. *Economics Letters 6*(4), 329–333.

Falk, A., A. Becker, T. Dohmen, B. Enke, D. Huffman, and U. Sunde (2018). Global evidence on economic preferences. *The Quarterly Journal of Economics 133*(4), 1645–1692.

Fuchs-Schündeln, N. and M. Schündeln (2005). Precautionary savings and self-selection: Evidence from the German reunification experiment. *The Quarterly Journal of Economics 120*(3), 1085–1120.

Gneezy, U. and J. Potters (1997). An experiment on risk taking and evaluation periods. *The Quarterly Journal of Economics 112*(2), 631–645.

Gollier, C. and J. W. Pratt (1996). Risk vulnerability and the tempering effect of background risk. *Econometrica 64*, 1109–1123.

Heinrich, T. and J. Shachat (2018). The development of risk aversion and prudence in Chinese children and adolescents. MPRA Paper No. 86456.

Holt, C. A. and S. K. Laury (2002). Risk aversion and incentive effects. *The American Economic Review 92*(5), 1644–1655.

Horton, N. J. and S. R. Lipsitz (2001). Multiple imputation in practice. *The American Statistician 55*(3), 244–254.

Kelly, Y., A. Zilanawala, C. Booker, and A. Sacker (2019). Social media use and adolescent mental health: Findings from the UK millennium cohort study. *EClinicalMedicine 6*, 59–68.

Kimball, M. S. (1990). Precautionary saving in the small and in the large. *Econometrica 58*(1), 53–73.

Kimball, M. S. (1992). *New Palgrave Dictionary of Money and Finance*, Chapter Precautionary Motives for Holding Assets, pp. 158–161. MacMillan, London.

Krieger, M. and T. Mayrhofer (2012). Patient preferences and treatment thresholds under diagnostic risk. Ruhr Economic Paper No. 321.

Krieger, M. and T. Mayrhofer (2016). Prudence and prevention: An economic laboratory experiment. *Applied Economics Letters 24*(1), 19–24.

Leland, H. E. (1968). Saving and uncertainty: The precautionary demand for saving. *The Quarterly Journal of Economics 82*(3), 465–473.

McCord, M. and R. de Neufville (1986). "Lottery Equivalents": Reduction of the certainty effect problem in utility assessment. *Management Science 32*(1), 56–60.

Menegatti, M. (2009). Optimal prevention and prudence in a two-period model. *Mathematical Social Sciences 58*(3), 393–397.

Menezes, C., C. Geiss, and J. Tressler (1980). Increasing Downside Risk. *The American Economic Review 70*(5), 921–932.

Messer, S. C., A. Angold, E. J. Costello, and R. Loeber (1995). Development of a short questionnaire for use in epidemiological studies of depression in children and adolescents: Factor composition and structure across development. *International Journal of Methods in Psychiatric Research 4*(5), 251–262.

Modica, S. and M. Scarsini (2005). A note on comparative downside risk aversion. *Journal of Economic Theory 122*(2), 267–271.

Nesi, J. and M. J. Prinstein (2015, apr). Using social media for social comparison and feedback-seeking: Gender and popularity moderate associations with depressive symptoms. *Journal of Abnormal Child Psychology 43*(8), 1427–1438.

Newcomb, M. D., G. J. Huba, and P. M. Bentler (1981, dec). A multidimensional assessment of stressful life events among adolescents: Derivation and correlates. *Journal of Health and Social Behavior 22*(4), 400.

Noussair, C. N., S. T. Trautmann, and G. van de Kuilen (2014). Higher Order Risk Attitudes, Demographics, and Financial Decisions. *The Review of Economic Studies 81*(1), 325–355.

Ofcom (2020). Children and parents: media use and attitudes report 2019. https://www.ofcom.org.uk/research-and-data/media-literacy-research/childrens/children-and-parents-media-use-and-attitudes-report-2019. Accessed: 2020-02-12.

Orben, A. and A. K. Przybylski (2019, jan). The association between adolescent well-being and digital technology use. *Nature Human Behaviour 3*(2), 173–182.

Pedroni, A., R. Frey, A. Bruhin, G. Dutilh, R. Hertwig, and J. Rieskamp (2017). The risk elicitation puzzle. *Nature Human Behaviour 1*(11), 803–809.

Pratt, J. W. (1964). Risk aversion in the small and in the large. *Econometrica 32*(1/2), 122.

Przybylski, A. K. and N. Weinstein (2017). A large-scale test of the Goldilocks Hypothesis: Quantifying the relations between digital-screen use and the mental well-being of adolescents. *Psychological Science 28*(2), 204–215.

Romano, J. P. and M. Wolf (2005a). Exact and approximate stepdown methods for multiple hypothesis testing. *Journal of the American Statistical Association 100*(469), 94–108.

Romano, J. P. and M. Wolf (2005b). Stepwise multiple testing as formalized data snooping. *Econometrica 73*(4), 1237–1282.

Romano, J. P. and M. Wolf (2016). Efficient computation of adjusted p-values for resampling-based stepdown multiple testing. *Statistics & Probability Letters 113*, 38–40.

Rothschild, M. and J. E. Stiglitz (1970). Increasing risk: I. A definition. *Journal of Economic Theory 2*(3), 225–243.

Rubin, D. B. (1996). Multiple imputation after 18+ years. *Journal of the American Statistical Association 91*(434), 473–489.

Samek, A., A. Gray, A. Datar, and N. Nicosia (2019). Adolescent time and risk preferences: Measurement, determinants and field consequences. CESR-Schaeffer Working Paper No. 2019-003.

Schneider, S., M. Ibanez, and G. Riener (2019). Measuring utility – An application to higher order risk and saving in Bogotá. Mimeo.

Sutter, M., M. G. Kocher, D. Glätzle-Rützler, and S. T. Trautmann (2013). Impatience and uncertainty: Experimental decisions predict adolescents field behavior. *The American Economic Review 103*(1), 510–531.

Sutter, M., C. Zoller, and D. Glätzle-Rützler (2019). Economic behavior of children and adolescents – A first survey of experimental economics results. *European Economic Review 111*, 98–121.

Tanaka, T., C. F. Camerer, and Q. Nguyen (2010). Risk and time preferences: Linking experimental and household survey data from vietnam. *The American Economic Review 100*(1), 557–571.

Tarazona-Gomez, M. (2004). Are individuals prudent? An experimental approach using lottery choices. EHESS Toulouse Working Paper.

Tennant, R., L. Hiller, R. Fishwick, S. Platt, S. Joseph, S. Weich, J. Parkinson, J. Secker, and S. Stewart-Brown (2007). The warwick-edinburgh mental well-being scale (WEMWBS): development and UK validation. *Health and Quality of Life Outcomes 5*(1), 63.

Trautmann, S. T. and G. van de Kuilen (2018). Higher order risk attitudes: A review of experimental evidence. *European Economic Review 103*, 108–124.

Twenge, J. M., T. E. Joiner, M. L. Rogers, and G. N. Martin (2018). Increases in depressive symptoms, suicide-related outcomes, and suicide rates among u.s. adolescents after 2010 and links to increased new media screen time. *Clinical Psychological Science 6*(1), 3–17.

Wagner, G. G., J. R. Frick, and J. Schupp (2007). The German Socio-Economic Panel Study (SOEP) - Evolution, scope and enhancements. *Schmollers Jahrbuch: Journal of Applied Social Science Studies / Zeitschrift für Wirtschafts- und Sozialwissenschaften 127*(1), 139–169.

Wakker, P. and D. Deneffe (1996). Eliciting von Neumann-Morgenstern utilities when probabilities are distorted or unknown. *Management Science 42*(8), 1131–1150.

Weber, E. U., A.-R. Blais, and N. E. Betz (2002). A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. *Journal of Behavioral Decision Making 15*(4), 263–290.

YouGov (2018). Yougov/v&a - phone use. https://yougov.co.uk/topics/technology/articles-reports/2018/10/18/yougov-reveals-extent-britains-addiction-our-phone. Accessed: 2020-02-12.

A Appendix: Tables and Figures

Table A-1: Influence Factors of Risk Aversion (Arrow-Pratt Measure)

	Risk Aversion		Risk Aversion		Risk Aversion		Risk Aversion	
Age (in years)	−0.031***	(0.010)	−0.014	(0.011)			−0.007	(0.019)
Cognitive Ability (comb.)			−0.125**	(0.047)	−0.134***	(0.043)	−0.142**	(0.049)
Female							0.229**	(0.080)
Impatience							−0.726**	(0.257)
Pocket money per week							−0.004	(0.003)
Math grade							−0.015	(0.052)
German grade							−0.036	(0.070)
Number of siblings							0.005	(0.035)
Migration background							−0.089	(0.098)
Education mother: A-levels							−0.117	(0.108)
Education father: A-levels							−0.032	(0.099)
Deviation from median BMI							−0.016	(0.012)
Parents Occupation								
one full-time, one part-time							0.010	(0.080)
both part-time							−0.148	(0.123)
one full-time							0.066	(0.147)
one part-time							0.276	(0.178)
other regularity							−0.024	(0.110)
both don't work							0.354	(0.295)
Religion								
Protestant							0.100	(0.113)
Islamic							0.140	(0.206)
Other religious community							−0.126	(0.124)
Without rel. denomination							−0.068	(0.144)
School controls	no		no		no		yes	
R^2	0.01		0.02		0.02		0.08	
Observations	656		603		604		582	

Notes: Positive coefficients imply increasing risk aversion. Robust standard errors clustered at the session level in parentheses. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. See Table A-5 for regression results including participants that reported problems with handling their tablets during our study. P-values for factors added in the last column of this table including impatience are corrected for multiple testing using the Romano-Wolf procedure (Romano and Wolf, 2016, 2005a,b).

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table A-2: Influence Factors of Prudence

	Prudence		Prudence		Prudence		Prudence	
Age (in years)	−0.018	(0.013)	−0.015	(0.017)			−0.017	(0.018)
Cognitive Ability (comb.)			−0.054	(0.063)	−0.065	(0.055)	−0.053	(0.064)
Female							0.213**	(0.095)
Impatience							−0.511	(0.296)
Pocket money per week							−0.008	(0.003)
Math grade							−0.026	(0.048)
German grade							−0.051	(0.070)
Number of siblings							0.025	(0.037)
Migration background							0.041	(0.078)
Education mother: A-levels							−0.141	(0.084)
Education father: A-levels							0.004	(0.093)
Deviation from median BMI							−0.012	(0.013)
Parents Occupation								
one full-time, one part-time							0.104	(0.080)
both part-time							−0.226	(0.195)
one full-time							0.265	(0.146)
one part-time							0.088	(0.328)
other regularity							0.033	(0.112)
both don't work							0.308	(0.570)
Religion								
Protestant							0.021	(0.080)
Islamic							−0.095	(0.205)
Other religious community							−0.348	(0.147)
Without rel. denomination							−0.006	(0.139)
School controls	no		no		no		yes	
R^2	0.00		0.01		0.00		0.07	
Observations	656		603		604		582	

Notes: Positive coefficients imply increasing prudence. Robust standard errors clustered at the session level in parentheses. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. See Table A-6 for regression results including participants that reported problems with handling their tablets during our study. P-values for factors added in the last column of this table including impatience are corrected for multiple testing using the Romano-Wolf procedure (Romano and Wolf, 2016, 2005a,b).

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table A-3: Influence Factors of Temperance

	Temperance		Temperance		Temperance		Temperance	
Age (in years)	−0.015	(0.011)	−0.004	(0.013)			−0.001	(0.018)
Cognitive Ability (comb.)			−0.098**	(0.044)	−0.101**	(0.040)	−0.114**	(0.048)
Female							0.143**	(0.066)
Impatience							−0.524	(0.278)
Pocket money per week							−0.004	(0.003)
Math grade							−0.023	(0.061)
German grade							0.002	(0.071)
Number of siblings							0.007	(0.038)
Migration background							−0.128	(0.098)
Education mother: A-levels							−0.163	(0.092)
Education father: A-levels							0.002	(0.094)
Deviation from median BMI							−0.011	(0.011)
Parents Occupation								
one full-time, one part-time							0.092	(0.087)
both part-time							−0.154	(0.193)
one full-time							0.164	(0.129)
one part-time							0.125	(0.307)
other regularity							0.121	(0.085)
both don't work							0.498	(0.481)
Religion								
Protestant							−0.033	(0.109)
Islamic							−0.011	(0.180)
Other religious community							−0.119	(0.167)
Without rel. denomination							−0.128	(0.146)
School controls	no		no		no		yes	
R^2	0.00		0.01		0.01		0.05	
Observations	656		603		604		582	

Notes: Positive coefficients imply increasing temperance. Robust standard errors clustered at the session level in parentheses. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. See Table A-7 for regression results including participants that reported problems with handling their tablets during our study. P-values for factors added in the last column of this table including impatience are corrected for multiple testing using the Romano-Wolf procedure (Romano and Wolf, 2016, 2005a,b).

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table A-4: Influence Factors of (Higher Order) Risk Preferences (Raw Cognitive Ability Measures)

	Risk Aversion		Prudence		Temperance	
Age (in years)	−0.013	(0.017)	−0.015	(0.018)	−0.003	(0.017)
Female	0.278***	(0.092)	0.248**	(0.109)	0.183*	(0.086)
Impatience	−0.869***	(0.285)	−0.568*	(0.291)	−0.671**	(0.300)
Other Factors	10		10		10	
School controls	yes		yes		yes	
R^2	0.09		0.07		0.06	
Observations	634		634		634	

Notes: Positive coefficients imply increasing risk aversion, prudence and temperance. Robust standard errors clustered at the session level in parentheses. Cognitive ability scores are standardized, such that above average scores are positive. Other possible influence factors controlled for are relative math grade, relative German grade (where positive variables imply above average performance relative to the grade), the amount of pocket money per week, the number of siblings, the religion, migration background, an indicator for mother and father having A-levels each, parents' occupation as well as relative BMI; see Tables A-5, A-6 and A-7 for detailed regressions results. P-values for factors omitted in this table and for impatience are corrected for multiple testing using the Romano-Wolf procedure (Romano and Wolf, 2016, 2005a,b).

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table A-5: Influence Factors of Risk Aversion (Arrow-Pratt Measure, Raw Cognitive Ability Measures)

	Risk Aversion		Risk Aversion		Risk Aversion		Risk Aversion	
Age (in years)	−0.031***	(0.010)	−0.014	(0.012)			−0.013	(0.017)
Cognitive ability (raw)			−0.126***	(0.041)	−0.126***	(0.038)	−0.138***	(0.042)
Female							0.278***	(0.092)
Impatience							−0.869***	(0.285)
Pocket money per week							−0.003	(0.002)
Math grade							−0.025	(0.049)
German grade							−0.032	(0.070)
Number of siblings							0.002	(0.032)
Migration background							−0.085	(0.093)
Education mother: A-levels							−0.102	(0.097)
Education father: A-levels							−0.017	(0.106)
Deviation from median BMI							−0.013	(0.013)
Parents Occupation								
one full-time, one part-time							0.038	(0.070)
both part-time							−0.141	(0.123)
one full-time							0.116	(0.143)
one part-time							0.380	(0.186)
other regularity							−0.041	(0.093)
both don't work							0.357	(0.278)
Religion								
Protestant							0.105	(0.127)
Islamic							0.126	(0.201)
Other religious community							−0.160	(0.143)
Without rel. denomination							−0.144	(0.144)
School controls	no		no		no		yes	
R^2	0.01		0.02		0.02		0.09	
Observations	656		656		658		634	

Notes: Positive coefficients imply increasing risk aversion. Robust standard errors clustered at the session level in parentheses. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. See Table A-1 for regression results excluding participants that reported problems with handling their tablets during our study. P-values for factors added in the last column of this table including impatience are corrected for multiple testing using the Romano-Wolf procedure (Romano and Wolf, 2016, 2005a,b).

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table A-6: Influence Factors of Prudence (Raw Cognitive Ability Measures)

	Prudence		Prudence		Prudence		Prudence	
Age (in years)	−0.018	(0.013)	−0.010	(0.016)			−0.015	(0.018)
Cognitive ability (raw)			−0.059	(0.055)	−0.063	(0.048)	−0.055	(0.055)
Female							0.248**	(0.109)
Impatience							−0.568*	(0.291)
Pocket money per week							−0.008*	(0.003)
Math grade							−0.036	(0.044)
German grade							−0.052	(0.071)
Number of siblings							0.033	(0.035)
Migration background							0.047	(0.085)
Education mother: A-levels							−0.085	(0.093)
Education father: A-levels							−0.015	(0.102)
Deviation from median BMI							−0.010	(0.013)
Parents Occupation								
one full-time, one part-time							0.089	(0.071)
both part-time							−0.252	(0.181)
one full-time							0.243	(0.143)
one part-time							0.168	(0.304)
other regularity							0.012	(0.099)
both don't work							0.286	(0.552)
Religion								
Protestant							0.002	(0.092)
Islamic							−0.123	(0.196)
Other religious community							−0.418	(0.162)
Without rel. denomination							−0.033	(0.134)
School controls	no		no		no		yes	
R^2	0.00		0.00		0.00		0.07	
Observations	656		656		658		634	

Notes: Positive coefficients imply increasing prudence. Robust standard errors clustered at the session level in parentheses. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. See Table A-2 for regression results excluding participants that reported problems with handling their tablets during our study. P-values for factors added in the last column of this table including impatience are corrected for multiple testing using the Romano-Wolf procedure (Romano and Wolf, 2016, 2005a,b).

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table A-7: Influence Factors of Temperance (Raw Cognitive Ability Measures)

	Temperance		Temperance		Temperance		Temperance	
Age (in years)	−0.015	(0.011)	−0.001	(0.013)			−0.003	(0.017)
Cognitive ability (raw)			−0.104**	(0.039)	−0.099**	(0.035)	−0.115**	(0.042)
Female							0.183*	(0.086)
Impatience							−0.671**	(0.300)
Pocket money per week							−0.004	(0.003)
Math grade							−0.033	(0.058)
German grade							0.003	(0.070)
Number of siblings							0.009	(0.034)
Migration background							−0.125	(0.097)
Education mother: A-levels							−0.119	(0.092)
Education father: A-levels							0.008	(0.098)
Deviation from median BMI							−0.005	(0.011)
Parents Occupation								
one full-time, one part-time							0.110	(0.068)
both part-time							−0.156	(0.193)
one full-time							0.186	(0.132)
one part-time							0.240	(0.311)
other regularity							0.128	(0.090)
both don't work							0.492	(0.460)
Religion								
Protestant							−0.040	(0.117)
Islamic							−0.031	(0.183)
Other religious community							−0.172	(0.183)
Without rel. denomination							−0.200	(0.156)
School controls	no		no		no		yes	
R^2	0.00		0.01		0.01		0.06	
Observations	656		656		658		634	

Notes: Positive coefficients imply increasing temperance. Robust standard errors clustered at the session level in parentheses. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. See Table A-3 for regression results excluding participants that reported problems with handling their tablets during our study. P-values for factors added in the last column of this table including impatience are corrected for multiple testing using the Romano-Wolf procedure (Romano and Wolf, 2016, 2005a,b).

*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table A-8: DOSPERT (adapted)

	DOSPERT		DOSPERT		DOSPERT		DOSPERT	
Prudence	-0.093	(0.056)	-0.093	(0.055)	-0.093*	(0.053)	-0.098*	(0.051)
Risk aversion (AP)			-0.238***	(0.071)	-0.238***	(0.071)	-0.252***	(0.068)
Temperance			-0.045	(0.043)	-0.045	(0.042)	-0.041	(0.040)
Impatience					0.144***	(0.047)	0.120**	(0.050)
Age (in years)							0.006	(0.018)
Female							-0.065	(0.069)
Math grade							-0.167***	(0.047)
German grade							-0.133*	(0.062)
R^2	0.0087		0.024		0.045		0.097	
Observations	658		658		658		653	

Notes: Positive coefficients imply increasing general risk taking behavior. Experimental risk and time measures are expressed in standard deviations. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. Outcome indices are formed using PCA weights and are standard normalized. Questions included in this index are listed under section DOS in the questionnaire in Online Appendix B.2. Robust standard errors clustered at the session level in parentheses.
****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

Table A-9: DOSPERT (original subset)

	DOSPERT		DOSPERT		DOSPERT		DOSPERT	
Prudence	-0.093	(0.056)	-0.093	(0.055)	-0.093*	(0.053)	-0.098*	(0.051)
Risk aversion (AP)			-0.238***	(0.071)	-0.238***	(0.071)	-0.252***	(0.068)
Temperance			-0.045	(0.043)	-0.045	(0.042)	-0.041	(0.040)
Impatience					0.144***	(0.047)	0.120**	(0.050)
Age (in years)							0.006	(0.018)
Female							-0.065	(0.069)
Math grade							-0.167***	(0.047)
German grade							-0.133*	(0.062)
R^2	0.0087		0.024		0.045		0.097	
Observations	658		658		658		653	

Notes: Positive coefficients imply increasing general risk taking behavior. Experimental risk and time measures are expressed in standard deviations. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. Outcome indices are formed using PCA weights and are standard normalized. Questions included in this index are listed under section DOS in the questionnaire in Online Appendix B.2. Robust standard errors clustered at the session level in parentheses.
****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

Table A-10: General Patience Scale

	General Patience (all)		General Patience (all)		General Patience (all)	
Impatience	-0.144***	(0.045)	-0.144***	(0.044)	-0.131***	(0.042)
Risk aversion (AP)			0.086	(0.084)	0.080	(0.089)
Prudence			0.117**	(0.046)	0.114**	(0.049)
Temperance			0.096	(0.055)	0.091	(0.056)
Age (in years)					-0.001	(0.037)
Female					0.178*	(0.089)
Math grade					0.101**	(0.035)
German grade					0.040	(0.039)
R^2	0.021		0.041		0.062	
Observations	658		658		653	

Notes: Positive coefficients imply increasing patience. Experimental risk and time measures are expressed in standard deviations. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. Outcome indices are formed using PCA weights and are standard normalized. Questions included in this index are listed under section GIS in the questionnaire in Online Appendix B.2. Robust standard errors clustered at the session level in parentheses.
****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

Table A-11: Saving/Debt

	Saving (w./ Debt)		Saving (w./ Debt)		Saving (w./ Debt)		Saving (w./ Debt)	
Prudence	0.061*	(0.033)	0.062*	(0.032)	0.062*	(0.032)	0.079*	(0.041)
Risk aversion (AP)			0.093	(0.120)	0.093	(0.115)	0.134	(0.129)
Temperance			0.110**	(0.050)	0.110**	(0.049)	0.114**	(0.041)
Impatience					-0.222***	(0.036)	-0.211***	(0.038)
Age (in years)							0.003	(0.021)
Female							-0.317***	(0.068)
Math grade							0.125**	(0.057)
German grade							0.116*	(0.055)
Pocket money per week							-0.009***	(0.002)
Earnings side job per week							0.001	(0.002)
Pocket money gets cut occasionally							-0.030	(0.162)
Additional money when needed							0.037	(0.046)
R^2	0.0037		0.013		0.061		0.13	
Observations	658		658		658		646	

Notes: Positive coefficients imply increasing likelihood to save. Risk and time measures are expressed in standard deviations. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. Outcome indices are formed using PCA weights and are standard normalized. Questions included in this index are listed under section SC in the questionnaire in Online Appendix B.2. Robust standard errors clustered at the session level in parentheses. ****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

Table A-12: Risky Investment

	Risky Investment (main)		Risky Investment (main)		Risky Investment (main)		Risky Investment (main)	
Temperance	-0.064**	(0.024)	-0.065**	(0.025)	-0.065**	(0.025)	-0.034	(0.022)
Risk aversion (AP)			-0.160*	(0.078)	-0.160*	(0.078)	-0.072	(0.077)
Prudence			-0.103*	(0.050)	-0.103*	(0.050)	-0.059	(0.047)
Impatience					0.013	(0.027)	-0.009	(0.026)
Age (in years)							-0.025	(0.017)
Female							-0.535***	(0.067)
Math grade							0.071*	(0.037)
German grade							0.011	(0.037)
Pocket money per week							0.008	(0.004)
Earnings side job per week							0.003	(0.002)
Pocket money gets cut occasionally							0.002	(0.118)
Additional money when needed							-0.092	(0.064)
R^2	0.0041		0.017		0.017		0.11	
Observations	658		658		658		646	

Notes: Positive coefficients imply increasing likelihood to invest in risky assets. Risk and time measures are expressed in standard deviations. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. Outcome indices are formed using PCA weights and are standard normalized. Questions included in this index are listed under section Inv in the questionnaire in Online Appendix B.2. Robust standard errors clustered at the session level in parentheses.
****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

Table A-13: Risky Investment II

	Risky Investment (all)		Risky Investment (all)		Risky Investment (all)		Risky Investment (all)	
Temperance	-0.053**	(0.022)	-0.054**	(0.022)	-0.054**	(0.022)	-0.021	(0.022)
Risk aversion (AP)			-0.172**	(0.068)	-0.172**	(0.068)	-0.081	(0.069)
Prudence			-0.100*	(0.050)	-0.100*	(0.050)	-0.054	(0.046)
Impatience					0.026	(0.029)	0.003	(0.029)
Age (in years)							-0.024	(0.019)
Female							-0.582***	(0.070)
Math grade							0.045	(0.042)
German grade							0.030	(0.040)
Pocket money per week							0.007	(0.004)
Earnings side job per week							0.003	(0.002)
Pocket money gets cut occasionally							-0.038	(0.118)
Additional money when needed							-0.101	(0.069)
R^2	0.0028		0.016		0.017		0.12	
Observations	658		658		658		646	

Notes: Positive coefficients imply increasing likelihood to invest in risky assets. Risk and time measures are expressed in standard deviations. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. Outcome indices are formed using PCA weights and are standard normalized. Questions included in this index are listed under sections Inv and Dos in the questionnaire in Online Appendix B.2. Robust standard errors clustered at the session level in parentheses.
****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

Table A-14: Financial Insurance Demand

	Fin. Insurance		Fin. Insurance		Fin. Insurance		Fin. Insurance	
Prudence	-0.063**	(0.025)	-0.063**	(0.025)	-0.063**	(0.025)	-0.045	(0.032)
Risk aversion (AP)			-0.064	(0.074)	-0.064	(0.073)	-0.039	(0.072)
Temperance			-0.009	(0.070)	-0.009	(0.070)	-0.010	(0.071)
Impatience					0.021	(0.041)	0.010	(0.043)
Age (in years)							-0.007	(0.018)
Female							-0.109	(0.074)
Math grade							-0.032	(0.050)
German grade							0.024	(0.064)
Pocket money per week							0.008**	(0.003)
Earnings side job per week							0.001	(0.002)
Pocket money gets cut occasionally							-0.026	(0.157)
Additional money when needed							-0.015	(0.047)
R^2	0.0039		0.0050		0.0054		0.020	
Observations	658		658		658		646	

Notes: Positive coefficients imply increasing likelihood to possess an insurance. Risk and time measures are expressed in standard deviations. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. Outcome indices are formed using PCA weights and are standard normalized. Questions included in this index are listed under section Ins in the questionnaire in Online Appendix B.2. Robust standard errors clustered at the session level in parentheses.
****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

Table A-15: Unhealthy Behavior (extended index)

	Unhealthy Behavior (main ext.)		Unhealthy Behavior (main ext.)		Unhealthy Behavior (main ext.)		Unhealthy Behavior (main ext.)	
Prudence	-0.136***	(0.041)	-0.136***	(0.040)	-0.138***	(0.041)	-0.168****	(0.037)
Risk aversion (AP)			0.020	(0.096)	0.019	(0.093)	-0.023	(0.088)
Temperance			-0.019	(0.059)	-0.019	(0.060)	-0.028	(0.059)
Impatience					0.172***	(0.041)	0.156***	(0.047)
Age (in years)							0.015	(0.022)
Female							0.233*	(0.106)
Math grade							-0.143***	(0.045)
German grade							-0.193****	(0.029)
R^2	0.016		0.016		0.042		0.10	
Observations	561		561		561		560	

Notes: Positive coefficients imply increasing engagement in unhealthy or addictive behavior. Risk and time measures are expressed in standard deviations. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. Outcome indices are formed using PCA weights and are standard normalized. Questions included in this index are listed under sections H and DOS in the questionnaire in Online Appendix B.2. Robust standard errors clustered at the session level in parentheses.
****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

Table A-16: Unhealthy Behavior (main target questions)

	Unhealthy Behavior (main)		Unhealthy Behavior (main)		Unhealthy Behavior (main)		Unhealthy Behavior (main)	
Prudence	-0.136***	(0.036)	-0.136***	(0.035)	-0.138***	(0.036)	-0.171****	(0.034)
Risk aversion (AP)			0.031	(0.089)	0.030	(0.086)	-0.020	(0.081)
Temperance			-0.023	(0.064)	-0.023	(0.065)	-0.035	(0.063)
Impatience					0.161***	(0.039)	0.146***	(0.046)
Age (in years)							0.013	(0.022)
Female							0.284**	(0.105)
Math grade							-0.149***	(0.046)
German grade							-0.185****	(0.031)
R^2	0.016		0.016		0.039		0.11	
Observations	561		561		561		560	

Notes: Positive coefficients imply increasing engagement in unhealthy or addictive behavior. Risk and time measures are expressed in standard deviations. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. Outcome indices are formed using PCA weights and are standard normalized. Questions included in this index are listed under section H in the questionnaire in Online Appendix B.2. Robust standard errors clustered at the session level in parentheses.
****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

Table A-17: Addictive behavior

	Addictive Behavior		Addictive Behavior		Addictive Behavior		Addictive Behavior	
Prudence	-0.143***	(0.035)	-0.143***	(0.035)	-0.145***	(0.035)	-0.177****	(0.034)
Risk aversion (AP)			0.016	(0.089)	0.015	(0.086)	-0.032	(0.081)
Temperance			-0.016	(0.062)	-0.016	(0.062)	-0.028	(0.061)
Impatience					0.163***	(0.040)	0.149***	(0.047)
Age (in years)							0.013	(0.022)
Female							0.280**	(0.103)
Math grade							-0.144***	(0.043)
German grade							-0.169****	(0.031)
R^2	0.017		0.018		0.041		0.10	
Observations	561		561		561		560	

Notes: Positive coefficients imply increasing engagement in addictive behavior. Risk and time measures are expressed in standard deviations. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. Outcome indices are formed using PCA weights and are standard normalized. Questions included in this index are listed under section H in the questionnaire in Online Appendix B.2. Robust standard errors clustered at the session level in parentheses.
****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

Table A-18: Addictive Usage of Smarthpone and Social Media

	Smartphone Addiction		Smartphone Addiction		Smartphone Addiction		Smartphone Addiction	
Prudence	-0.153****	(0.034)	-0.153****	(0.034)	-0.154****	(0.034)	-0.187****	(0.035)
Risk aversion (AP)			0.002	(0.091)	0.001	(0.087)	-0.053	(0.082)
Temperance			0.001	(0.053)	0.001	(0.055)	-0.011	(0.056)
Impatience					0.154***	(0.038)	0.145***	(0.046)
Age (in years)							0.009	(0.022)
Female							0.331***	(0.106)
Math grade							-0.120**	(0.041)
German grade							-0.153***	(0.041)
R^2	0.020		0.020		0.040		0.095	
Observations	561		561		561		560	

Notes: Positive coefficients imply increasing engagement in addictive behavior. Risk and time measures are expressed in standard deviations. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. Outcome indices are formed using PCA weights and are standard normalized. Questions included in these indices are listed under section H in the questionnaire in Online Appendix B.2. Robust standard errors clustered at the session level in parentheses.
****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

Table A-19: Prevention (Short-Term)

	General Prevention (Short Term)		General Prevention (Short Term)		General Prevention (Short Term)		General Prevention (Short Term)	
Prudence	-0.117***	(0.038)	-0.117***	(0.039)	-0.111**	(0.039)	-0.130***	(0.041)
Risk aversion (AP)			0.167*	(0.081)	0.178**	(0.079)	0.131	(0.075)
Temperance			0.025	(0.039)	0.031	(0.039)	0.022	(0.041)
Impatience					0.073**	(0.026)	0.069**	(0.030)
Age (in years)							-0.003	(0.027)
Number of siblings							-0.058*	(0.029)
Female							0.254***	(0.057)
Math grade							-0.108**	(0.049)
German grade							-0.056	(0.061)
R^2	0.014		0.021		0.026		0.063	
Observations	658		658		658		653	

Notes: Positive coefficients imply increasing prevention effort. Risk and time measures are expressed in standard deviations. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. Outcome indices are formed using PCA weights and are standard normalized. Questions included in this index are listed under section P1 in the questionnaire in Online Appendix B.2. Robust standard errors clustered at the session level in parentheses. ****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

Table A-20: Prevention (Long-Term)

	General Prevention (Long Term)		General Prevention (Long Term)		General Prevention (Long Term)		General Prevention (Long Term)	
Prudence	0.039	(0.056)	0.040	(0.053)	0.033	(0.053)	0.009	(0.051)
Risk aversion (AP)			0.239**	(0.089)	0.229**	(0.088)	0.190**	(0.080)
Temperance			0.134**	(0.053)	0.127**	(0.055)	0.116**	(0.047)
Impatience					-0.072*	(0.037)	-0.069*	(0.035)
Age (in years)							-0.007	(0.022)
Female							0.381***	(0.108)
Math grade							-0.096*	(0.049)
German grade							0.077	(0.055)
R^2	0.0015		0.026		0.031		0.080	
Observations	658		658		658		653	

Notes: Positive coefficients imply increasing prevention effort. Risk and time measures are expressed in standard deviations. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. Outcome indices are formed using PCA weights and are standard normalized. Questions included in this index are listed under section P2 in the questionnaire in Online Appendix B.2. Robust standard errors clustered at the session level in parentheses. ****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

Table A-21: Eco-friendly behavior

	Eco-friendly behavior		Eco-friendly behavior		Eco-friendly behavior		Eco-friendly behavior	
Prudence	0.044	(0.038)	0.044	(0.038)	0.031	(0.037)	0.036	(0.037)
Risk aversion (AP)			0.208***	(0.076)	0.188**	(0.075)	0.193**	(0.076)
Temperance			0.060	(0.052)	0.048	(0.052)	0.041	(0.049)
Impatience					-0.140****	(0.041)	-0.118***	(0.041)
Age (in years)							-0.007	(0.016)
Female							0.106	(0.078)
Math grade							0.064	(0.047)
German grade							0.200****	(0.056)
R^2	0.0020		0.015		0.034		0.077	
Observations	658		658		658		653	

Notes: Positive coefficients imply increasing eco-friendly behavior. Risk and time measures are expressed in standard deviations. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. Outcome indices are formed using PCA weights and are standard normalized. Questions included in this index are listed under section E in the questionnaire in Online Appendix B.2. Robust standard errors clustered at the session level in parentheses. ****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

Table A-22: Preference for Competitive Income

	Pref. for Comp. Income		Pref. for Comp. Income		Pref. for Comp. Income		Pref. for Comp. Income	
Risk aversion (AP)	-0.093***	(0.024)	-0.092***	(0.023)	-0.092***	(0.023)	-0.069**	(0.025)
Prudence			0.053*	(0.026)	0.053*	(0.026)	0.058**	(0.025)
Temperance			0.053	(0.049)	0.053	(0.049)	0.025	(0.048)
Impatience					-0.017	(0.028)	-0.016	(0.029)
Age (in years)							0.025***	(0.008)
Female							-0.266****	(0.050)
Math grade							0.004	(0.022)
German grade							0.021	(0.026)
R^2	0.027		0.035		0.036		0.096	
Observations	649		649		649		645	

Notes: Positive coefficients imply increasing preference for competitive income. Risk and time measures are expressed in standard deviations. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. Outcome indices are formed by adding z-Scores and are standard normalized. Questions included in this index are listed under section C in the questionnaire in Online Appendix B.2. Robust standard errors clustered at the session level in parentheses.
****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

Table A-23: Sensitivity of Optimal Choice to Risk

	Sensitivity of Optimal Choice		Sensitivity of Optimal Choice		Sensitivity of Optimal Choice		Sensitivity of Optimal Choice	
Prudence	0.041	(0.048)	0.043	(0.046)	0.043	(0.046)	0.034	(0.053)
Risk aversion (AP)			-0.033	(0.048)	-0.033	(0.048)	-0.052	(0.051)
Temperance			0.167***	(0.052)	0.167***	(0.052)	0.165***	(0.052)
Impatience					-0.009	(0.039)	-0.002	(0.040)
Age (in years)							-0.005	(0.028)
Female							0.140	(0.095)
Math grade							-0.028	(0.050)
German grade							0.020	(0.059)
R^2	0.0016		0.018		0.018		0.024	
Observations	658		658		658		653	

Notes: Positive coefficients imply increasing sensitivity of optimal choice to risk. Risk and time measures are expressed in standard deviations. Cognitive ability scores, relative German grade and relative math grade are standardized, such that above average scores are positive. Outcome indices are formed using PCA weights and are standard normalized. Questions included in this index are listed under section O in the questionnaire in Online Appendix B.2. Robust standard errors clustered at the session level in parentheses.
****/***/**/* denotes significance at the 0.1 / 1 / 5 / 10 percent level.

B Appendix: Translated Instructions and Questionnaire (For Online Publication)

B.1 Instructions

Hello and welcome to our study. Glad, you are here and want to participate. Within the next 45 minutes, we are going to play some "deciding games" with you, you are going to work on some riddles and then, you are going to complete a questionnaire. You can do almost everything on a tablet and we will explain everything explicitly step by step. We will explain, then you can take action, and then we will explain the next step. We start with the games.

(In the session with the older students): Another comment on the explanations. Because we are doing a scientific study, it is important that we always give the same explanations. Since we also conduct the study with younger students, the explanations are more detailled sometimes than it would be necessary otherwise. So it has nothing to do with you in case it seems a little elongated to you, but we have to do it this way and it also ensures that you really understand everything very well.

From now on, please do not talk to each other anymore, leave your cell phone where it is resp. put it away in case you are holding it in your hands and listen carefully. You can earn money in the games. We will pay you out in cash at the end of the experiment or you will receive the money in an envelope - more on this later. The amount of money you can earn depends on your answers and decisions. That is why it is important for you to understand the rules. So please listen carefully! We are going to take some breaks repeatedly, so that you can ask some questions. Just raise your hand, then one of us will come to you to answer your question.

Is everything clear so far? *(leave some time for questions; answer questions individually and privately)*

In the first game, you are to decide four times whether you would rather have a specific amount of money today, or a slightly larger amount of money in 3 weeks. Here you can see such a decision situation. *(show the slide of the presentation that displays the time preference decision situation.)* That is what it is going to look like. On the left, you can see the amount of money you would get immediately, in this example that are 100 thalers. On the right, you can see the amount you would get in three weeks, in this example 120 thalers.

So if you say, for 20 thalers more I would wait three weeks, given the amount of 100 thalers - which option do you have to choose? *(Assuming that the answer is "right")* Exactly, then you have to choose the option on the right. If you prefer

to have the 100 thalers today, you have to choose the left option, accordingly. We convert the thalers in euros and 100 thalers are approximately

- grade 6: 2 euros.
- grade 8: 2 euros 50.
- grade 10: 3 euros 50.
- grade 12: 5 euros 50.

So think carefully about what you prefer.

You can simply enter your decesion by tapping the "L" or "R" button.

Is everything clear so far? *(leave some time for questions; answer questions individually and privately)*

For payout: In addition to the deciding games, we still have a few riddles. For each riddle you have solved correctly you will get some additional money.

Besides this game, we are going to play another two types of games with you. Overall, you will make about 25 decisions, and one of those decisions will be paid out for real.

Your tablet randomly chooses one of the three types of deciding games and it also randomly picks the number of the decision. It is important that you take every decision seriously, because until the end, you will not know which decision will be payed out.

If this game is randomly chosen by the tablet for payout, you will receive the money either today or in three weeks - depending on your decisions.

If you decided upon a payout in three weeks and this decision was randomly picked for payout, you could collect the money in the secretary's office in three weeks.

Is everything clear so far? *(leave some time for questions; answer questions individually and privately)*

If anyone of you does not want to participate, please let us know now. You will also be able to stop later at any time. Just raise your hand - then one of us will come to you and discuss the next steps.

Does anyone like to stop now or do you have any questions? *(leave some time for the students to raise their hands resp. for questions; answer questions individually and privately; if someone drops out, write the tablet's ID-number and the session down, in order to be able to delete the dataset.)*

(set the slide show to black by pressing the "B" key)

Okay, then we will play the deciding games now. *(start session) (When everyone has made his/her decisions)* Now you will decide 18 times, whether you would rather

have a specific certain amount or you would like to throw a coin with us and end up wanting either a higher or a lower amount than the certain amount. We will change the amounts within the 18 decision situations.

Such a situation looks like this, for example. *(show the slide of the presentation that displays the coin tossing decision situation).* On the left, we have a coin and you will get 70 thalers, regardless of whether the coin lands with the white or the black side at the top. So you will get this amount certainly; we show that by the fact that both for the white side *(point at the upper arrow)* and the black side *(point at the lower arrow)* there are 70 thalers in the end. On the right *(point at the right option)* this looks different. Here you will get 140 thalers, if the coin lands with the white side at the top *(point at the upper arrow)*, thus laying on the black side. If the coin lands with the black side at the top *(point at the lower arrow)*, you will get 0 thalers – therefore nothing.

Thus, you have to decide, whether you would rather take 70 thalers home certainly or you would like to have the chance to get 140 thalers, whereby you can also end empty-handed. So if you say: "I would rather like to have the chance to get 140 thalers and take the risk of ending empty-handed with this coin toss", which option do you have to choose? *Assuming that the answer is "right")* Exactly, you have to choose the right option. Otherwise, if you say you prefer to play it safe, you have to chose the left option.

To enter your decision, simply tap on the button below the option you prefer. Because the decision situations look very similar at first sight, you also have to press "Next" *(point at the "Next"-button)*, to make sure you do not accidentally choose the same answer again for another situation.

Is everything clear so far ? *(leave some time for questions; answer questions individually and privately)*

For payout: Let us say the computer selected decision 1 of the coin toss.

Let us now additionally assume that you would have chosen the left option. Then you simply get 70 thalers. However, if you have chosen the right option, your tablet will toss a coin. If the coin shows white, you would get 140 thalers in this example. As I said, we will convert the thalers into euros later. 140 thalers are the most you can earn with this game. That is about

- grade 6: 2,75 euros
- grade 8: 3,50 euros
- grade 10: 5,00 euros
- grade 12: 7,75 euros

So think carefully about how you decide.

Is everything clear so far ? *(leave some time for questions; answer questions individually and privately)*

(set the slide show to black by pressing the „B“ key)

(start subsession certainty equivalents)

(When everyone has made his/her decisions)

In the last of the three games you are going to choose in different situations whether you prefer to draw a ball from a bag, we call it bag L for left, or a ball from another bag, we call it bag R for right. Of course, this will happen without you being able to look into the bag, so you will not be able to pick out the ball you want. You will randomly draw a ball. The bags each look like on this picture *(show the slide of the presentation that displays the urn decision situation)*. As you can see, there are four balls in each bag. The number on the balls indicates how many thalers you will get if you randomly draw the corresponding ball. For example *(point at the ball with 50, marked with R)*, on the red ball - R stands for red, G for green, B for blue – it says 50. So, if you randomly draw this ball, you get 50 thalers. As I said, you will not be able to look into the bag, so you could draw each of the four balls, and the chances of drawing each of these balls are the same. That is, if you draw out of the right bag, the chances that you will draw a ball with a 50 and get 50 thalers are twice as big as the chance to draw a ball with an 80 or 120, simply because there are two balls with a 50 in it.

You may only draw one ball and only choose once per decision situation from which bag you want to draw. In the next decision situation you will be allowed to draw out of another bag. In total, there are three such decision situations.

Is everything clear so far ? *(leave some time for questions; answer questions individually and privately)*

Okay. In this situation, if you think: “I would rather have a higher chance of a quite high payment, even if I could end up going home with the smallest amount”; from which bag would you like to draw here, which option do you prefer? Drawing out of the left or the right bag? *(Assuming that the answer is "left")* Exactly, then you have to choose the left option. But if you think: “Even if the chances to draw the small amount are higher – it is not that small in comparison - and I could draw the highest amount as well.” – then you have to choose the option on the right.

To enter your decision, simply tap on the button below the bag from which you prefer to draw.

Is everything clear so far? *(leave some time for questions; answer questions individually and privately)*

(set the slide show to black by pressing the “B” key)

(start subsession urn)

(When everyone has made his/her decisions)

In the next part of our study we would like to ask you a few riddles. We have brought two types of riddles: The first type of riddle is to assign a number to a symbol. As fast as possible. The goal is to assign the correct number to as many symbols as possible in two minutes. *(show the slide of the presentation that displays the Symbol-Digit-Test)* Up here *(point at the allocation table)* you can see which number belongs to which symbol. You will always see this table. Here on the middle, *(point at the symbol on the middle)* a symbol is randomly selected. Your task is to press *(point at the buttons)* the correct number as fast as possible. What is the right number now? *(Assuming that the answer is "eight")* Exactly, "eight" is correct, and you have to choose "eight" here *(point at eight)*. Take good care of what you are pressing because there is no going back. If you pressed a number, the next task with the next symbol will come and you shall choose the corresponding number again. It takes a total of two minutes and up here *(point at time)* you can see how much time you have left.

Together, for the riddles that you will just play and for those that you will play after them, those of you who have the most correct answers get approximately

- grade 6: 1,40 euros
- grade 8: 1,75 euros
- grade 10: 2,50 euros
- grade 12: 3,90 euros.

If you solved fewer riddles correctly, you will get less; so make an effort!

Is everything clear so far? *(leave some time for questions; answer questions individually and privately)*

Okay, then you can play these riddles for a minute and a half now. When you are ready, you can press “Next”, but after 15 seconds at the latest it will automatically continue, and then the time will run. A minute and a half, as many and as correct as possible.

Is everything clear so far? *(leave some time for questions; answer questions individually and privately)*

(set the slide show to black by pressing the “B” key)

(start subsession “Cognitive Ability 1”)

(When the time to answer the Symbol-Digit-Test is up)

Now we come to the second kind of riddles. Here, you will be shown some different patterns, and one of the patterns is always missing. There are several

possibilities to fill in the missing space, and these possibilities will be shown to you. Then, you will have to choose the number of the fitting possibility. We will show you a total of 10 such patterns and you will have 5 minutes to solve the riddles. *(show the slide of the presentation that displays the matrix test.)* For example, it looks like this: Up here *(point at time)* you can see how much time you have left. Here *(point at pattern)* you can see the pattern. Here *(point at gap)* something is missing. Down here *(point at possible options)* you can see different possibilities to fill in the missing space. In this example, which option is the correct one? *(Assuming that the answer is "five")* Exactly, "five" is the correct solution. So we choose five down here. Take good care of what you are pressing, because there is no going back. When you have pressed a number, the next pattern riddle starts.

Is everything clear so far? *(leave some time for questions; answer questions individually and privately)*

Okay, then you can play these riddles for five minutes now. When you are ready, you can press "Next" again, just like before. After 15 seconds at the latest, however, it will continue automatically. Then, your time will run.

Is everything clear so far? *(leave some time for questions; answer questions individually and privately)*

Then, you can start solving the riddles.

(start subsession „Cognitive Ability 2")

(When the time to answer the pattern-riddles is up)

Now, you can complete a questionnaire. If you have any questions, just raise your hand and one of us will come and help you. You can answer the most questions to tick quite quick. Just read the question and tick what you think. To give you a feeling of how long this should take: That is less than 2 minutes per page.

In the questionnaire, we will not ask for your name. That means we have no way of finding out who completed which questionnaire. So, it is completely anonymous. We only know that a questionnaire belongs to a person in this room, but we have no way of finding out to which person, once you have left the room.

There will be a number of questions where you can enter single letters from your name and your parents' names; e.g. the last letter of your fist name. We did so to be able to match your data, in case we will come cack in two years. You have this information and so you will be able to enter the same data again in two years. But for us, it is impossible to do anything with it, because we do not know your parents' names. As I said, we do not even save your name, so we cannot figure out whose questionnaire it was. So this remains anonymous.

Is everything clear so far? *(leave some time for questions; answer questions individually and privately)*

After that, we will go through the rows and pay you. So please just remain seated.

Then, we will give you a stack of sheets with some more questions; I will tell you more about that later.

(start subsession "Questionnaire")

(When all network surveys have been completed)

In the stack of sheets we have just handed out, we are asking for some of your classmates' names who come to your mind when you answer the corresponding question. We will replace the names with codes as soon as you are done, and the columns with the names will stay here and will be shredded. So we will not take them with us and again, we have no possibility of finding out who has given which name. All we know later is thas student A has given students B, C and D in question 1. But we cannot find out who students A, B, C and D are.

To answer the questions, please name only students who are in your class. Students who are not present today can still be named. Please do not mention you friends' names, in case they are not in your class, e.g. friends from your soccer club or something similar. Please do not name them. Only your classmates' names. When you write some names on the answer sheet, please only use full names, so first and last names. Please do not use nicknames or names only you use. If you do not know the full name, please raise your hand and we will help you. Answering the questions, please name the classmates who come to your mind. You are welcome to give more than one name; just do not name all of your classmates. There is no right or wrong here – just write what you think. Please write in block letters and try to write clearly. Do not use more than one minute per page.

Is everything clear so far? *(leave some time for questions; answer questions individually and privately)*

B.2 Questionnaire

Area	#	Question	available	Index
Demographic Information				
	D	I am [female, male]		
	D	Your postcode/I am from [Choice list with possible living areas]		
	D	What grade are you in? [6,8,10,12]		
	D	Your month of birth [1 - 12]		
	D	Your year of birth [Choice list with birth years]		
		Last year, I got the following grades in my report:		
	D	In mathematics [1, 2, 3, 4, 5, 6]		
	D	In german [1, 2, 3, 4, 5, 6]		
	D	I am [Choice list with the most frequent religions]		
	D	How often do you attend religious festivities (e.g. mass, mosque attendance, ...) [spareTimeFrequency]		
	D	Please mark the appropriate statement: [“My parents and I were born in Germany”, “I was born in Germany. One parent was not”, “I was born in Germany. My mother and my father were not”, “I was not born in Germany”]		
	D	My mother has A levels [yes, no]		
	D	My father has A levels [yes, no]		
	D	My parents [“both work full-time (e.g. both father and mother work from monday to friday the whole day)”, “one works full-time, one works part-time”, “both work part-time (e.g. both father and mother only work in the midmorning or only on 2-3 days per week)”, “one works full-time”, “one works part-time”, “work in another regularity”, “currently, both do not work.”]		
	D	Number of younger sisters		
	D	Number of older sisters		
	D	Number of younger brothers		
	D	Number of older brothers		
Income				
	Inc	Approximate amount of pocket money (from my parents, my grandparents, ... altogether) per week [0-50; 0.5]		
	Inc	I have a side job, through which I earn the following amount per week (on average; 0 if no side job) [0-150; 1]		
	Inc	Is your pocket money cut sometimes? [yes, no]		

Inc	Do you get additional pocket money for larger purchases and expenses? [yes, sometimes/it depends, no]		
Inc	Do you regulary get the same amount of money in your side job? [yes, no, I do not have a side job]	10, 12	
Inc	Do you have any influence on it (e.g. because you can decide yourself how often you work)? [yes, no, I do not have a side job]	10, 12	
Domain-Specific Risk-Taking Scale (DOSPERT)			
DOS	How many times did you drink five or more alcoholic beverages on a single evening in 2018?	8, 10, 12	DOS, H*
DOS	How often did you take parts of somebody else's work in 2018 (e.g. copied a longer text from Wikipedia for a presentation or copied some homework)?	10, 12	DOS
DOS	Have you ever skied on a piste that has exceeded your abilities or have you skied off-piste? [yes, no, I do not ski]		
DOS	Have you ever got involved in unprotected sex? [yes, no]	10, 12	DOS, H*
DOS	How many times did you tell a friend's secret to someone else in 2018?		DOS
DOS	How many times in 2018 did you not fasten your seat belt while driving?		DOS, H*
DOS	How often in 2018 did you not wear a helmet when riding a scooter or a motorbike (or similar)?		DOS, H*
DOS	How often did you not use sun protection in 2018 even though you were in the sun for a long time?		DOS, H*
DOS	How often did you copy (from your neighbour, a cheat sheet, . . .) in a class test/exam in 2018?		DOS
DOS	How often did you fake the signature of another person (e.g. your parents) in 2018?		DOS
DOS	Have you ever stolen a small object in a shop (e.g. a pencil or a lipstick)? [yes, no]		DOS
DOS	How often in 2018 did you wear clothes (even on private occasions) that your parents or someone else disagreed with?		DOS
DOS	How many times in 2018 did you steal a small amount of money from someone you know?		DOS ext.
DOS	How many times were you involved in a brawl in 2018?		DOS, H*

DOS	How many times in 2018 did you cross a red light?	DOS, H*
DOS	Have you ever bet an entire week's pocket money (or more)? [yes, no]	DOS*
DOS	How often in 2018 did you not wear a helmet when you rode a bike?	DOS*, H*
DOS	Have you ever met a person you got to know through the Internet/social networks? [yes, no]	DOS*
DOS	If I have forgotten my homework, I will not let anyone know and simply hope that it will not be my turn during the discussion. [yes, yes and no - it depends, no]	DOS*
DOS	Do you use your mobile phone in traffic other than for navigation (e.g. when you are driving a car, scooter or bicycle, when you are crossing the road, . . .)? [yes, no]	DOS*
General Impatience Scale		
GIS	It is not uncommon for me to procrastinate some activities. [levelOfApproval]	T
GIS	I always do my homework as early as possible. [levelOfApproval]	T
GIS	Playing an instrument (e.g. in music school, band, at home... [spareTimeFrequency]	T*
Savings and Credit:		
SC	How do you handle your pocket money/income? ["I spend everything quickly", "I save less than the half", "I save approximately the half", "I save more than the half", "I save everything"]	S, CS
SC	Assuming that you get 50 euros for christmas or for your birthday. What will you do with the money? ["I spend everything quickly", "I save less than the half", "I save approximately the half", "I save more than the half", "I save everything"]	S, CS
SC	Do you have a bank account? [yes, no]	S, CS
SC	Do you borrow money from your parents? ["Yes, actually every month", "Yes, several times per year (more than 4 times per year; but not every month)", "Yes, rarely (less than 4 times per year)", "No, never"]	C, S, CS
SC	Do you have a credit card? [yes, no]	C, S, CS
Risky Investment		
Inv	Do you know what a stock is? [yes, no]	Inv

Inv	Do you have any stocks? [yes, no]		Inv
Inv	Do you think you will buy some stocks in the future? [yes, no]		Inv
Inv	Have you ever used money, that was originally intended for something else at a subsequent date (e.g. for holidays or a present), for a bet or invested it in stocks? [yes, no]		Inv
Financial Insurance			
Ins	Do you have a cell phone insurance? [yes, no, I do not know]		Ins
Ins	Did you take it out yourself? [yes, no, I do not have a cell phone insurance resp. I do not know if I have one]		Ins
Ins	Do you have a bike insurance? [yes, no, I do not know]		Ins
Ins	Did you take it out yourself? [yes, no, I do not have a bike insurance resp. I do not know if I have one]		Ins
General Prevention Effort			
P1	I mutually interchange secrets with my friends to make sure they do not disclose mine. [0-5]		P1
P1	To make sure that I can always use my mobile phone and can be reached, I have a powerbank with me. [0-5]		H*, SP*, P1
P1	Because the others do the same, I prefer to go to the bakery or to the kiosk instead of taking food from home. [0-5]		P1, P1
P1	Because I think of packing something to eat and drink during longer journeys by bus, train or car I am not hungry or thirsty in such situations. [0-5]		P1
P1	When the class is divided up into groups, I make sure that I have at least one student in my group who is good at the subject in question. [0-5]		P1
P1	Because (romantic) relationships sometimes go better and sometimes worse, I invest time in relationships with good friends and my family - they are always there for me. [0-5]	8, 10, 12	P1
P2	When packing, do you use a packing list to make sure you do not forget anything important? [yes, no]		P2, DOS*
P2	Instead of using illegal streaming sites, I prefer to use Netflix, Amazon Prime Video or similar services and pay for that. [yes, no]		P2, DOS*
P2	I brush my teeth as often and as long as I should. [0-5]		P2
P2	I pay attention to my diet: that it is healthy and balanced, not too much and not too little. [0-5]		P1, P2

P2	For some subjects, I study more in order to compensate for a worse grade in another subject, for example because I do not like the other subject, or because the tests/exams are often very difficult. [0-5]		P2
P2	Because the risk of being caught copying, for example from a cheat sheet, is much too high for me, I prefer to learn more and refrain from copying. [0-5]		P2
P2	On average: How long do you prepare for a test or an exam? ["more than one week", "approximately one week", "a few days", "one day"]		P2
P2	Because I do not know yet what I would like to become later, I try to get good grades to keep all possibilities open to me. [yes, no]		P2
P2	If I have to give a presentation at school using PowerPoint, I will always have two options to access the file (e.g. via my e-mail address and an USB stick) or I have the presentation as a PDF file with me. [0-5]	10, 12	P2
P2	when looking for a (side) job, an internship or even a university place, it makes sense to send further applications until you have received a written confirmation of the desired option, even if it has already been confirmed orally. [yes, no]	8, 10, 12	P2
P2	Every now and then, I check whether the vaccinations according to my vaccination card are up-to-date. [yes, no]	8, 10, 12	P2
Pro-Environmental behavior			
E	I buy second-hand products, for example second-hand clothes, mobile phones, laptops, or the like. [0-5]		E
E	If I leave my room for several hours, I will turn down the heating. [0-5]		E
E	If I am the last to leave the room, I will turn off the light. [0-5]		E
E	If I do not need the water while showering, I will turn it off. [0-5]		E
E	If currently noone is watching, the TV will be turned off. [0-5]		E
E	If I do not use the computer/laptop for a considerable time, I will turn it off resp. put it into the power-saving mode. [0-5]		E
E	When I do the shopping, I use my own bag or backpack. [0-5]		E
E	At school or on the way, I use my own beverage bottle (made of glass or metal). [0-5]		E

E	I use my own cup for coffee or hot chocolate. [0-5]		E
E	I try using the bike, wherever it is possible. [0-5]		E
E	I seperate my waste to the best of my knowledge and belief. [0-5]		E
E	If you go to the bathroom, wash your hands and there are only paper towels to dry your hands: How many paper towels do you take? [0-10]		E
E	When you are in the canteen, how many napkins do you take on your tray? [0-10]		E
E	If you smoke (otherwise leave the question unanswered): I throw the cigarettes on the ground after smoking. [0-5]	8, 10, 12	E
Health related behavior			
H	Body height (in cm)		H
H	Body weight (in kilograms (kg))		H
H	When I take a photo with my cell phone or experience a special situation, I immediately think about posting it on Facebook, Instagram, Snapchat or the like. [0-5]		H, A, SA
H	I get into trouble with my parents or friends or with my girlfriend resp. my boyfriend, because I use my smartphone that much. [0-5]		H, A, SA
H	I feel uncomfortable (e.g. nervous or fretful or disquiet or a bit sad) when I cannot use my smartphone for a considerable time, because of an empty battery, no signal, or because my smartphone was taken away. [0-5]		H, A, SA
H	When I feel bad or when I face a difficult task, I distract myself with my smartphone. [0-5]		H, A, SA
H	My smartphone disturbs me while doing my homework or studying. [0-5]		H, A, SA
H	I often check my phone while eating with my family to see if there are any news. [yes, no]		H, A, SA
H	Sports (soccer, volleyball, dancing, running, ...) [spareTime-Frequency]		H
H	Do you smoke cigarettes? [“I do not smoke”, “I do not smoke, but I have tried it”, “I smoke approx. 1-2 cigarette(s) per day”, “I smoke approx. one pack of cigarettes per week”, “I smoke more than one pack of cigarettes per week”]	8, 10, 12	H, A

H	Do you drink any alcohol? ["no, never", "yes, rarely (up to 1-2x per month)", "yes, occasionally, one to two drinks (up to 1-2x per week)", "yes, occasionally, more than two drinks (up to 1-2x per week)", "yes, regulary (more often than 2x per week)"]	8, 10, 12	H, A
Preference for competitive Income			
C	Later, I would like to be self-employed, e.g. as a craftsman, an architect, a cafe owner, etc. [yes, no]		CI
C	Later, I would like to be a civil servant, e.g. as a teacher, a policeman, in a city's administration or at the tax office, etc. [yes, no]		CI
C	For the riddles, we will pay a few thalers for each correct solution. Although we will not change that: Would you prefer a fixed amount of thalers for your payment, regardless of the number of riddles that you have solved correctly? [yes, no]		CI
C	Or alternatively, would you like to make a small competition out of it? We would allot you a classmate from the room, and the one of you who would have solved more riddles correctly, would get the partner's fixed payment and additionally his own fixed payment. However, the other one would get nothing. [yes, no]		CI
Survey Questions			
SQ	Compared to others, are you generally willing to renounce something to benefit from that in the future? Or are you, compared to others, not willing to do so? Please tick one of the boxes on the scale, whereby the value 0 means: "not at all willing to do so", and the value 10 means: "very willing to do so". With the values in between you can graduate your assessment. [0-10]		SQ
SQ	How do you assess yourself: Are you generally a person who is ready to take risks or do you try to avoid risks? Please tick one of the boxes on the scale, whereby the value 0 means: "not at all ready to take risks" and the value 10 means: "very ready to take risks". With the values in between you can graduate your assessment. [0-10]		SQ
SQ	In general, are you also ready to take risks even when something really bad can happen or do you try to avoid risks like that? Please tick one of the boxes on the scale, whereby the value 0 means: "not at all ready to take risks" and the value 10 means: "very ready to take risks". With the values in between you can graduate your assessment. [0-10]		SQ

Optimal Choice Under Risk

O	Imagine in the next vocabulary test 10 words from the last lesson of the last school year are asked in addition to the current lesson. How much longer are you going to study? ["0 minutes", "10 minutes", "20 minutes", "30 minutes", "45 minutes", "1 hour", "1 hours, 30 minutes", "2 hours", "2 hours, 30 minutes", "3 hours", "4 hours", "5 hours", "6 hours", "7 hours"]	
O	Imagine you would like to visit us at the Max-Planck-Institute and have an appointment with us. According to Google Maps you need 20 minutes by bike from the main station in Bonn, where you start either with your own bike or with a borrowed one. However, there are three traffic lights on the route, all of which can be either red or green - or any combination of the two. How many minutes/hours before the meeting should you start at the main station? ["1 hour", "55 minutes", "50 minutes", "45 minutes", "40 minutes", "35 minutes", "30 minutes", "25 minutes", "20 minutes", "15 minutes"]	
O	Imagine you have to hand in an important document of several pages printed and bound at a certain time (e.g. 12 noon), e.g. a seminar paper or a longer presentation with classmates. You decide to have this done in a copy shop right next to the place where you have to hand in the document. Also, imagine you could go there from home and that would take 10 minutes. It is always possible that the USB stick is not readable, the format is wrong, the file is not readable or there are five customers ahead of you. The printing itself and the binding do not last longer than 15 minutes. How many minutes/hours before handing in do you start going to the copy shop from home? ["20 minutes", "25 minutes", "30 minutes", "35 minutes", "40 minutes", "45 minutes", "50 minutes", "55 minutes", "1 hour", "1 hours, 15 minutes", "1 hour, 30 minutes", "1 hours, 45 minutes", "2 hours", "2 hours, 30 minutes", "3 hours"]	10, 12

Own Expenditure and Beliefs About Friends' Expenditures'

	How much of your available money (pocket money, side job) do you spend on the following things:
Exp	mobile phone bill
Exp	(computer-)games and toys
Exp	clothes

Exp	magazines, journals and music		
Exp	going out and cinema		
Exp	food and drinks		
Exp	cosmetic products		
Exp	sweets		H*
Exp	sports-, music- and other events	8, 10, 12	
Exp	cigarettes	8, 10, 12	H*
Exp	alcoholic drinks	8, 10, 12	H*
	And your friends - what do you think, how much of their available money (pocket money, side job) do they spend on the following things?		
BFE	mobile phone bill		
BFE	(computer-)games and toys		
BFE	clothes		
BFE	magazines, journals and music		
BFE	going out and cinema		
BFE	food and drinks		
BFE	cosmetic products		
BFE	sweets		
BFE	sports-, music- and other events	8, 10, 12	
BFE	cigarettes	8, 10, 12	
BFE	alcoholic drinks	8, 10, 12	
Beliefs about Friends' Income			
BFI	I think my friends get about the following amount of pocket money per week [0-50; 0.5]		
BFI	I think my friends earn (on average) about the following amount in their side job per week [0-150;1]		

C Appendix: German Original Instructions and Questionnaire (For Online Publication)

C.1 Instructions (German)

Hallo und herzlich willkommen zu unserer Studie. Schön, dass ihr hier seid und mitmachen wollt. In den nächsten 45 Minuten werden wir ein paar "Entscheidungsspiele" mit euch spielen, ihr dürft ein paar Rätsel bearbeiten und anschließend einen Fragebogen ausfüllen. Ihr dürft fast alles auf einem Tablet machen und wir erklären alles ausführlich der Reihe nach. Wir erklären, dann dürft ihr aktiv werden, und danach erklären wir den nächsten Schritt. Wir fangen mit den Spielen an.

(In der Session mit den älteren Schülern): Noch ein Kommentar zu den Erklärungen. Da wir eine wissenschaftliche Studie machen, ist es wichtig, dass wir immer die gleichen Erklärungen machen. Da wir die Studie auch mit jüngeren Schülern durchführen, sind die Erklärungen teilweise ausführlicher, als das sonst nötig wäre. Das hat also nichts mit euch zu tun, wenn euch das etwas länglich erscheint, aber wir müssen das so machen und es stellt auch sicher, dass ihr wirklich alles ganz genau versteht.

Redet ab jetzt bitte nicht mehr miteinander, lasst euer Handy wo es ist bzw. legt es weg, wenn ihr es gerade in der Hand haltet und hört gut zu. Ihr könnt in den Spielen Geld verdienen. Das Geld werden wir euch in bar am Ende des Experiments auszahlen oder aber ihr bekommt es in einem Briefumschlag - mehr dazu später. Wieviel Geld ihr verdienen könnt, hängt von euren Antworten und Entscheidungen ab. Daher ist es wichtig, dass ihr die Regeln versteht. Hört also bitte gut zu! Wir werden öfter eine Pause machen, sodass ihr Fragen stellen könnt. Hebt dazu einfach die Hand, einer von uns wird dann zu euch kommen um eure Frage zu beantworten.

Alles klar soweit? *(Zeit lassen für Fragen; Fragen persönlich und vertraulich beantworten)*

Im ersten Spiel sollt ihr viermal entscheiden, ob ihr einen bestimmten Geldbetrag lieber heute haben wollt, oder einen etwas größeren Geldbetrag in 3 Wochen. Hier seht ihr so eine Entscheidungssituation. *(Slide der Präsentation, die die Zeitpräferenz-Entscheidungssituation abbildet, zeigen.)* So sieht das dann aus. Hier links seht ihr den Geldbetrag, den ihr sofort bekommen würdet, in diesem Beispiel sind das 100 Taler. Rechts steht der Betrag, den ihr in drei Wochen bekommen würdet, im Beispiel 120 Taler.

Wenn ihr also sagt, für 20 Taler mehr, da würde ich bei einer Höhe von 100 Taler schon auch drei Wochen warten - welche Option müsst ihr dann wählen? *(Angenommen, die Antwort ist rechts)* Genau, dann müsst ihr die rechte Option wählen. Wenn ihr die 100 Taler allerdings lieber heute hättet, müsst ihr entsprechend die linke Option wählen. Wir rechnen die Taler in Euro um, und 100 Taler sind ungefähr

- Klasse 6: 2 Euro.
- Klasse 8: 2 Euro 50.
- Klasse 10: 3 Euro 50.

- Klasse 12: 5 Euro 50.

Überlegt also gut, was euch lieber ist.

Eure Entscheidung könnt ihr einfach durch Tippen auf den "L" oder "R" Button eingeben.

Alles klar soweit? *(Zeit lassen für Fragen; Fragen persönlich und vertraulich beantworten)*

Zur Auszahlung: Zusätzlich zu den Entscheidungsspielen haben wir noch ein paar Rätselfragen. Pro richtig gelöstem Rätsel bekommt ihr zusätzlich Geld.

Wir werden außer diesem Spiel noch weitere zwei Arten von Spielen mit euch spielen. Ihr werdet dabei insgesamt rund 25 Entscheidungen treffen, und eine dieser Entscheidungen wird in echt ausgezahlt.

Aus den drei Arten von Entscheidungsspielen wählt euer Tablet zufällig eines aus und wählt außerdem zufällig die Nummer der Entscheidung aus. Da ihr bis zum Schluss nicht wissen werdet, welche Entscheidung ausbezahlt wird, ist es wichtig, dass ihr jede Entscheidung ernst nehmt.

Wenn dieses Spiel vom Tablet zufällig zur Auszahlung ausgewählt wird, dann bekommt ihr euer Geld entweder heute oder in drei Wochen - je nachdem, wie ihr entschieden habt.

Solltet ihr euch für eine Zahlung in drei Wochen entschieden haben und diese Entscheidung zufällig zur Auszahlung ausgewählt werden, könnt ihr das Geld in drei Wochen im Sekretariat abholen.

Alles klar soweit? *(Zeit lassen für Fragen; Fragen persönlich und vertraulich beantworten)*

Falls eine oder einer von euch nicht teilnehmen möchte, lasst es uns bitte jetzt wissen. Ihr werdet auch später zu jedem Zeitpunkt aufhören können. Hebt dafür einfach die Hand - einer von uns kommt dann zu euch und bespricht das weitere Vorgehen.

Möchte jemand jetzt aufhören oder habt ihr Fragen? *(Zeit lassen für Meldungen bzw. Fragen; Fragen persönlich und vertraulich beantworten; bei Abbruch ID-Nummer des Tablets zusammen mit der jeweiligen Session notieren, um Datensatz löschen zu können.)*

(Bildschirmpräsentation mit Druck auf Taste "B" auf schwarz stellen)

Okay, dann werden wir jetzt die Entscheidungsspiele spielen. *(Session starten) (Wenn alle soweit ihre Entscheidungen getätigt haben)* Jetzt dürft ihr 18 mal entscheiden, ob ihr lieber einen bestimmten Betrag sicher haben oder aber mit uns eine Münze werfen wollt, und am Ende entweder einen höheren oder aber einen niedrigeren Betrag als den sicheren Betragt haben wollt. Wir werden die Beträge in den 18 Entscheidungssituationen verändern.

Eine solche Situation sieht zum Beispiel so aus *(Slide der Präsentation, die die Münzwurf-Entscheidungssituation abbildet, zeigen).* Wir haben hier links eine Münze, und egal, ob die Münze auf der weißen oder auf der schwarzen Seite zum Liegen kommt, bekommt ihr 70 Taler. Diesen Betrag bekommt ihr also sicher; das zeigen wir damit, dass sowohl für weiß *(auf oberen Pfeil zeigen)* als auch für schwarz *(auf unteren Pfeil zeigen)* am Ende 70 Taler stehen. Hier rechts *(auf rechte Option zeigen)* sieht das anders aus. Hier bekommt ihr 140 Taler, wenn die Münze weiß

zeigt *(auf oberen Pfeil zeigen)*, also auf der schwarzen Seite liegt. Wenn die Münze nun aber schwarz zeigt *(auf unteren Pfeil zeigen)*, bekommt ihr 0 Taler - also nichts.

Ihr müsst also entscheiden, ob ihr lieber 70 Taler sicher nach Hause nehmen oder lieber die Chance haben wollt, 140 Taler zu bekommen, wobei ihr eben auch leer ausgehen könnt. Wenn ihr also sagt: "Ich möchte lieber die Chance haben, 140 Taler zu bekommen, und nehme das Risiko in Kauf, bei diesem Münzwurf auch leer auszugehen", welche Option müsst ihr dann wählen? *Angenommen, die Antwort ist "rechts")* Genau, ihr müsst die rechte Option wählen. Andererseits, wenn ihr sagt, ihr wollt lieber auf Nummer Sicher gehen, dann müsst ihr die linke Option wählen.

Um eure Entscheidung einzugeben, tippt bitte einfach auf den Button unter der Option, die ihr lieber hättet. Weil die Entscheidungssituationen auf den ersten Blick sehr ähnlich aussehen, müsst ihr zusätzlich auf "Weiter" drücken *(auf "Weiter"-Button zeigen)*, um sicherzustellen, dass ihr nicht versehentlich noch einmal die gleiche Antwort für eine andere Situation wählt.

Alles klar soweit? *(Zeit lassen für Fragen; Fragen persönlich und vertraulich beantworten)*

Zur Auszahlung hier: Nehmen wir jetzt mal an, der Computer hätte die Entscheidung 1 des Münzwurfs ausgewählt.

Nehmen wir jetzt zusätzlich an, dass ihr euch für die linke Option entschieden hättet. Dann bekommt ihr einfach 70 Taler. Hättet ihr euch hingegen für die rechte Option entschieden, wirft euer Tablet eine Münze. Zeigt die Münze weiß, hättet ihr in diesem Beispiel also 140 Taler bekommen. Wie gesagt rechnen wir die Taler später in Euro um. 140 Taler sind das meiste, was ihr hier mit diesem Spiel verdienen könnt. Das sind ungefähr

- Klasse 6: 2,75 Euro
- Klasse 8: 3,50 Euro
- Klasse 10: 5,00 Euro
- Klasse 12: 7,75 Euro

Überlegt euch also gut, wie ihr entscheidet.

Alles klar soweit? *(Zeit lassen für Fragen; Fragen persönlich und vertraulich beantworten)*

(Bildschirmpräsentation mit Druck auf Taste „B" auf schwarz stellen)

(Subsession Certainty Equivalents starten)

(Wenn alle soweit ihre Entscheidungen getätigt haben)

Im letzten der drei Spiele müsst ihr in verschiedenen Situationen wählen, ob ihr lieber einen Ball aus einem Beutel, nennen wir ihn Beutel L für links, oder einen Ball aus einem anderen Beutel, den nennen wir Beutel R für rechts, ziehen wollt. Das passiert natürlich, ohne dass ihr in den Beutel schauen könnt, also ihr könnt euch nicht den Ball raussuchen, den ihr gerne hättet. Ihr zieht einen Ball zufällig. Die Beutel sehen jeweils so aus wie auf diesem Bild hier *(Slide der Präsentation, die die Urnen-Entscheidungssituation abbildet, zeigen).* Ihr seht, in jedem Beutel sind vier Bälle. Die Zahl auf den Bällen gibt an, wieviel Taler ihr bekommt, wenn ihr den entsprechenden Ball zufällig zieht. Zum Beispiel hier *(auf Ball mit der 50, markiert*

mit R, zeigen), auf dem roten Ball - R steht für rot, G steht für grün, B steht für blau - da steht 50 drauf. Wenn ihr also diesen Ball zufällig zieht, bekommt ihr 50 Taler. Wie gesagt, ihr dürft nicht in den Beutel schauen, ihr könntet also jeden der vier Bälle ziehen, und die Chancen, jeden dieser Bälle zu ziehen, sind gleich. Das heißt wenn ihr hier aus dem rechten Beutel zieht, sind die Chancen, dass ihr einen Ball mit einer 50 zieht und 50 Taler bekommt, doppelt so groß, wie die Chance einen Ball mit einer 80 oder 120 zu ziehen, ganz einfach, weil hier zwei Bälle mit einer 50 drin sind.

Ihr dürft nur einen Ball ziehen und nur einmal pro Entscheidungssituation wählen, aus welchem Beutel ihr ziehen wollt. In der nächsten Entscheidungssituation dürft ihr dann wieder aus einem anderen Beutel ziehen. Insgesamt gibt es drei solcher Entscheidungssituationen.

Alles klar soweit? *(Zeit lassen für Fragen; Fragen persönlich und vertraulich beantworten)*

Okay. Wenn ihr in dieser Situation jetzt denkt: "Ich möchte lieber größere Chancen auf eine recht hohe Zahlung, auch wenn ich dabei am Ende mit dem kleinsten Betrag heim gehen könnte" aus welchem Beutel möchtet ihr dann hier ziehen, welche Option bevorzugt ihr? Ziehen aus dem Beutel links oder aus dem Beutel rechts? *(Angenommen, die Antwort ist links)* Genau, dann müsst ihr links wählen. Wenn ihr aber denkt: "Auch wenn die Chancen, den kleinen Betrag zu ziehen höher sind - so klein ist er im Vergleich auch nicht - und außerdem könnte ich ja auch den höchsten Betrag ziehen" – dann müsst ihr die rechte Option wählen.

Um eure Entscheidung einzugeben, tippt bitte einfach auf den Button unter dem Beutel, aus dem ihr lieber ziehen wollt.

Alles klar soweit? *(Zeit lassen für Fragen; Fragen persönlich und vertraulich beantworten)*

(Bildschirmpräsentation mit Druck auf Taste "B" auf schwarz stellen)

(Subsession Urn starten)

(Wenn alle soweit ihre Entscheidungen getätigt haben)

Im nächsten Teil unserer Studie wollen wir euch ein paar Rätselfragen stellen. Wir haben zwei Arten von Rätselfragen mitgebracht: Die erste Art von Rätsel besteht darin, einem Symbol eine Zahl zuzuordnen. Und zwar möglichst schnell. Das Ziel ist, in zwei Minuten so vielen Symbolen wie möglich die korrekte Zahl zuzuordnen. *(Slide der Präsentation, die den Symbol-Digit-Test abbildet, zeigen.)* Hier oben *(auf Zuordnungstabelle zeigen)* seht ihr, welche Zahl zu welchem Symbol gehört. Diese Tabelle werdet ihr immer sehen. Hier in der Mitte *(auf Symbol in der Mitte zeigen)* wird dann zufällig ein Symbol ausgewählt. Eure Aufgabe ist es nun, so schnell wie möglich hier unten *(auf die Buttons zeigen)* die richtige Zahl zu drücken. Was ist jetzt hier die richtige Zahl? *(Angenommen, die Antwort ist acht)* Genau, hier ist acht richtig, und ihr müsst die acht hier wählen *(auf acht zeigen)*. Passt gut auf, was ihr drückt, weil es hier kein Zurück gibt. Wenn ihr eine Zahl gedrückt habt, kommt die nächste Aufgabe mit dem nächsten Symbol und ihr sollt wieder die zugehörige Zahl wählen. Insgesamt dauert das zwei Minuten und hier oben *(auf Zeit zeigen)* seht ihr, wie viel Zeit ihr insgesamt noch habt.

Zusammen für die Rätselspiele, die ihr gleich spielt, und die, die danach kommen, bekommen diejenigen, die am meisten richtig haben, ungefähr

- Klasse 6: 1,40 Euro
- Klasse 8: 1,75 Euro
- Klasse 10: 2,50 Euro
- Klasse 12: 3,90 Euro.

Wer weniger Rätsel richtig gelöst hat, bekommt entsprechend weniger; gebt euch also Mühe!

Alles klar soweit? *(Zeit lassen für Fragen; Fragen persönlich und vertraulich beantworten)*

Okay, dann dürft ihr diese Rätsel jetzt für eineinhalb Minuten spielen. Wenn ihr bereit seid, könnt ihr "Weiter" drücken, aber spätestens nach 15 Sekunden geht es auch automatisch weiter, und ab dann läuft die Zeit. Eineinhalb Minuten, so viel und so richtig wie möglich.

Alles klar soweit? *(Zeit lassen für Fragen; Fragen persönlich und vertraulich beantworten)*

(Bildschirmpräsentation mit Druck auf Taste "B" auf schwarz stellen)

(Subsession "Cognitive Ability 1" starten)

(Wenn die Zeit zur Beantwortung des Symbol-Digit-Tests abgelaufen ist)

Nun kommen wir zur zweiten Art von Rätselfragen. Hier bekommt ihr verschiedene Muster gezeigt, und jeweils ein Muster fehlt. Es gibt verschiedene Möglichkeiten, die fehlende Stelle auszufüllen, und diese Möglichkeiten werden euch angezeigt. Ihr sollt dann die Nummer der Möglichkeit wählen, die passt. Wir zeigen euch insgesamt 10 solcher Muster und ihr habt 5 Minuten Zeit. *(Slide der Präsentation, die den Matrizentest abbildet, zeigen.)* Das sieht zum Beispiel so aus: Hier oben *(auf Zeit zeigen)* seht ihr, wieviel Zeit ihr noch habt. Hier *(auf Muster zeigen)* seht ihr das Muster. Hier *(auf Lücke zeigen)* fehlt etwas. Hier unten *(auf mögliche Optionen zeigen)* seht ihr verschiedene Möglichkeiten, um die fehlende Stelle auszufüllen. Welche ist in diesem Beispiel die richtige Möglichkeit? *(Angenommen, die Antwort ist "fünf")* Genau, "fünf" ist die richtige Lösung. Wir wählen hier unten also fünf aus. Passt gut auf, was ihr drückt, weil es hier kein Zurück gibt. Wenn ihr eine Zahl gedrückt habt, kommt das nächste Musterrätsel für euch.

Alles klar soweit? *(Zeit lassen für Fragen; Fragen persönlich und vertraulich beantworten)*

Okay, dann dürft ihr diese Rätsel jetzt für fünf Minuten spielen. Wenn ihr bereit seid, könnt ihr wieder "Weiter" drücken, wie vorhin auch schon. Nach spätestens 15 Sekunden geht es aber auch automatisch weiter. Dann läuft eure Zeit.

Alles klar soweit? *(Zeit lassen für Fragen; Fragen persönlich und vertraulich beantworten)*

Dann könnt ihr gleich mit den letzten Rätselfragen starten.

(Subsession „Cognitive Ability 2" starten)

(Wenn die Zeit zur Beantwortung der Muster-Rätsel abgelaufen ist)

Nun dürft ihr noch einen Fragebogen beantworten. Wenn ihr dabei Fragen habt, hebt bitte einfach die Hand, einer von uns kommt dann zu euch und hilft euch. Die meisten Fragen zum Ankreuzen sind recht schnell zu beantworten. Lest einfach die

Frage, und kreuzt an, was ihr denkt. Um euch ein Gefühl zu geben, wie lange das dauern sollte: Das sind pro Seite, die gezeigt wird, unter 2 Minuten.

Wir fragen auf dem Fragebogen nicht nach eurem Namen. Das heißt, wir haben keine Möglichkeit, herauszufinden, wer welchen Fragebogen ausgefüllt hat. Das ist also komplett anonym. Wir wissen lediglich, dass ein Fragebogen zu einer Person hier im Raum gehört, haben aber keine Möglichkeit herauszufinden, zu welcher Person, sobald ihr den Raum verlassen habt.

Es wird eine Reihe von Fragen geben, bei denen ihr einzelne Buchstaben aus euren Namen und den Namen eurer Eltern angeben dürft; z.B. den letzten Buchstaben eures Vornamens. Das haben wir gemacht, falls wir in zwei Jahren wieder kommen, um eure Daten zusammen bringen zu können. Diese Informationen habt ihr und könnt damit in zwei Jahren dieselben Daten wieder angeben. Für uns ist es allerdings unmöglich, damit etwas anzufangen, weil wir ja nicht wissen, wie eure Eltern heißen. Wir speichern ja wie gesagt nicht einmal euren Namen, können also nicht darauf kommen, wessen Fragebogen das war. Das bleibt also dadurch anonym.

Alles klar soweit? *(Zeit lassen für Fragen; Fragen persönlich und vertraulich beantworten)*

Im Anschluss daran werden wir durch die Reihen gehen und euch bezahlen. Bleibt bitte also einfach sitzen.

Dann geben wir euch noch einen Stapel von Blättern mit einigen weiteren Fragen; dazu sage ich später mehr.

(Subsession "Questionnaire" starten)

(Wenn alle Network Surveys ausgefüllt wurden)

In dem Stapel von Blättern, den wir gerade ausgeteilt haben, fragen wir nach Namen von einigen Mitschülern von euch, die euch bei den entsprechenden Fragen einfallen. Wir werden die Namen, sobald ihr fertig seid, durch Codes ersetzen, und die Spalten mit den Namen bleiben hier und werden geshreddert. Die nehmen wir also nicht mit, und wir haben wieder keine Möglichkeit, herauszufinden, wer was angegeben hat. Alles, was wir später wissen, ist, dass Schüler A bei Frage 1 Schüler B, C und D angegeben hat. Wer aber Schüler A, B, C und D sind, können wir nicht mehr herausbekommen.

Bitte nennt zur Beantwortung der Fragen nur Namen von Schülern, die in eurer Klasse sind. Schülerinnen oder Schüler, die heute nicht anwesend sind, können trotzdem genannt werden. Bitte nennt keine Namen von Freunden, die nicht in dieser Klasse sind, z.B. aus eurem Fußballverein oder Ähnlichem. Die bitte nicht nennen. Nur Namen von Mitschülerinnen und Mitschüler. Wenn ihr Namen auf den Antwortbogen schreibt, verwendet bitte nur ganze Namen, also Vor- und Nachnamen. Bitte verwendet keine Namen, die nur ihr verwendet oder andere Spitznamen. Wenn ihr den vollständigen Namen nicht kennt, meldet euch bitte und wir werden euch helfen. Nennt als Antwort auf die Fragen die Namen eurer Mitschüler, die euch bei der jeweiligen Frage einfallen. Ihr könnt gern mehrere Namen nennen; nennt nur nicht alle eure Mitschüler. Es gibt hier kein richtig oder falsch - schreibt einfach, was ihr denkt. Bitte schreibt in Druckbuchstaben und gebt euch Mühe, deutlich zu schreiben. Verwendet pro Seite nicht mehr als eine Minute.

Alles klar soweit? *(Zeit lassen für Fragen; Fragen persönlich und vertraulich beantworten)*

C.2 Questionnaire (German)

Area	#	Question	available	Index
Demographic Information				
D		Ich bin [weiblich, männlich]		
D		Deine Postleitzahl/Ich komme aus [Choice list with possible living areas]		
D		In welcher Klassenstufe bist du? [6,8,10,12]		
D		Dein Geburtsmonat [1 - 12]		
D		Dein Geburtsjahr [Choice list with birth years]		
		Letztes Jahr habe ich folgende Noten im Zeugnis bekommen:		
D		In Mathematik [1, 2, 3, 4, 5, 6]		
D		In Deutsch [1, 2, 3, 4, 5, 6]		
D		Ich bin [Choice list with the most frequent religions]		
D		Wie oft besuchst du religiöse Feiern (z.B. Gottestdienst, Moscheebesuch, ...) [spareTimeFrequency]		
D		Bitte markiere die zutreffende Aussage: [“Meine Eltern und ich wurden in Deutschland geboren”, “Ich wurde in Deutschland geboren. Ein Elternteil nicht”, “Ich wurde in Deutschland geboren. Meine Mutter und mein Vater nicht”, “Ich wurde nicht in Deutschland geboren”]		
D		Meine Mutter hat (Fach-)Abitur [ja, nein]		
D		Mein Vater hat (Fach-)Abitur [ja, nein]		
D		Meine Eltern arbeiten [“beide Vollzeit (z.B. Vater und Mutter jeweils Montag bis Freitag den ganzen Tag)”, “einer Vollzeit, einer Teilzeit”, “beide Teilzeit (z.B. Vater und Mutter nur am Vormittag oder nur an 2-3 Tagen in der Woche”, “einer Vollzeit”, “einer Teilzeit”, “in einer anderen Regelmäßigkeit”, “zur Zeit beide nicht”]		
D		Anzahl jüngerer Schwestern		
D		Anzahl älterer Schwestern		
D		Anzahl jüngerer Brüder		
D		Anzahl älterer Brüder		
Income				
Inc		Ungefährer Taschengeldbetrag (von meinen Eltern, Großeltern, ... insgesamt) pro Woche [0-50; 0.5]		
Inc		Ich habe einen Nebenjob, durch den ich pro Woche (im Schnitt) den folgenden Betrag verdiene (0 falls keinen Nebenjob) [0-150; 1]		

Inc	Wird dir manchmal das Taschengeld gekürzt? [ja, nein]		
Inc	Bekommst du für größere Anschaffungen und Ausgaben zusätzlich zu deinem Taschengeld weiteres Geld? [ja, manchmal/kommt darauf an, nein]		
Inc	Bekommst du in deinem Nebenjob regelmäßig denselben Betrag? [ja, nein, habe keinen Nebenjob]	10, 12	
Inc	Hast du einen Einfluss darauf (z.B. weil du selbst entscheiden kannst, wie oft du arbeitest)? [ja, nein, habe keinen Nebenjob]	10, 12	
Domain-Specific Risk-Taking Scale (DOSPERT)			
DOS	Wie oft hast du im Jahr 2018 fünf oder mehr alkoholische Getränke an einem einzigen Abend zu dir genommen?	8, 10, 12	DOS, H*
DOS	Wie oft hast du im Jahr 2018 Teile aus einer fremden Arbeit übernommen (z.B. einen längeren Text aus Wikipedia für ein Referat kopiert oder Hausaufgaben abgeschrieben)?	10, 12	DOS
DOS	Hast du schon einmal eine Skipiste befahren, die deine Fähigkeiten überstiegen hat oder bist abseits der Piste gefahren? [ja, nein, fahre kein Ski]		
DOS	Hast du dich schon einmal auf ungeschützten Sex eingelassen? [ja, nein]	10, 12	DOS, H*
DOS	Wie oft hast du im Jahr 2018 ein Geheimnis einer Freundin oder eines Freundes jemand anderem verraten?		DOS
DOS	Wie oft hast du dich im Jahr 2018 beim Autofahren nicht angeschnallt?		DOS, H*
DOS	Wie oft hast du im Jahr 2018 beim Roller- oder Motorradfahren (oder ähnlichem) keinen Helm getragen?		DOS, H*
DOS	Wie oft hast du im Jahr 2018 keinen Sonnenschutz benutzt, obwohl du längere Zeit in der Sonne warst?		DOS, H*
DOS	Wie oft hast du im Jahr 2018 in einer Klassenarbeit/Klausur abgeschrieben (von deinem Nachbarn, einem Spickzettel, ...)		DOS
DOS	Wie oft hast du im Jahr 2018 die Unterschrift einer anderen Person (z.B. deiner Eltern) gefälscht		DOS
DOS	Hast du schon einmal einen kleinen Gegenstand in einem Geschäft geklaut (z.B. einen Stift oder einen Lippenstift?) [ja, nein]		DOS
DOS	Wie oft hast du im Jahr 2018 Kleidung (auch bei privaten Anlässen) getragen, mit der deine Eltern oder jemand anderes nicht einverstanden waren?		DOS

DOS	Wie oft hast du im Jahr 2018 eine geringfügige Menge an Geld von jemand entwendet, den du kennst?	DOS ext.
DOS	Wie oft warst du im Jahr 2018 an einer Schlägerei beteiligt?	DOS, H*
DOS	Wie oft hast du im Jahr 2018 eine Ampel bei rot überquert?	DOS, H*
DOS	Hast du schon einmal das Taschengeld einer ganzen Woche (oder mehr) verwettet? [ja, nein]	DOS*
DOS	Wie oft hast du im Jahr 2018 beim Fahrradfahren keinen Helm getragen?	DOS*, H*
DOS	Hast du dich schon einmal mit einer Person getroffen, die du über das Internet/soziale Netzwerke kennen gelernt hast? [ja, nein]	DOS*
DOS	Wenn ich die Hausaufgaben vergessen habe, sage ich nicht Bescheid und hoffe einfach, bei der Besprechung nicht dranzukommen [ja, teils/teils - kommt darauf an, nein]	DOS*
DOS	Verwendest du dein Mobiltelefon im Straßenverkehr außer zur Navigation (z.B. beim Auto-, Roller oder Fahrradfahren, beim über die Straße gehen, ...) [ja, nein]	DOS*
General Impatience Scale		
	Es kommt öfters vor, dass ich Tätigkeiten vor mir herschiebe. [levelOfApproval]	T
	Ich erledige meine Hausaufgaben stets so früh wie möglich. [levelOfApproval]	T
	Instrument spielen (z.B. in der Musikschule, Band, zu Hause... [spareTimeFrequency]	T*
Savings and Credit:		
SC	Wie gehst du mit deinem Taschengeld/Einkommen um? [“Ich gebe alles rasch aus”, “Ich spare weniger als die Hälfte”, “Ich spare ungefähr die Hälfte”, “Ich spare mehr als die Hälfte”, “Ich spare alles”]	S, CS
SC	Angenommen, du bekommst 50 Euro an Weihnachten oder zum Geburtstag. Was machst du mit dem Geld? [“Ich gebe alles rasch aus”, “Ich spare weniger als die Hälfte”, “Ich spare ungefähr die Hälfte”, “Ich spare mehr als die Hälfte”, “Ich spare alles”]	S, CS
SC	Hast du ein Bankkonto? [ja, nein]	S, CS

SC	Leihst du dir Geld von deinen Eltern? ["Ja, eigentlich jeden Monat", "Ja, öfter pro Jahr (mehr als 4 mal pro Jahr; aber nicht jeden Monat)", "Ja, selten (weniger als 4 mal pro Jahr)", "Nein, nie"]	C, S, CS
SC	Hast du eine Kreditkarte? [ja, nein]	C, S, CS
Risky Investment		
Inv	Weißt du, was eine Aktie ist? [ja, nein]	Inv
Inv	Hast du selbst Aktien? [ja, nein]	Inv
Inv	Denkst du, du wirst in der Zukunft Aktien kaufen? [ja, nein]	Inv
Inv	Hast du schon einmal Geld, das eigentlich für etwas anderes zu einem späteren Zeitpunkt gedacht war (z.B. für einen Urlaub oder ein Geschenk), für eine Wette verwendet oder in Aktien investiert? [ja, nein]	Inv
Financial Insurance		
Ins	Hast du eine Handyversicherung? [ja, nein, weiß nicht]	Ins
Ins	Hast du sie selbst abgeschlossen? [ja, nein, habe keine Handyversicherung bzw. weiß nicht, ob ich eine habe]	Ins
Ins	Hast du eine Fahrradversicherung? [ja, nein, weiß nicht]	Ins
Ins	Hast du sie selbst abgeschlossen? [ja, nein, habe keine Fahrradversicherung bzw. weiß nicht, ob ich eine habe]	Ins
General Prevention Effort		
P1	Ich tausche mit Freundinnen oder Freunden gegenseitig Geheimnisse aus, um sicherzugehen, dass sie meine nicht verraten. [0-5]	P1
P1	Um sicher zu gehen, dass ich mein Handy immer nutzen kann und erreichbar bin, habe ich eine Powerbank dabei. [0-5]	H*, SP*, P1
P1	Weil die Anderen das auch so machen, gehe ich lieber zum Bäcker oder zum Kiosk anstatt Essen von zu Hause mitzunehmen. [0-5]	P1, P1
P1	Weil ich bei längeren Reisen im Bus, Zug oder Auto daran denke, mir etwas zu essen und zu trinken einzupacken, bin ich in solchen Situationen nicht hungrig oder durstig. [0-5]	P1
P1	Bei der Einteilung zur Gruppenarbeit achte ich darauf, noch mindestens eine Schülerin oder einen Schüler in meiner Gruppe zu haben, der gut im jeweiligen Fach ist. [0-5]	P1

P1	Weil (Liebes-)Beziehungen manchmal besser und manchmal schlechter laufen, investiere ich Zeit in die Beziehung zu guten Freundinnen und Freunden sowie in meine Familie - die sind schließlich immer für mich da. [0-5]	8, 10, 12	P1
P2	Verwendest du beim Packen eine Packliste, um sicherzugehen, nichts Wichtiges zu vergessen? [ja, nein]		P2, DOS*
P2	Statt illegaler Streaming-Seiten verwende ich lieber Netflix, Amazon Prime Video oder ähnliche Dienste, und zahle dafür. [ja, nein]		P2, DOS*
P2	Ich putze meine Zähne so oft und so lange, wie ich sollte. [0-5]		P2
P2	Ich achte auf meine Ernährung: Dass sie gesund und ausgewogen, nicht zu viel und nicht zu wenig ist. [0-5]		P1, P2
P2	Ich lerne für manche Fächer mehr, um eine schlechtere Note in einem anderen Fach auszugleichen, zum Beispiel weil mir das andere Fach nicht liegt, oder weil die Klassenarbeiten/Klausuren oft sehr schwer sind. [0-5]		P2
P2	Weil mir das Risiko, beim Abschreiben z.B. von einem Spickzettel, erwischt zu werden, viel zu hoch ist, lerne ich lieber mehr und verzichte auf das Abschreiben. [0-5]		P2
P2	Wie lange bereitest du dich im Schnitt auf eine Klassenarbeit/Klausur vor? ["mehr als eine Woche", "ungefähr eine Woche", "ein paar Tage", "einen Tag"]		P2
P2	Weil ich noch nicht weiß, was ich später werden möchte, bemühe ich mich, gute Noten zu bekommen, um mir alle Möglichkeiten offen zu halten. [ja, nein]		P2
P2	Wenn ich eine Präsentation als PowerPoint-Präsentation in der Schule halten soll, habe ich immer zwei Möglichkeiten, um auf die Datei zuzugreifen (z.B. über meine Mailadresse und einen USB-Stick) oder habe die Präsentation als PDF-Datei dabei. [0-5]	10, 12	P2
P2	Bei der Suche nach einem (Neben-)Job, einem Praktikum oder auch einem Studienplatz macht es Sinn, noch weitere Bewerbungen zu versenden, bis die Zusage für die Wunschoption schriftlich vorliegt, auch wenn diese mündlich bereits zugesagt wurde. [ja, nein]	8, 10, 12	P2
P2	Ich überprüfe immer mal wieder, ob die Impfungen laut meinem Impfpass aktuell sind. [ja, nein]	8, 10, 12	P2

Pro-Environmental behavior

E	Ich kaufe gebrauchte Artikel, zum Beispiel gebrauchte Klamotten, Handys, Laptops, oder Ähnliches. [0-5]		E
E	Wenn ich für mehrere Stunden mein Zimmer verlasse, drehe ich die Heizung runter. [0-5]		E
E	Wenn ich als letzter den Raum verlasse, mache ich das Licht aus. [0-5]		E
E	Wenn ich das Wasser beim Duschen gerade nicht brauche, mache ich es aus. [0-5]		E
E	Wenn gerade niemand schaut, läuft der Fernsehapparat auch nicht. [0-5]		E
E	Wenn ich den Computer/Laptop für längere Zeit nicht nutze, schalte ich ihn aus bzw. in den Energiesparmodus. [0-5]		E
E	Beim Einkaufen habe ich meine eigene Tüte, Beutel, Tasche oder Rucksack für die Einkäufe dabei. [0-5]		E
E	Ich habe in der Schule oder unterwegs meine eigene Getränkeflasche (aus Glas oder Metall) dabei. [0-5]		E
E	Ich habe meinen eigenen Getränkebecher dabei für Kaffee oder Kakao. [0-5]		E
E	Ich versuche, so gut es geht, überall mit dem Fahrrad hinzukommen. [0-5]		E
E	Meinen Müll trenne ich nach bestem Wissen und Gewissen. [0-5]		E
E	Wenn du auf die Toilette gehst, dir die Hände wäschst, und es nur Papiertücher zum Abtrocknen gibt: Wie viele Tücher nimmst du? [0-10]		E
E	Wie viele Servietten nimmst du in der Mensa auf dein Tablett? [0-10]		E
E	Falls du rauchst (sonst lasse die Frage unbeantwortet): Ich werfe die Zigaretten nach dem Rauchen auf den Boden. [0-5]	8, 10, 12	E
Health related behavior			
H	Körpergröße (in cm)		H
H	Körpergewicht (in Kilogramm (kg))		H
H	Wenn ich ein Foto mit dem Handy mache oder eine besondere Situation erlebe, überlege ich sofort, wie ich das auf Facebook, Instagram, Snapchat, o.Ä. posten könnte. [0-5]		H, A, SA
H	Weil ich mein Smartphone soviel benutze, gibt es Ärger mit meinen Eltern oder Freunden oder mit meinem Freund bzw. meiner Freundin. [0-5]		H, A, SA

H	Ich fühle mich unwohl (z.B. nervös oder gereizt oder unruhig oder ein wenig traurig), wenn ich mein Handy längere Zeit nicht nutzen kann, weil der Akku leer ist, oder weil ich keinen Empfang habe, oder weil es mir weggenommen wurde. [0-5]		H, A, SA
H	Wenn es mir schlecht geht oder ich vor einer schwierigen Aufgabe stehe, lenke ich mich mit dem Handy ab. [0-5]		H, A, SA
H	Mein Handy stört mich bei den Hausaufgaben oder beim Lernen. [0-5]		H, A, SA
H	Ich schaue während des Essens mit meiner Familie öfter auf mein Handy, um zu schauen, ob es etwas Neues gibt. [ja, nein]		H, A, SA
H	Sport (Fußball, Volleyball, Tanzen, Laufen, ...) [spareTime-Frequency]		H
H	Rauchst du? ["Ich rauche nicht", "Ich rauche nicht, habe es aber probiert", "Ich rauche ca. 1-2 Zigarette(n) pro Tag", "Ich rauche ca. eine Schachtel pro Woche", "Ich rauche mehr als eine Schachtel pro Woche"]	8, 10, 12	H, A
H	Trinkst du Alkohol? ["nein, niemals", "ja, selten (bis zu 1-2 Mal im Monat)", "ja, gelegentlich, ein bis zwei Getränke (bis zu 1-2x pro Woche)", "ja, gelegentlich, mehr als zwei Getränke (bis zu 1-2x pro Woche)", "ja, regelmäßig (öfters als 2x pro Woche)"]	8, 10, 12	H, A
Preference for competitive Income			
C	Später wäre ich gerne selbständig beschäftigt, z.B. als Handwerker, Architekt, Cafébesitzer, etc. [ja, nein]		CI
C	Später wäre ich gerne Beamter, z.B. als Lehrer, Polizist, in der Verwaltung einer Stadt oder beim Finanzamt, etc. [ja, nein]		CI
C	Für die Rätsel werden wir für jedes richtig gelöste Rätsel einige Taler bezahlen. Obwohl wir das nicht ändern werden: Wäre es dir lieber, wir würden einfach eine feste Summe an Taler bezahlen, unabhängig davon, wie viele Rätsel richtig gelöst wurden? [ja, nein]		CI
C	Oder aber würdest du gerne einen kleinen Wettbewerb daraus machen? Dir würde eine Mitschülerin oder ein Mitschüler aus dem Raum zugelost, und der- oder diejenige von euch, die bzw. der mehr Rätsel richtig gelöst hätte, bekäme die feste Auszahlung des Partners und seine eigene dazu. Der Andere hingegen würde nichts bekommen. [ja, nein]		CI
Survey Questions			

SQ	Bist du im Vergleich zu anderen im Allgemeinen bereit, heute auf etwas zu verzichten, um in der Zukunft davon zu profitieren, oder bist du im Vergleich zu anderen dazu nicht bereit? Bitte klicke ein Kästchen auf der Skala an, wobei der Wert 0 bedeutet "gar nicht bereit", und der Wert 10 bedeutet "sehr bereit". Mit den Werten dazwischen kannst du deine Einschätzung abstufen. [0-10]	SQ
SQ	Wie schätzt du dich persönlich ein: Bist du im Allgemeinen ein risikobereiter Mensch oder versuchst du, Risiken zu vermeiden? Bitte kreuze ein Kästchen auf der Skala an, wobei der Wert 0 bedeutet: "gar nicht risikobereit" und der Wert 10: "sehr risikobereit". Mit den Werten dazwischen kannst du deine Einschätzung abstufen. [0-10]	SQ
SQ	Bist du im Allgemeinen auch dann risikobereit, wenn etwas wirklich Schlimmes passieren kann oder versuchst du, solche Risiken eher zu vermeiden? Bitte kreuze ein Kästchen auf der Skala an, wobei der Wert 0 bedeutet: "gar nicht risikobereit" und der Wert 10: "Sehr risikobereit". Mit den Werten dazwischen kannst du deine Einschätzung abstufen. [0-10]	SQ

Optimal Choice Under Risk

O	Stell dir vor, im nächsten Vokabeltest werden 10 Wörter aus der letzten Lektion vom letzten Schuljahr zusätzlich zur aktuellen Lektion abgefragt. Wie viel länger wirst du nun lernen? ["0 Minuten", "10 Minuten", "20 Minuten", "30 Minuten", "45 Minuten", "1 Stunde", "1 Stunde, 30 Minuten", "2 Stunden", "2 Stunden, 30 Minuten", "3 Stunden", "4 Stunden", "5 Stunden", "6 Stunden", "7 Stunden"]
O	Stell dir vor, du möchtest uns am Max-Planck-Institut besuchen und hast dich mit uns verabredet. Laut Google Maps brauchst du mit dem Fahrrad 20 Minuten vom Hauptbahnhof in Bonn, wo du entweder mit deinem oder mit einem geliehenen Fahrrad startest. Allerdings sind auf der Strecke drei Ampeln, die entweder alle rot oder alle grün sein können - oder eine beliebige Kombination davon. Wie viele Minuten/Stunden vor dem Treffen solltest du am Hauptbahnhof starten? ["1 Stunde", "55 Minuten", "50 Minuten", "45 Minuten", "40 Minuten", "35 Minuten", "30 Minuten", "25 Minuten", "20 Minuten", "15 Minuten"]

O	Stell dir vor, du musst ein wichtiges Dokument von mehreren Seiten, z.B. eine Seminararbeit oder ein längeres Referat mit Mitschülern, gedruckt und gebunden zu einer bestimmten Zeit (z.B. 12 Uhr mittags) abgeben. Du entscheidest dich, das in einem Copyshop direkt neben dem Ort, an dem du das Dokument abgeben musst, machen zu lassen. Stell dir außerdem vor, du könntest von zu Hause dort hin gehen, und das würde 10 Minuten dauern. Es kann ja immer passieren, dass der USB-Stick nicht lesbar ist, das Format falsch gewählt wurde, die Datei nicht lesbar ist oder noch fünf Kunden vor dir sind. Der Druck selbst und das Binden dauern nicht länger als 15 Minuten. Wie viel Minuten/Stunden vor Abgabe gehst du zu Hause los zum Copyshop? ["20 Minuten", "25 Minuten", "30 Minuten", "35 Minuten", "40 Minuten", "45 Minuten", "50 Minuten", "55 Minuten", "1 Stunde", "1 Stunde, 15 Minuten", "1 Stunde, 30 Minuten", "1 Stunde, 45 Minuten", "2 Stunden", "2 Stunden, 30 Minuten", "3 Stunden"]	10, 12	
Own Expenditure and Beliefs About Friends' Expenditures'			
	Wie viel deines dir zur Verfügung stehenden Geldes (Taschengeld, Nebenjob) gibst du für folgende Dinge aus:		
Exp	Handyrechnung		
Exp	(Computer-)spiele und Spielzeug		
Exp	Kleidung		
Exp	Zeitschriften, Magazine und Musik		
Exp	Ausgehen und Kino		
Exp	Essen und Trinken		
Exp	Kosmetikprodukte		
Exp	Süßigkeiten		H*
Exp	Sport-, Musik- und andere Events	8, 10, 12	
Exp	Zigaretten	8, 10, 12	H*
Exp	Alkoholische Getränke	8, 10, 12	H*
	Und deine Freunde - was denkst du, wie viel ihres zur Verfügung stehenden Geldes (Taschengeld, Nebenjob) geben sie für folgende Dinge aus?		
BFE	Handyrechnung		
BFE	(Computer-)spiele und Spielzeug		

BFE	Kleidung	
BFE	Zeitschriften, Magazine und Musik	
BFE	Ausgehen und Kino	
BFE	Essen und Trinken	
BFE	Kosmetikprodukte	
BFE	Süßigkeiten	
BFE	Sport-, Musik- und andere Events	8, 10, 12
BFE	Zigaretten	8, 10, 12
BFE	Alkoholische Getränke	8, 10, 12

Beliefs about Friends' Income

BFI	Ich denke, meine Freunde bekommen pro Woche etwa den folgenden Betrag an Taschengeld [0-50; 0.5]	
BFI	Ich denke, meine Freunde verdienen pro Woche (im Schnitt) in etwa den folgenden Betrag in ihrem Nebenjob [0-150;1]	