Global wellbeing and need satisfaction across domains: Which domain and need matters the most - and for whom?

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Abstract

Across the world, an increasing share of young people reports low levels of wellbeing, however we are still very far from understanding the problem, its sources and the development. A large empirical literature drawing on Self-Determination Theory, links wellbeing to the satisfaction of three basic needs, suggesting that low levels of wellbeing among adolescents reflect low levels of need satisfaction. Our study adds to this literature by testing a) whether need satisfaction in one life domain is more strongly correlated with global wellbeing than need satisfaction in other life domains, and b) whether, within a given domain, the satisfaction of one need is more strongly correlated with global wellbeing than the satisfaction of other needs. We rely on data from a survey distributed among a representative sample of Danish youth aged 15-19 (N=6,792) in the spring of 2024 and regression models. We find that wellbeing is most strongly associated with need satisfaction in the family domain, and to some extent, also the education and friend domain, and that the need for feeling competent in the family and friend domain and the need for relatedness and competence in the education domain matters the most. Results vary slightly between subgroups and by level of need satisfaction. Our findings may not only inform the public debate on the sources of wellbeing in adolescence, but also help decision makers allocate their scarce resources for intervening against further declines in young people's wellbeing, to domains and groups where they will matter the most.

Introduction

Since 2006, wellbeing among young people in almost all western countries has been on the decline. PISA data from 2015-2018 documents significant declines in the life satisfaction of school children aged 15 in 42 out of 47 countries, and in most countries the 2018-share of 15 year olds with low levels of life satisfaction was above 20 percent (Marquez and Long 2021). More recent reports have not been able to refute further deterioration of young people's mental health (Blanchflower 2025), and there is consistent evidence that girls score lower than boys on almost any measure of wellbeing (Health Behavior in School-aged Children 2023). This development, which is mirrored in multiple other studies, is concerning, not only because we want our young people to thrive, but also because studies link low levels of wellbeing to unfavorable outcomes in adulthood (De Neve et al. 2013; Goosby et al. 2013; Kansky et al. 2016; Richards and Huppert 2011). Thus, the current development predicts a future, where a substantial part of the working population – those that are young today, but whom we expect to be the core workforce in the future – may end up contributing less to our societies than we need and expect them to.

As expected, politicians, decision makers, NGOs, etc. see the observed decrease in young people's wellbeing as a call for action. A call, however, that requires an understanding of the key sources of high and low levels of wellbeing. Existing studies point to a plethora and a very diverse set of explanations. Wellbeing is linked to school climate, defined as social connectedness, school safety, peer connectedness and academic environment (Aldridge and McChesney 2018). It is linked to the ability to exercise forgiveness (Wulandari and Megawati 2020), to the quality of one's friendships (Alsarrani et al. 2022), to being exposed to abuse such a sexual harassment, physical aggression and cyberbullying (Basu and Banerjee 2020) and to screentime (Haidt 2024). And wellbeing is linked to sports and leisure activities (Ekinci 2024) and more broadly to the nature of social relations (Cunsolo 2017). The mere range and diversity of suggested sources leave politicians with very little directions of where to act.

But moreover, to fully comprehend the sources of high and low levels of wellbeing, we need to understand *why* e.g. school climate, sports, or social relations matter; what is activated at the individual level when the person engages in a healthy school environment, when he or she engages in sports, or when he or she engages with friends and family? Furthermore, when decision makers with the responsibility for improving adolescent wellbeing, but with limited resources, ask the research community about how to prioritize their efforts, we need to be able to not only answer the question of *why* activities and social relations in these domains matter, but also *what* activities, social relations and domains matter the most, and for *whom*. The answers to these questions will help decisionmakers allocate their scarce resources to domains and groups where they will matter the most.

To help answer these questions, our study relies on survey data collected among a representative sample of Danish youth (aged 15-19, N=6,792) in the spring of 2024, and Self-Determination Theory (SDT) coupled

with a few points from bottom-up life satisfaction theory. Using SDT we claim that wellbeing during adolescence relies on the satisfaction of three basic needs (autonomy, competence and relatedness). In addition, we use the bottom-up life satisfaction theory to claim, that multiple life domains matter for global wellbeing. In the empirical analysis, we test the hypothesis that not all domains and needs are equally important for overall wellbeing, by testing a) whether need satisfaction in one of five key life domains is more strongly correlated with global wellbeing than need satisfaction in the remaining four key domains (the relative importance of need satisfaction *across* domains), and b) whether, within a given domain, the satisfaction of one need is more strongly correlated with global wellbeing than the satisfaction of other needs. Together these analyses will improve our knowledge of whether specific domains hold the key to improved wellbeing, and whether the satisfaction of specific needs may have more impact than others. While other SDT-studies have tested links between domain specific need satisfaction and global wellbeing (e.g. in the leisure domain, see Leversen et al. 2012), and between domain specific need satisfaction and domain specific wellbeing (e.g. in the school domain, see Tian et al. 2014; Conesa et al. 2022), ours is the first study to simultaneously consider the association between wellbeing and need satisfaction across this large number of domains.

Our results show that need satisfaction in the family domain is most strongly associated with global wellbeing and that satisfying the need for feeling competent in this domain is particularly relevant. Our results also suggest that need satisfaction in the educational domain matters for global wellbeing, and that, the satisfaction of the relatedness need is most strongly associated with global wellbeing. We find some evidence that the correlation between need satisfaction and global wellbeing varies across subgroups, defined by gender, age or socioeconomic status, and, relying on quintile regressions, we furthermore find that need satisfaction is less strongly correlated with wellbeing for young people who experience relatively higher levels of need satisfaction. Thus, according to our findings, decision makers who aim to improve wellbeing among adolescents should find ways to support need satisfaction in families and in the educational institutions, and more particularly to help families satisfy young people's need for feeling competent and help schools satisfy their needs for relatedness.

Self-Determination Theory

Self-Determination Theory (SDT) is a framework developed to study human development with a focus on motivation and personality, and it builds on the proposition that social nutriments and support are a fundamental precondition for human development. More specifically, SDT states that our wellbeing depends on the satisfaction of three basic needs; the need for autonomy, for competence and for relatedness. The need for autonomy is satisfied when the individual experiences volition and self-endorsement of his or her activities. The need for competence is satisfied when the individual experiences a sense of effectiveness when he or she interacts with the context, and the need for relatedness is satisfied when the individual

experiences belonging, and care and love from significant others. The three needs are found in all individuals, across contexts. As the actual satisfaction relies on the properties of the context, the individual is inclined to engage in contexts – pursue goals, engage in domains and relationships - that support their need satisfaction. If they succeed in aligning needs and context, they will experience positive psychological outcomes (Ryan and Deci 2000; Deci and Ryan 2000; 1995). This link between need satisfaction and wellbeing has been tested and validated empirically in a number of studies in various domains, such as the workplace (Nunes et al. 2023), including specific types of workplaces (e.g. health care professions, see Bernard, Martin, and Kulik 2014), schools and teaching (King et al. 2024), physical education (Bagøien et al. 2010) musical participation (Krause, North, and Davidson 2019) and cultures (Church et al. 2013; King et al. 2024).[1]

A key element linking need satisfaction to wellbeing and positive outcomes is autonomous motivation. When needs are satisfied, the individual experiences autonomous motivation, which is associated with greater wellbeing, creativity, dedication and a healthier lifestyle. In contrast, need frustration/thwarting leads to low or controlled motivation which is associated with stress, depressive symptoms and anxiety, as well as with lower performance (Deci and Ryan 2000; Vansteenkiste et al. 2020; Vansteenkiste and Ryan 2013). Need frustration may also lead to compensational strategies, such as rigid behavioral patterns, that create a structure for achieving a goal that the individual has little autonomous motivation for achieving. Need frustration may furthermore lead to oppositional defiance, that involves doing the opposite of what is requested by socializing figures, and which is often linked to externalizing problem-behavior. There is little evidence that these strategies increase the potential for need satisfaction in the long run and thus have a positive effect on wellbeing.

Thus, according to SDT, individuals thrive when all three basic needs are satisfied, because need satisfaction nurtures the ground for autonomous motivation that is a key driver behind psychological wellbeing. SDT may explain the current negative development in mental wellbeing among adolescents and emerging adults as a signal that one or more of these three basic needs are not sufficiently satisfied, or maybe even frustrated or thwarted, among an increasing share of young people in our societies.

Need satisfaction across domains?

Here, we study the relative importance of need satisfaction across five key life domains for global wellbeing: As an intuitive extension of the proposition stated above, that all needs must be satisfied for humans to thrive, we would think that need satisfaction across all domains that an individual engages in, would matter. This intuition aligns well with the bottom-up theory on life satisfaction, suggesting that overall life

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[1] For a comprehensive collection of research using Self-Determination Theory to study wellbeing, see https://selfdeterminationtheory.org/research/

satisfaction reflects the accumulated domain specific life satisfaction (e.g. Loewe et al. 2014; Malvaso et al. 2021; Nakamura et al. 2022, for studies on adolescence, see Avedissian and Alayan 2021; Hossain, O'Neill, and Strnadová 2023). Yet that very same literature also questions whether wellbeing (and thus need satisfaction) in each domain contribute equally to global wellbeing, e.g. is need satisfaction in a spare time job as important as need satisfaction in the family?

This question is addressed in a few studies demonstrating that the *relative* importance of life domains for overall wellbeing among adolescents does in fact vary, i.e. that not all domains contribute equally to overall wellbeing. Here, e.g. Woode & Chen (2024) show that family, safety and possessions matters the most for the life satisfaction of 10-year olds, and family, school and possessions matter the most among 12-year-olds. Bradshaw & Rees (2017) find that overall, the sense of freedom matters the most for overall life satisfaction among young adolescents, however with some variation across contexts (i.e. family satisfaction is the most important factor in Colombia and Germany, and satisfaction with the future is the most important factor in South Korea), a finding supported in Lee & Yoo (2017).

A small group of studies have tested whether levels of need satisfaction across all domains are equally relevant for overall wellbeing. Examples include studies on adult samples focusing on work-life balance (e.g. White et al. (2024) and Luppi, Mencarini, & See (2024)). The limited number of studies on adolescents mainly focus on the importance of a *balanced* need satisfaction across contexts for overall wellbeing. However, these studies also report findings from a simultaneous test of the association between wellbeing and need satisfaction across domains, indicating that overall wellbeing is most strongly associated with need satisfaction in the home, and least strongly associated with need satisfaction with peers (see e.g. (Milyavskaya et al. 2009; Véronneau, Koestner, and Abela 2005; see also Gui et al. 2025 for tests of need satisfaction in leisure and academic life).

Are all needs equally important?

A related question is whether, within each domain, the three needs are equally strongly correlated with global wellbeing? SDT stipulates that the satisfaction of each need is vital for optimal human development, and thus for the most effective functioning, and that the thwarting or neglect of just one of the three needs may have significant negative consequences. This proposition implies that one need is not more important than another. However, the founders of SDT do state that "… we believe that there are situations in which relatedness is less central to intrinsic motivation than autonomy and competence" (Deci and Ryan 2000), whereby they open up the discussion of the relative importance of the three needs. And in fact, studies suggest that the three needs predict the same outcomes to a different extent. For instance, (Edmunds et al. 2006; Ng et al. 2012; Sebire et al. 2013) find that depression is more strongly (and negatively) associated with autonomy need satisfaction than the other two needs, but that competence need satisfaction is most strongly associated with anxiety. Likewise, (Sebire et al. 2013) show that only autonomy need satisfaction is correlated with

intrinsic motivation among adolescents. Thus, the three needs are not equally associated with wellbeing indicators, and the three needs do not equally predict outcomes among adolescents.

Our study

In this paper, we expand the small literature on domain-specific need satisfaction among adolescents, by testing a) whether need satisfaction in one domain is more strongly correlated with global wellbeing than need satisfaction in other domains, and b) whether within a given domain, the satisfaction of one need is more strongly correlated with global wellbeing than the satisfaction of other needs. For this purpose, we rely on unique data from 6,792 Danish adolescents, that enables a test of the relative importance of need satisfaction in five key life domains for global wellbeing. These domains include family, school, leisure activities, work, and friends, a choice informed by existing studies on what the important life domains among adolescents are (Avedissian and Alayan 2021; Hossain et al. 2023; Woode and Chen 2024; Bradshaw and Rees 2017). Note that to reduce the complexity of the current study, we reserve the focus on need *frustration* to a future study and focus exclusively on need *satisfaction* in this study.[2]

Data

The present study is part of a larger project aimed at understanding the complexity of young people's mental wellbeing and identifying its underlying drivers, with a particular focus on understanding the role of need satisfaction. Data comes from a survey conducted among young people, (age 15-19) in Denmark, collected in March and April 2024.[3]

We invited 17,000 young people to participate in our survey, of which 6,792 provided full responses (equivalent to a response rate of 40 pct). Because we obtained information on respondents' social security number, we were able to link their survey responses to Danish register data, which provides individual-level information on a range of topics, including educational attainment and results, labor market affiliation, etc., along with same information on the young person's parents.

Younger respondents and girls were more likely to respond than older respondents and boys. To account for selective attrition, all results that we present in this paper are weighed with an inverse probability weight that gives more emphasis on less probable or rare observations, given the respondents and non-respondents

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[2] The exclusive focus on need satisfaction is common in the SDT literature.

[3] To acquire data for this project, we distributed a survey among young people (age 15-19) in Denmark during March and April, 2024. For this purpose, we contacted a representative sample of 17,000 15–19-year-old individuals, that we identified as living in Denmark in February 2024 through the Danish Central Personal Register. The invitation to participate was sent out with a physical letter that explained the purpose of the study, and provided a QR code that, when scanned with a mobile device, would open the survey. Specifically for respondents that were younger than 18 years old at the time of the distribution, we also sent out a letter addressed to their parents, which carefully explained the purpose of the study, and emphasized that participation was voluntary and that all responses would be treated anonymously. We incentivized participation by granting all respondents who completed the survey a gift certificate of 100 DKK (~ 13 €). The project was funded by the ROCKWOOL Foundation in May 2023 (#4004)

observable characteristics. These characteristics are the respondent's family characteristics, i.e., highest parental education, income, immigrant status, age and municipal residency, along with the respondents' sex, age and immigrant status.

The Survey

The core components of the survey are questions related to need satisfaction and need frustration in five domains: Leisure activities, education, work (whether full- or parttime), family, and friends. In the survey, we incorporated a 12-item version of the Basic Psychological Need Satisfaction Scales for the education, work and leisure time domains, and a 9-item version for the friend and family domains. We refrained from using versions of the scale that contained more items (e.g. the standard 21-item version) due to concerns that including a high number of items in the survey would tire out our young respondent group and lower the survey's response rate. This choice also reflected that we assess need satisfaction across five domains rather than just one and including more items per domain would substantially increase the length of the survey. For each of the five domains, six items capture need satisfaction, and respectively six and three items capture need frustration. Since need satisfaction has not been surveyed before in a Danish context, we had two separate translators translating the official English and the Dutch versions into Danish and back to English for validation. The translations were made in three steps. First, the two translators worked independently on their translations into Danish. Second, the two translator translated each other's Danish survey items back into English. Third, the two translators worked together on choosing the translation that most closely resembled the original survey item. Finally, one member of the survey team and an external advisory board member assessed the fidelity of the final Danish translations. The wording (translated backwards from our Danish version) is reported in the Appendix Table A1.

Additionally, the survey includes two standard questions on wellbeing. First, it includes the Cantril Ladder in which respondents are asked to imagine a ladder with 10 steps, where the highest step (10) represents the best possible life and the lowest step (0) the worst possible life. The respondents are then asked to provide their current position on the ladder. We use Cantril Ladder as our life satisfaction measure. Second, the survey includes the 5 questions used for constructing the WHO5 wellbeing index, in which respondents are asked to assess their wellbeing during the last 2 weeks, through positive worded questions such as "Over the last two weeks, I have felt cheerful and in good spirits" and "Over the last two weeks, my daily life has been filled with things that interest me". The respondents must answer the questions using a six-point scale, with five indicating "All the time" and zero "At no time". Respondents' score on the index is retrieved from

adding all answers and multiplying by 4. This gives a score ranging from 0 to 100, with 100 representing the best possible quality of life.[4]

Indicators and descriptive statistics.

To test whether global wellbeing is more contingent on need satisfaction in some domains, we start by constructing three sets of indicators of need satisfaction for each of the five domains: The six items included in the survey to capture need satisfaction in each of the five domains can be grouped into three pairs (see Appendix table A1 for details). Each pair corresponds to the respondent's subjective assessment of one of the three needs. We collapse each pair into one piece of information on need satisfaction by calculating the average of each subscale. The scale of this average reflects the scale of the original items, and ranges from 1-5, with 5 representing the highest level of need satisfaction. This strategy mirrors the strategy used in the broader SDT literature (e.g. Mabbe et al 2018, Van der Kaap-Deeder et al 2017), and results in a total of 15 need satisfaction indicators - three indicators in each of the five domains.

To answer the question of the relative importance of need satisfaction across domains, we use these 15 indicators to construct two collated measures of need satisfaction within each domain. For our first measure, we recode each need satisfaction score into a binary indicator, which takes the value 1 if the score is at or above 4 (thus indicating need satisfaction at or above the second highest level of satisfaction), and then combine these indicators within domains. The resulting five measures range between 0 and 3, where 0 indicates that no needs are satisfied at the second highest-level or above, and 3 indicates that all three needs are satisfied at or above the second-highest level. For the second measure, we recode the first measure into a binary indicator which takes the value 1, if all needs are satisfied within a given domain (i.e. if the first indicator takes the value 3), and zero otherwise. We use these two sets of indicators to test whether the association between need satisfaction and global wellbeing varies by the domain in which the needs are satisfied (i.e. whether the extent of the need satisfaction is more important in some domains than in others), with the first indicator measuring the relative importance of having one additional need satisfied across the five domains, and the second indicator the relative importance of having all needs satisfied across the domains.

To answer the question of the relative importance of the three needs within a domain, we use the 15 need satisfaction indicators specified above (the three indicators of need satisfaction for each of the five domains).

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[4] The survey also included a range of other questions related to motivation and amotivation, and related to more indirect indicators of wellbeing, such as screen time alone and with friends, truancy, early school leaving, number of friends, time spend with friends, experiences of loneliness, and use of stimulants (drugs, nicotine products and alcohol), and finally 10 question that aim to capture personality traits (the big five). We do not use or report on these questions in this study.

These indicators will show whether having one specific need satisfied at a higher level within a specific domain is more strongly correlated with global wellbeing than having one of the other two needs satisfied at a higher level.

Table 1 below reports means and standard deviations of the three sets of indicators: a) the two sets of indicators used to assess the relative importance of need satisfaction across domains for global wellbeing, and b) the third set of indicators used to assess the relative importance of the three needs within a domain, for global wellbeing. Observe that not all respondents contribute to all domains (i.e. report need satisfaction in all domains), reflecting that not all respondents engage in all domains. However column N shows that most respondents report need satisfaction in the family and friends domain, and most respondents report need satisfaction in the education domain. Less than half of the respondents report need satisfaction in the work domain.

As is evident in Table 1, need satisfaction is highest in the family domain, with relatedness satisfaction being the top score (mean=4.25; std.=0.92). This is also the domain where most needs are satisfied on average (mean=2.16; std.=1.16) and where the largest share experiences that all three needs are satisfied (60 pct). In contrast, we find the lowest score within the education domain, where the mean score on autonomy satisfaction is 2.96 (std.=0.98), which is also the domain where the lowest number of needs are satisfied on average (mean=1.40; std.=0.97) and the smallest share experience full need satisfaction (15 pct.). We furthermore learn that across domains, autonomy satisfaction is the need that varies the most, with a top score of 4.22 (std.=0.81) in the friends domain. Moreover, we find the largest discrepancy in average need satisfaction within the education domain, with the autonomy satisfaction score being 1.14 points lower than the relatedness satisfaction score (mean=4.10, std.=0.96).

As a supplement, Tables A2a to A2d in the appendix report Pearson's correlation coefficients for pairwise associations within the three sets of indicators. According to the coefficients reported in Tabel A2a, the correlation between the number of needs satisfied (the first set of indicators) across domains is low to moderate – with coefficients ranging from 0.21 to 0.36, indicating that having a specific need satisfied or all needs satisfied does not reflect individual level characteristics. The correlations found for the second set of indicators are even lower, with coefficients ranging from 0.13 to 0.31 (Table A2b). Thus, having all needs satisfied within one domain does not predispose the young person to also have all domains satisfied in other domains.

In contrast, within a given domain, the correlation between the levels of satisfaction of the three needs is much higher (our third set of indicators, Tabel A2c), especially within the family and friends domains, with coefficients of around ~ 0.7. Thus, within these domains, the three needs are likely to be satisfied to the same degree. We find the weakest correlations within the education domain, where e.g. the correlation between autonomy and relatedness satisfaction is only 0.28, indicating that levels of need satisfaction within the

educational domain are poorly aligned. The last table (Tabel A2d) reports Pearson's correlation coefficients for pairwise associations between the level of need satisfaction across domains. As demonstrated, all correlations are positive, indicating that having a specific need satisfied in one domain increases the likelihood of also having the same or one of the other two needs satisfied in other domains. Crucially, all correlation coefficients are below 0.43, and most (70 out of 90) below 0.30, suggesting that most correlations are negligible. In sum, the correlation coefficients reported in the four appendix tables suggest that the number and types of needs satisfied seems to be contingent on the context rather than the individual.

Table 1: Means and standard deviations of the 25 need satisfaction indicators.

	Education Mean/Std.	Work Mean/Std.	Leisure act. Mean/Std.	Family Mean/Std.	Friends Mean/Std.
		First set of indicators			
No. of needs satisfied at or above 4 (range: 0-3)	1.40 0.97	1.65 1.04	1.81 1.09	2.16 1.16	2.02 1.16
		Second set of indicators			
All needs satisfied at or above 4 (binary)	0.15 0.36	0.25 0.44	0.35 0.48	0.60 0.49	0.51 0.50
		Third set of indicators			
Auto. satis.	2.96 0.98	3.14 1.15	3.83 0.86	4.20 0.93	4.22 0.81
Comp. satis.	3.64 0.95	4.03 0.83	3.76 0.91	4.08 0.95	3.99 0.88
Rela. satis.	4.10 0.96	4.04 0.95	4.06 1.00	4.25 0.92	4.02 0.91
N	6,135	2,796	3,994	6,792	6,705

To measure wellbeing we rely on two different, but often used indicators, Cantrill's Ladder and WHO5. While the two indicators are overlapping, they are believed to measure different elements of wellbeing, with the life satisfaction measured with Cantrill's Ladder empirically linked to social and economic resources, and the feelings of positive emotions measured using the WHO5 more closely linked to personality traits such as neuroticism (Fors Connolly and Gärling 2024). Here we use both measures to understand the robustness of the association we find between need satisfaction and wellbeing, across measures.

Table 2 below shows respondent scores on our two outcome variables – the indicators of subjective wellbeing, WHO5, and the life satisfaction measure. The mean WHO5 score is 56.51 (std.=18.64), and the mean life satisfaction score is 6.91 (std.=1.99). These average levels of wellbeing are quantitatively in line with other studies, such as the Health Behavior in School-Aged Children (HSBC) study. The HSBC reports a mean WHO5 score across 43 countries of 55.9 and a life satisfaction score of 7.1, while the Danish averages

are 61.8 and 7.1, respectively ([Countries Data - HBSC](#)). The averages from the HSBC study correspond to the self-assessed wellbeing among 15-year-olds in 2022.

Furthermore, Table 2 shows descriptive statistics on the respondents with regards to sex, age, schooling (the level they attended at the time of the data collection), immigration background and parent SES. For comparison, the second row of the table reports descriptive statistics, where possible, for all Danish youth aged 15-19 at the time of the data collection, with stars representing significance levels of statistical differences with information from administrative registers. There is an overweight of girls (only 43 percent of the sample are boys, compared to 51 percent in the full population) and that the mean age is 16.78 (std.=1.38), reflecting that older respondents were less likely to respond to the survey. The share in high school or further education is significantly higher in our sample than in the full population (42 vs. 35 percent), while the share in elementary school (41 percent) aligns with the full population. 9 percent did not attend school at the time of the survey, which is less than in the full population, where 13 percent of the 15–19-year-olds do not attend school. These differences, however, reflect that the education information that we have for the full group of 15-19-year-olds is measured in September 2023, rather than at the time of the survey. 10 percent of the sample are first- or second-generation immigrants, which is a little less than in the full population. Compared to the full population, we see that our respondents come from families with more resources than the average Danish youth aged 15-19. To account for the potential bias that these imbalances may cause, all the results presented below are weighed by our inverse probability weight, described previously.

Table 2: Means and standard deviations of wellbeing indicators and background characteristics

	Estimation sample	All 15-19-year olds
	Mean (std. dev.)	Mean (std. dev.)
Wellbeing indicators		
WHO5 (range: 1-100)	56.51 (18.64)	
Life satisfaction (range: 1-10)	6.91 (1.99)	
Controls, child		
Sex(1=boy)	0.43 (0.49)	0.51 (0.50)***
Age at the time of the interview[1]	16.78 (1.38)	
Elementary school	0.41 (0.49)	0.41 (0.49) n.s.
Vocational school	0.07 (0.25)	0.09 (0.28)***
High school/further edu.	0.42 (0.49)	0.35 (0.48)***
Pre. Basic edu.	0.02 (0.13)	0.03 (0.16)***
Not in edu.	0.09 (0.28)	0.13 (0.33)***
1./2. Gen. immigrant	0.10 (0.30)	0.14 (0.35)***
Parent SES		
Mother, further edu.	0.57 (0.49)	0.50 (0.50)***
Father, further edu.	0.42 (0.49)	0.37 (0.48)***
Social benefits, mother	0.05 (0.22)	0.08 (0.28)***
Social benefits, father	0.07 (0.25)	0.10 (0.30)***
Mother's logged wages	12.73 (1.03)	12.68 (1.06)***
Father's logged wages	13.08 (0.94)	13.00 (1.07)***
N	6,792	373,419

1: Note that we also have age recorded at the beginning of 2023 from the registers. Here, mean age in the estimation sample is 15.63 (std. dev=1.38) and 15.64 (std. dev=1.60) in the register cohorts.

***=p>0.001; **=p>0.01; *=p>0.05

Results

Using the data presented above, we study a) whether the relative importance of need satisfaction varies across domains and b) whether, within domains, one need is more strongly correlated with global wellbeing than others. The results are presented below.

### *The relative importance of need satisfaction across domains*

Our first set of results is documented in Figure 1, where we show associations between our two wellbeing measures (WHO5 and Life Satisfaction), and our first set of indicators of need satisfaction. All associations are calculated within the same model (standard OLS, no controls, but incl. the inverse probability weight). The x-axis of the figure specifies which domain ("Education", Work", etc.) the results concern, and results related to the WHO5 reads on the first y-axis, while results related to the Life Satisfaction measure reads on the second y-axis. The model relies on the 1,717 respondents who have reported need satisfaction in all 5 domains (consult appendix table A3 for the distribution of the three set of need indicators and the background characteristics for this limited sample). Figure A1a in the appendix shows results when we include control variables in the models. Furthermore, because our aim to assess correlations across all five domains in the same model reduces our sample substantially, panel A of Figure A1b shows results when we exclude the two smallest domains (the work and leisure domain, which leaves us with 6,018 respondents), and panel B shows results when we exclude the work domain, in which the fewest respondents have reported need satisfaction (N=3,624). These supplementary results show that our conclusions are relatively robust across specifications.

Figure 1 shows that the importance of having one additional need satisfied varies by domain. The pattern is roughly the same across the two wellbeing measures, and for both measures we see a strong link between having an additional need satisfied in the educational domain and experiencing increased wellbeing. The size of the association roughly suggests that having one additional need satisfied in the educational domain is associated with 2.5-3 percentages points higher wellbeing (regardless of the wellbeing measure). We see a similarly strong association between global wellbeing and the number of needs satisfied in the family domain, where having one additional need satisfied increases life satisfaction by 0.4 (equivalent to a 4 percentage points increase), and WHO5 by ~ 4 percentage points. Having one additional need satisfied in the leisure domain represents a 2-3 percentage point increase in wellbeing, while having one additional need satisfied in the work or friends domain only accounts for an increase of ~ 1 percentage point on the WHO5 and 0-1 percentage points on the Life Satisfaction measure. Including control variables in the model depresses associations slightly, however the overall pattern remains the same (Appendix Figure A1a). In addition, excluding the leisure and work domain (Appendix Figure A1b Panel A) and the work domain

(Appendix Figure A1b Panel B), produces the same pattern of results for the remaining domains, however coefficients are slightly larger for the specification presented in Panel A.

We test the statistical difference of the estimated coefficients to assess whether the differences we see in associations are also significantly different. More specifically, we perform a Wald test that produces an F-test statistic for the pairwise differences in the coefficients. Table A4 in the appendix shows the results that are almost identical across the two wellbeing measures. The association between need satisfaction in the education domain and the two measures of global wellbeing is significantly different from the estimated associations between need satisfaction in the work and the friends domain, but not from the associations estimated in the leisure and family domain. The same pattern is found for associations between need satisfaction in the family domain and global wellbeing; the coefficient is no different from the education- and leisure coefficients, but significantly different from those estimated for the work and friends domain. This pattern reappears for the leisure domain. From these tests we may suggest that need satisfaction in the family and education domains is most strongly correlated with global wellbeing, but not always discernable from the association between global wellbeing and need satisfaction in the leisure domain.

Figure 1: Association between global wellbeing and no. of needs satisfied within a domain (N=1,717). OLS coefficients.
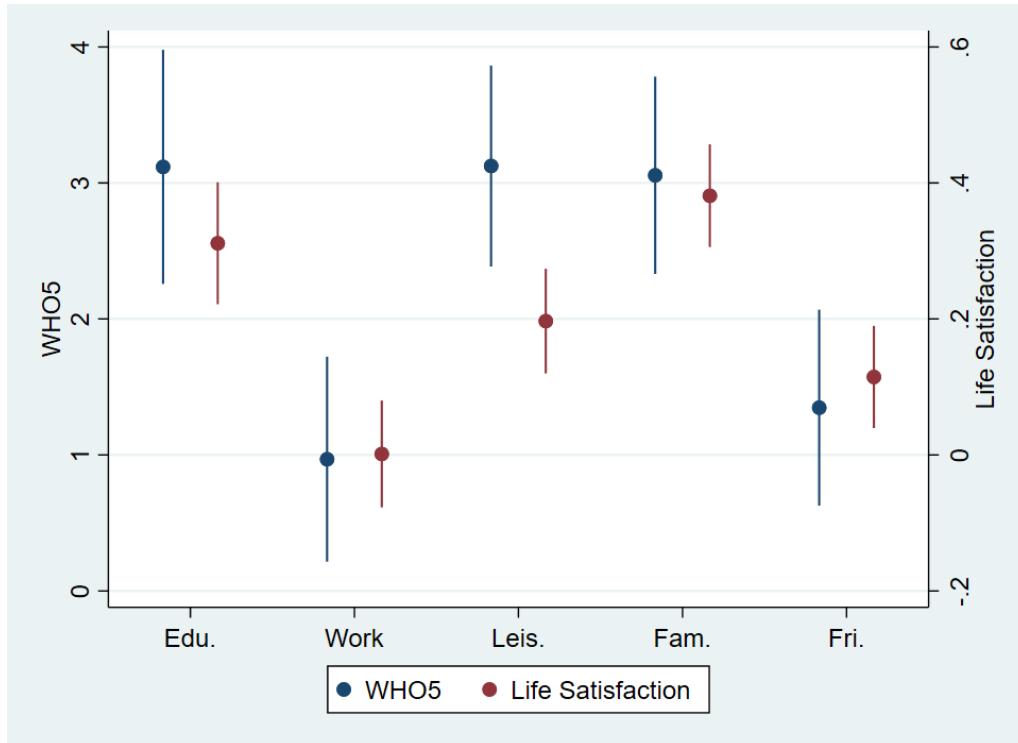

Our second set of results is documented in Figure 2, where we show associations between our two wellbeing measures (WHO5 and Life Satisfaction), and our second set of indicators of need satisfaction – recall that

this is a binary measure that takes the value 1 when all three needs in a domain are satisfied at the highest or second highest level. We calculate all associations within the same model, as used previously, to assess their relative importance. In the appendix, we again include the control variables presented in Table 2 (Figure A2a), and, respectively, exclude the two smallest domains (Figure A2b, Panel A), and the work domain (Figure A2b, Panel B), and conclude that the pattern of results persists.

The pattern of results is like the results presented in Figure 1. Wellbeing is most strongly associated with need satisfaction in the education and the family domains, as respondents with all needs satisfied in those two domains experience between 6 and 11 percentage points higher wellbeing compared to respondents where fewer or no needs are satisfied. In this specification we also see that the second most important domain is leisure and friends, and that wellbeing is least strongly associated with need satisfaction in the work domain. Coefficients are slightly depressed when we include controls (Figure A2a in the appendix). When we exclude the two smallest domains (Appendix Figure A2b Panel A) or exclude only the work domain (Appendix Figure A2b Panel B), the pattern of results persists, however coefficients increase slightly.

We test differences in associations, (Appendix Table A5), which show that the association between need satisfaction in the family domain and global wellbeing is significantly different from all other associations, except for the association between WHO5 and need satisfaction in the education domain. Furthermore, the association between need satisfaction in the education domain and both measures of global wellbeing is not significantly different from the association between the wellbeing measures and need satisfaction in the leisure domain, and from the association between need satisfaction in the friends domain and the life satisfaction measure. These tests hereby suggest that need satisfaction in the family domain is more important than need satisfaction in all other domains.

Figure 2: Association between global wellbeing and having all needs satisfied within a domain (N=1,717). OLS coefficients.
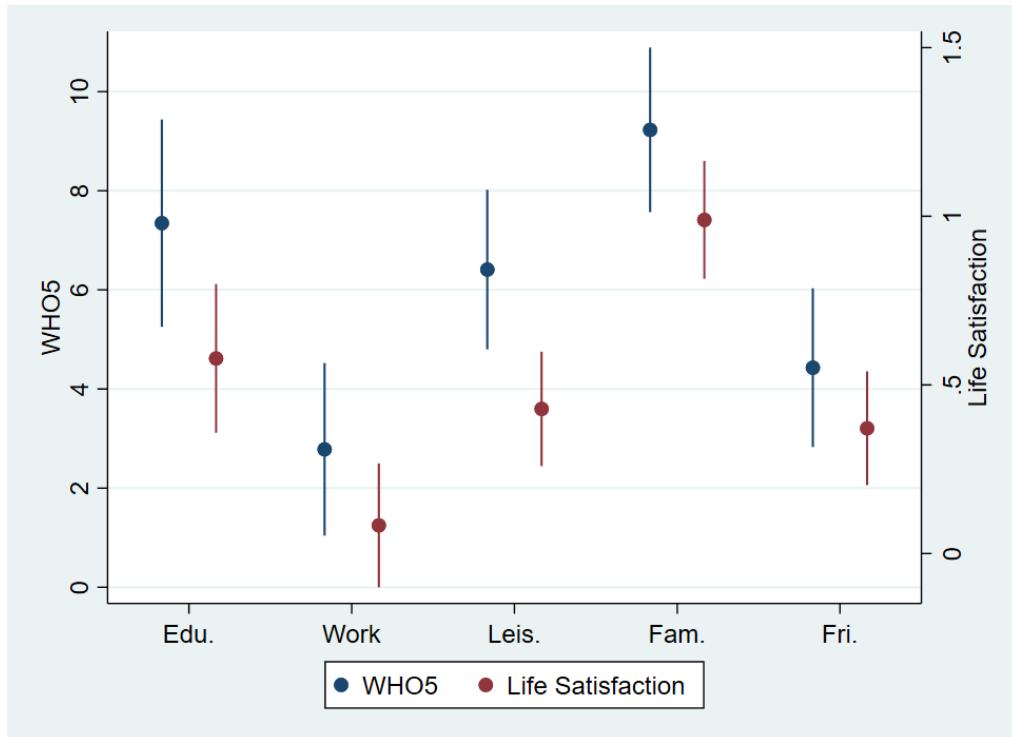
The relative importance of need satisfaction within domains

Our third set of results are documented in Figure 3, and they capture the association between the 15 indicators of need satisfaction and our two wellbeing indicators – the WHO5 and the life satisfaction measure (Cantrill's ladder). The results are based on 5 separate OLS models, without controls, but weighted, with each model reflecting need satisfaction in one of the 5 domains. While these results do not account for confounding of need satisfaction across domains (which, according to appendix table A2d, is also relatively small), they enable the assessment of the relative importance of the specific needs within domains, which is the focus of this part of the analysis. Each of the 5 models is based on the subsamples of respondents who have reported need satisfaction within the domain in focus (for N, see Table 1).

The x-axis of Figure 3 specifies domain ("Education", Work", etc.) and type of need ("A": autonomy, "C": competence and "R": relatedness). Results related to the WHO5 reads on the first y-axis, and results related to the Life Satisfaction measure reads on the second y-axis.

We see that the satisfaction of some needs is more strongly associated with global wellbeing than others. We find a strong correlation between global wellbeing and the satisfaction of the competence need within the family and friends domains, and associations related to the satisfaction of the competence and relatedness needs in the education domain also stand out. Interestingly, we find the weakest association, in some cases even insignificant, between global wellbeing and the satisfaction of the relatedness need in domains defined

by relations; the family and friends domains. Furthermore, autonomy in the education domain is also among the needs with the weakest association with global wellbeing. Hereby, the lack of autonomy satisfaction in schools does not seem to be an important driver of young people's global wellbeing.

Figure 3: Association between global wellbeing and specific need satisfaction. OLS coefficients.
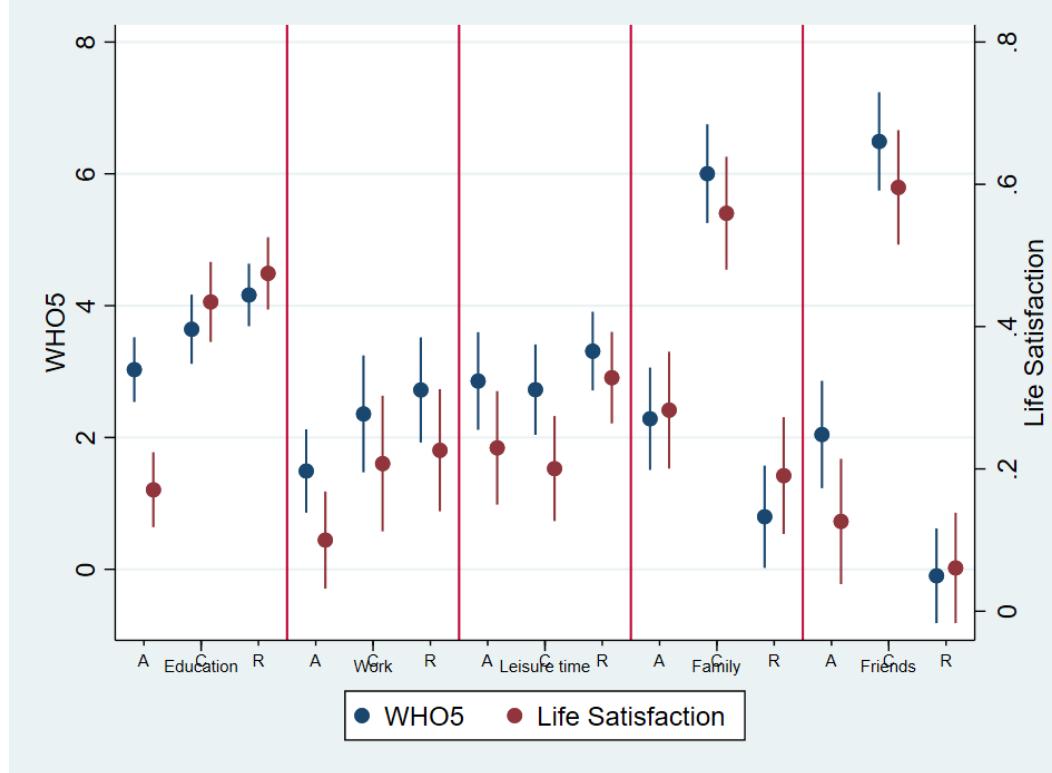
Figure A3 in the appendix, shows the associations when we include the control variables presented in Table 2. Coefficient sizes change when including control variables, however the overall pattern remains the same. Figure A3 panel B shows associations when need satisfaction across domains is considered simultaneously, on the reduced sample of 1,717 respondents who have reported need satisfaction in all 5 domains. These results indicate that need satisfaction is associated with wellbeing, even if the picture gets more blurry and more confidence intervals overlap. The competence need within the family domain still stands out as being strongly correlated with both measures of global wellbeing.

Differences by subgroup?

The main aim of our study is to assess whether the association between global wellbeing and need satisfaction varies across domains. However, a natural next question is whether the domain-specific associations vary across subgroups – e.g., whether need satisfaction in the education domain matters more for boys than for girls, or whether the importance of relatedness in the family differs by age? And related, whether need satisfaction is more strongly correlated with wellbeing among individuals whose needs are far from being fully satisfied? The importance of such subgroup analyses reflects our overall ambition of

providing guidance for decision makers aiming to improve wellbeing among adolescents, but who have limited resources. When, as is often the case, we cannot afford to target everyone, it is important that we target those that we expect will benefit the most. To provide knowledge needed for such prioritizations, we first, assess differences in results in subgroups defined by the respondents background characteristics, and second, we assess results at different levels of need satisfaction in a series of quintile regressions.

For the first test we run a series of subgroup analyses, where we use the same setup as for Figure 2 and 3[5], but estimate 9 new models for each setup, each of which includes an interaction term between the need satisfaction measures and one of the following background characteristics; gender (binary, 1=boy), age (binary, 1=17-19 years old at the time of the survey), immigrant (binary, 1=first or second generation immigrant), mother's further education (binary), father's further education (binary), mother's social welfare benefits (binary), father's social welfare benefits (binary), mother's wage income (continuous), and father's wage income (continuous).[6] Results are presented in appendix Figures A4 and A5, and Tables A6 and A7.

The subgroup analysis of Figure 2 (results displayed in Figure A4 and Table A6), which captures the relative importance of having all needs satisfied across domains for global wellbeing, produces few significant interactions. The 9 coefficients that capture the interaction between having all needs satisfied in the work domain and one of the nine background characteristics, 3 are significant in the models where WHO5 is our global wellbeing measure, and the same 3 are significant in the models where life satisfaction is our measure. These interaction coefficients indicate a stronger correlation between the two measures of global wellbeing and having all needs satisfied in the work domain for boys, and a lower correlation for those respondents whose fathers receive social benefits. Also, this correlation weakens when father's wage increases.

The subgroup analysis of Figure 3 also produces few significant interactions; of the 270 estimated interactions, 25 are significant, which is more than we would expect to happen at random. We find six of these significant interactions in the work domain, where autonomy satisfaction is more strongly associated with both WHO5 and life satisfaction among boys, where relatedness satisfaction is more strongly related to life satisfaction among immigrants and young people with mothers who receive social benefits, where the association between relatedness satisfaction and WHO5 increases by mothers wage income, and where we see a stronger association between competence satisfaction and life satisfaction among young people whose mothers have higher education. Thus, in the work domain, the association between need satisfaction and wellbeing is highly contingent on individual and family level characteristics.

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[5] We refrain from also running the interaction models with the setup used for Figure 1, due to the large similarities between result presented in Figure 1 and 2.

[6] A range of previous studies have tested whether background characteristics mediate the association between need satisfaction and wellbeing; for age, see e.g. Butkovic et al. 2020 , for gender see e.g. Turgeon et al. 2024, for socio-economic differences see e.g. Rodríguez-Meirinhos et al. 2020.

We find seven of the significant interactions in the friends domain of which six appear in models where life satisfaction is our global wellbeing indicator. From these results, we learn that relatedness satisfaction is less strongly associated with life satisfaction among boys, but more strongly among young people where either the father or the mother has higher education, and where the father earns more. In contrast, the correlation between competence satisfaction and life satisfaction is weaker among young people where the father has a higher education and where he earns more. Thus, among young people with more favorable socioeconomic backgrounds having the need for relatedness fulfilled in the friends domain is more crucial for wellbeing, while feeling competent matters less.

The overall picture that we derive from the subgroup analyses is that the strength of the associations between need satisfaction and wellbeing are somewhat contingent on individual and family level characteristics. As 13 of the 25 significant interactions include the relatedness need, it seems that the correlation between this need and global wellbeing is especially contingent on the young person's background characteristics.

Quantile regressions

As a final extension of our analysis, we assess the importance of the level of need satisfaction by running the models behind Figure 3 as quantile regressions. This type of model specification allows us to assess whether the strength of the correlations differs across levels of need satisfaction. Note that we only run the models used for Figure 3 as quantile regressions, as the need satisfaction measure used here is more suitable for this type of specification than the measures used in Figure 1 and 2. The two panels of Figure 4 show the results. Most coefficients do not vary by the quantile at which they are assessed, suggesting that need satisfaction is equally strongly (or weakly) associated with global wellbeing regardless of the actual level of need satisfaction. However, there are exceptions that all point in the same direction. For global wellbeing measured using the WHO5, a higher level of competence need satisfaction in the education domain, and a higher level of relatedness need satisfaction in the leisure domain is more weakly correlated with wellbeing than lower levels. For global wellbeing measured as life satisfaction, we see the same pattern for competence and relatedness need satisfaction in the education and work domains, and for relatedness need satisfaction in the leisure domain and competence in the friends domain. Thus, to the extent that associations vary across the distribution of need satisfaction, our findings suggest a declining "effect" of need satisfaction on global wellbeing. If need satisfaction does in fact have a causal effect on wellbeing (which we cannot test here), interventions that target young people who experience lower levels of need satisfaction will have a greater impact, than interventions targeting young people who experience higher levels of need satisfaction.

Figure 4: Wellbeing measures regressed on domain specific need satisfaction, quantile regression (25th, 50th and 75th quantile).
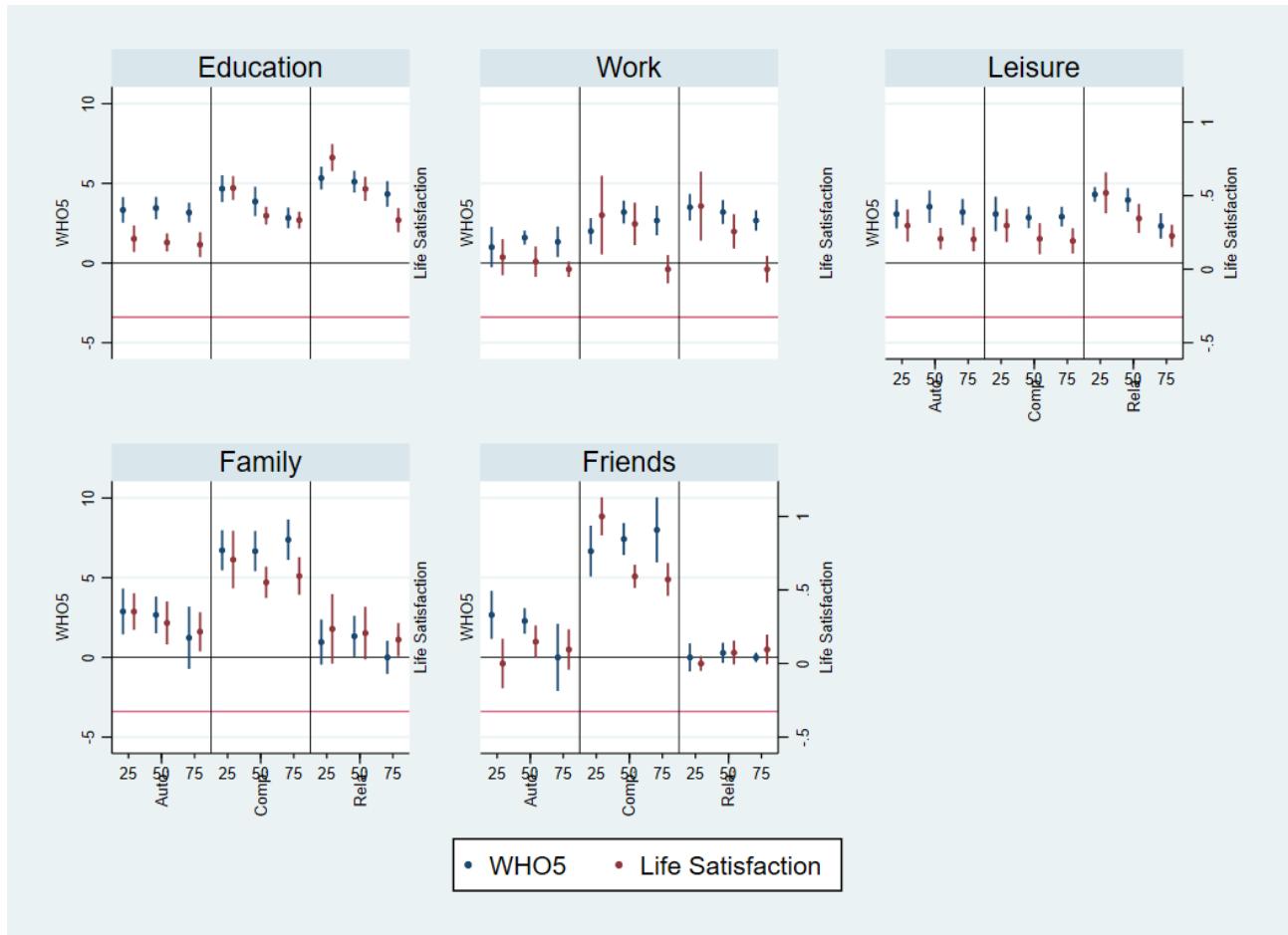
Discussion

This study tested whether global wellbeing in adolescence is more strongly associated with need satisfaction in specific domains, i.e. whether the strength of the association between global wellbeing measures and the satisfaction of the three basic needs – competence, autonomy and relatedness – depends on the domain in which the needs are satisfied. More specifically, we aimed to understand a) whether need satisfaction in one life domain is more strongly correlated with global wellbeing than need satisfaction in other life domains, and b) whether, within a given domain, the satisfaction of one need is more strongly correlated with global wellbeing than the satisfaction of other needs.

Overall, our findings support the proposition from SDT, that need satisfaction is correlated with wellbeing. But zooming in on the questions raised above, we found that our two wellbeing measures were most strongly associated with need satisfaction in the family and education domains. These were the domains in which having one additional need satisfied displayed the strongest correlation with global wellbeing and where having all needs satisfied was associated with the highest level of wellbeing. Importantly, while we found the largest coefficients for these two domains, they were not always significantly different from the coefficients estimated for need satisfaction in the leisure and friends domains. Our findings suggest that need satisfaction

in the domains that take up most of young people's time – education and family - has the strongest impact on their wellbeing. At the same time these are also domains that are somewhat forced upon the young person as one's family is rarely self-selected, and while education is voluntary after compulsory schooling, the social norms and expectations regarding further education is strong in the Danish society, as well as other societies. Thus, important domains are those that the young person cannot opt out of, and the domains that matter less are those that the young person engages in more voluntarily. This finding reflects that need satisfaction is particularly important in domains where volunteerism is less pronounced. The importance of the family found in our study resonates well with the broader literature on the role played by the family during adolescence (Paradis et al. 2011; García-Moya et al. 2012; Steinberg 2015; Buehler 2020).

Interestingly, the need most strongly associated with global wellbeing in the family domain is the need for competence, whereas the need most strongly associated with global wellbeing in the education domain is the need for relatedness, closely followed by the competence need. Thus, in the family domain, experiencing belongingness is not the most important, and in the education domain, where formal competences are achieved - feeling competent appears less important than belonging. While we know from the studies cited above, that family matters greatly for young people, to the best of our knowledge, we are the first to show that it is the opportunity to feel competent in the family, which drives the association.

Going back to the descriptive statistics in Table 1, we note that the need for feeling competent in the family domain and the need for relatedness in the educational domain are, on average and reassuringly, satisfied to a relatively high degree in our sample. However, given the importance of need satisfaction in the education domain, we may still be concerned about respondents' low satisfaction with the other two needs in this domain. And combined with the insights provided in the first part of our analysis, which suggests an improvement in wellbeing of each need satisfied and when all needs are satisfied, focus should be on strengthening all needs in that domain.

In sum, our results suggest that the importance of need satisfaction differs across domains, and that not all needs matter to the same degree for young people's wellbeing. In particular, the need for autonomy never stands out as the most important in any domain. At the policy level, our results suggest that encouraging young people to engage more in leisure activities or in social relations outside the family will have less impact on their wellbeing, than encouraging schools and families to strategically support basic needs, and in particular, the need for relatedness in the schools and the need for competences in the families.

The results presented here are based on statistical models that only allow for causal interpretations under very strict and unrealistic assumptions, and the data at hand – a cross-sectional survey – is not suitable for models that enable causal inference. Hereby, we cannot know if our results reflect reverse causation, or if the correlation between global wellbeing and level of need satisfaction reflect a third common factor or is simply spurious. These are all valid concerns. That being said, our empirical design relies on a theoretical model,

SDT, which claims causal links *from* need satisfaction *to* wellbeing. Thus, even if our empirical design does not allow for causal interpretations, causality is implied by our theoretical framework. We encourage future studies to collect and analyze in a way that enables causal inference to hereby unite theory and empirical evidence. In addition, future studies relying on qualitative data could explore in-depth how the young people understand and interpret the link between need satisfaction and wellbeing (Hossain et al. 2023). This again may provide some tangible tools for policy makers on what activities etc. to encourage to ensure further need satisfaction among young populations.

Appendix

Tabel A1: Need satisfaction questions (translated from Danish)

Domains	Autonomy satisfaction	Relatedness satisfaction	Competence satisfaction
Leisure activities I experienced that …	… I could do the things I wanted … the teaching/training was as I wanted it to be	… I had a good relationship with my teammates/other participants … I had a good relationship with the other participants	… I was sure I could do the activities … I was good at what I did
Education I experienced that …	… I could help decide what I should do … I could do what I was passionate about in school	…I had a good relationship with my classmates/fellow students …I had a good relationship with the classmates/fellow students I spent time with	… that I could do well in school … I was good at what I did in school
Work I experienced that …	… I could help decide what I would do at work … I could do what I was passionate about at work	… I had a good relationship with the others at work …I had a good relationship with the others at work that I spent time with	.. I was sure I could do well at work … I was good at what I did at work
Family When I was with my family, I experienced…	… that I could be myself … that I could have my say and be part of the decision-making process	…that I was loved … closeness	… that I was good at what I did …that I was very skilled
Friends When I was with my friends, I experienced…	… that I could be myself … that I could have my say and be part of the decision-making process	…that I was loved … closeness	… that I was good at what I did …that I was very skilled

Tabel A2a: Correlation between accumulated need satisfaction measure across domains

	Work	Leisure	Family	Friends
Education	0.31	0.36	0.31	0.36
Work		0.29	0.21	0.30
Leisure			0.31	0.34
Family				0.34

Note: >0.5: strong correlation; >0.3 & <0.5: moderate correlation; <0.3 weak correlation

Tabel A2b: Correlation between binary need satisfaction measure across domains

	Work	Leisure	Family	Friends
Education	0.21	0.21	0.16	0.20
N	2,457	3,648	6,135	6,062
Work		0.14	0.13	0.19
N		1,876	2,796	2,775
Leisure			0.23	0.24
N			3,955	3,926
Family				0.31
N				6,705

Note: >0.5: strong correlation; >0.3 & <0.5: moderate correlation; <0.3 weak correlation

Tabel A2c: Correlation between need satisfaction

		Aut. Satis.	Rela. Satis.	Com. Satis.
Education	Aut. Satis.	1.00		
	Rela. Satis.	0.28	1.00	
	Com. Satis.	0.48	0.35	1.00
Work	Aut. Satis.	1.00		
	Rela. Satis.	0.46	1.00	
	Com. Satis.	0.42	0.49	1.00
Leisure	Aut. Satis.	1.00		
	Rela. Satis.	0.48	1.00	
	Com. Satis.	0.55	0.45	1.00
Family	Aut. Satis.	1.00		
	Rela. Satis.	0.78	1.00	
	Com. Satis.	0.78	0.78	1.00
Friends	Aut. Satis.	1.00		
	Rela. Satis.	0.73	1.00	
	Com. Satis.	0.72	0.71	1.00

Note: >0.5: strong correlation; >0.3 & <0.5: moderate correlation; <0.3 weak correlation

Tabel A2d: Correlation between need satisfaction across domains

	Work	Leisure	Family	Friends

		Aut.	Rela.	Com.	Aut.	Rela.	Com.	Aut.	Rela.	Com.	Aut.	Rela.	Com
Edu.	Aut.	0.24	0.08	0.12	0.23	0.26	0.31	0.17	0.28	0.27	0.20	0.37	0.22
	Rela.	0.18	0.26	0.20	0.16	0.39	0.25	0.17	0.28	0.26	0.20	0.36	0.22
	Com.	0.16	0.23	0.25	0.17	0.23	0.30	0.23	0.30	0.35	0.26	0.35	0.36
N				2,457			3,648			6,135			6,062
Work	Aut.				0.16	0.21	0.27	0.11	0.23	0.21	0.14	0.29	0.27
	Rela.				0.13	0.28	0.24	0.09	0.21	0.21	0.15	0.27	0.25
	Com.				0.12	0.18	0.26	0.11	0.22	0.25	0.17	0.28	0.33
							1,876			2,796			2,775
Lei.	Aut.							0.26	0.25	0.23	0.27	0.31	0.23
	Rela.							0.25	0.25	0.20	0.25	0.29	0.19
	Com.							0.28	0.28	0.28	0.30	0.31	0.30
										3,955			3,926
Fam.	Aut.										0.28	0.28	0.31
	Rela.										0.26	0.30	0.32
	Com.										0.30	0.31	0.42
													6,705

Note: >0.5: strong correlation; >0.3 & <0.5: moderate correlation; <0.3 weak correlation

Tabel A3a: Mean and standard deviation of the 25 need satisfaction indicators.

	Education Mean/Std.	Work Mean/Std.	Leisure act. Mean/Std.	Family Mean/Std.	Friends Mean/Std.
	First set of indicators				
No. of needs satisfied at or above 4 (range: 0-3)	1.43 0.97	1.65 1.05	1.79 1.09	2.29 1.12	2.09 1.17
	Second set of indicators				
All needs satisfied at or above 4 (binary)	0.16 0.37	0.25 0.44	0.34 0.48	0.67 0.47	0.56 0.50
	Third set of indicators				
Auto. satis.	3.01 0.94	3.16 1.14	3.81 0.86	4.30 0.87	4.23 0.82
Comp. satis.	3.68 0.92	4.02 0.83	3.73 0.91	4.21 0.88	4.06 0.86
Rela. satis.	4.17 0.88	4.05 0.94	4.08 0.99	4.34 0.85	4.09 0.89
N	1,717	1,717	1,717	1,717	1,717

Tabel A3a: Mean and standard deviation wellbeing indicators and background characteristics

	Estimation sample	All 15-19-year olds

	Mean (std. dev.)	Mean (std. dev.)
Wellbeing indicators		
WHO5 (range: 1-100)	59.56 (17.35)	
Life satisfaction (range: 1-10)	7.32 (1.75)	
Controls, child		
Sex(1=boy)	0.43 (0.50)	0.51 (0.50)***
Age at the time of the interview[1]	16.70 (1.33)	
Elementary school	0.38 (0.49)	0.41 (0.49)*.
Vocational school	0.07 (0.26)	0.09 (0.28)*
High school/further edu.	0.52 (0.50)	0.35 (0.48)***
Pre. Basic edu.	0.00 (0.06)	0.03 (0.16)***
Not in edu.	0.02 (0.14)	0.13 (0.33)***
1./2. Gen. immigrant	0.09 (0.29)	0.14 (0.35)***
Parent SES		
Mother, further edu.	0.57 (0.49)	0.50 (0.50)***
Father, further edu.	0.42 (0.49)	0.37 (0.48)***
Social benefits, mother	0.04 (0.19)	0.08 (0.28)***
Social benefits, father	0.05 (0.22)	0.10 (0.30)***
Mother's logged wages	12.77 (0.98)	12.68 (1.06)***
Father's logged wages	13.15 (0.82)	13.00 (1.07)***
N	1,717	373,419

1: Note that we also have age recorded at the beginning of 2023 from the registers. Here, mean age in the estimation sample is 15.63 (std. dev=1.38) and 15.64 (std. dev=1.60) in the register cohorts.

Tabel A4: F-test for differences in coefficients presented in Figure 1

		Work	Leisure	Family	Friends
WHO5	Education	11.47***	0.00	0.01	7.93**
	Work		13.98***	14.78***	0.44
	Leisure			0.01	9.10**
	Family				8.56**
Life Satisfaction	Education	21.95***	3.04	1.15	9.01**
	Work		10.58**	45.04***	3.64
	Leisure			9.92**	1.96
	Family				19.16***

Note: ***=p>0.001; **=p>0.01; *=p>0.05

Tabel A5: F-test for differences in coefficients presented in Figure 2

		Work	Leisure	Family	Friends
WHO5	Education	9.09**	0.42	1.75	4.23*
	Work		8.44**	26.20***	1.69
	Leisure			5.07*	2.54
	Family				13.10***
Life Satisfaction	Education	9.64**	0.98	7.50**	1.92
	Work		6.89**	46.61**	4.65*
	Leisure			18.05***	0.19
	Family				19.57***

Note: ***=p>0.001; **=p>0.01; *=p>0.05

Tabel A6: Interaction effects, all needs satisfied

Panel A: WHO5 regressed on all needs satisfied. interactions. OLS coefficients.

	Gender			Age			Immigrant		
	Coef.	std.err	p-value	Coef.	std.err	p-value	Coef.	std.err	p-value
Education	-2.46	2.08	0.24	**5.36**	**2.13**	**0.01**	-2.37	3.45	0.49
Work	**4.07**	**1.72**	**0.02**	0.90	1.78	0.61	4.53	2.91	0.12
Leisure	-0.31	1.62	0.85	-2.81	1.65	0.09	4.34	2.68	0.11
Family	1.49	1.64	0.36	-1.07	1.69	0.53	2.29	2.48	0.36
Friends	-1.06	1.58	0.50	-0.04	1.63	0.98	3.49	2.49	0.16

	Mother's edu.			Father's edu.			Mother's s.b.		
	Coef.	std.err	p-value	Coef.	std.err	p-value	Coef.	std.err	p-value
Education	0.32	2.14	0.88	-0.61	2.22	0.78	7.01	6.44	0.28
Work	0.12	1.78	0.95	1.53	1.86	0.41	0.50	4.09	0.90
Leisure	-1.26	1.65	0.44	1.39	1.69	0.41	2.54	5.09	0.62
Family	-1.41	1.69	0.41	-2.54	1.75	0.15	2.78	3.67	0.45
Friends	-1.66	1.63	0.31	0.02	1.68	0.99	0.88	3.62	0.81

	Father's s. b.			Mother's wage			Father's wage		
	Coef.	std.err	p-value	Coef.	std.err	p-value	Coef.	std.err	p-value
Education	3.88	5.30	0.46	1.74	1.00	0.08	1.09	1.50	0.47
Work	**-12.51**	**3.66**	**0.00**	1.25	0.96	0.19	**-3.56**	**1.24**	**0.00**
Leisure	-1.92	3.45	0.58	-0.40	0.88	0.65	1.49	1.00	0.14
Family	3.44	3.38	0.31	-1.13	1.03	0.27	0.41	1.18	0.73
Friends	-2.96	3.26	0.36	-0.94	0.89	0.29	-1.41	1.21	0.25

Note: Coefficients in bold are significant at a 5 percent level.

Panel B: Life satisfaction regressed on all needs satisfied. interactions. OLS coefficients.

	Gender			Age			Immigrant		
	Coef.	std.err	p-value	Coef.	std.err	p-value	Coef.	std.err	p-value
Education	-0.17	0.23	0.44	0.22	0.23	0.33	-0.07	0.37	0.85
Work	**0.39**	**0.19**	**0.04**	0.08	0.19	0.69	0.18	0.31	0.57
Leisure	0.08	0.18	0.67	-0.20	0.17	0.25	0.24	0.28	0.39
Family	**-0.39**	**0.18**	**0.03**	0.06	0.18	0.74	-0.01	0.26	0.96
Friends	-0.08	0.17	0.65	-0.06	0.17	0.74	0.21	0.26	0.43

	Mother's edu.			Father's edu.			Mother's s.b.		
	Coef.	std.err	p-value	Coef.	std.err	p-value	Coef.	std.err	p-value
Education	-0.06	0.23	0.79	0.11	0.23	0.65	**1.55**	**0.68**	**0.02**
Work	0.26	0.19	0.16	0.04	0.20	0.82	-0.56	0.43	0.19
Leisure	-0.28	0.17	0.10	0.12	0.18	0.49	0.26	0.53	0.63
Family	-0.05	0.18	0.77	-0.34	0.18	0.07	**0.79**	**0.39**	**0.04**
Friends	-0.06	0.17	0.74	-0.15	0.18	0.40	-0.24	0.38	0.53

	Father's s. b.			Mother's wage			Father's wage		
	Coef.	std.err	p-value	Coef.	std.err	p-value	Coef.	std.err	p-value
Education	-0.06	0.56	0.92	0.01	0.10	0.91	0.16	0.16	0.32

	-1.10	0.39	0.00	0.14	0.10	0.16	-0.30	0.13	0.02
Work	**-1.10**	**0.39**	**0.00**	0.14	0.10	0.16	**-0.30**	**0.13**	**0.02**
Leisure	-0.03	0.36	0.93	-0.14	0.09	0.12	-0.05	0.11	0.62
Family	0.04	0.36	0.92	-0.09	0.11	0.38	-0.04	0.13	0.75
Friends	0.35	0.34	0.30	0.15	0.09	0.11	-0.16	0.13	0.21

Note: Coefficients in bold are significant at a 5 percent level.

Tabel A7: Interaction effects, domain specific need satisfaction

Panel A: WHO5 regressed on domain specific need satisfaction, interactions. OLS coefficients.

		Gender			Age			Immi.		
		Coef.	std.err	p-value	Coef.	std.err	p-value	Coef.	std.err	p-value
Education	Auto.	-0.35	0.49	0.47	-0.55	0.50	0.27	0.39	0.77	0.61
	Comp.	-0.22	0.52	0.67	0.60	0.53	0.26	1.06	0.83	0.20
	Rela.	-0.58	0.47	0.22	**-1.03**	**0.48**	**0.03**	-0.79	0.72	0.27
Work	Auto.	**1.31**	**0.63**	**0.04**	1.01	0.66	0.12	-0.09	1.04	0.93
	Comp.	1.00	0.88	0.25	-1.60	0.92	0.08	1.18	1.36	0.39
	Rela.	0.24	0.79	0.76	0.26	0.82	0.75	1.87	1.31	0.15
Leisure	Auto.	-0.71	0.74	0.34	0.27	0.76	0.72	-1.54	1.08	0.15
	Comp.	0.63	0.70	0.37	-1.24	0.70	0.08	0.72	1.06	0.50
	Rela.	0.21	0.60	0.72	-1.03	0.61	0.09	0.98	0.90	0.27
Family	Auto.	-1.14	0.77	0.14	-0.31	0.79	0.70	-1.90	1.11	0.09
	Comp.	-0.01	0.74	0.99	-1.01	0.76	0.18	0.73	1.17	0.54
	Rela.	1.31	0.77	0.09	0.06	0.79	0.94	0.92	1.13	0.42
Friends	Auto.	-0.19	0.81	0.81	-1.51	0.83	0.07	-1.10	1.21	0.36
	Comp.	1.08	0.74	0.14	-0.26	0.76	0.73	-0.90	1.13	0.43
	Rela.	1.13	0.73	0.12	0.01	0.73	0.99	2.12	1.11	0.06

		Mother's edu.			Father's edu.			Mother's s. b..		
		Coef.	std.err	p-value	Coef.	std.err	p-value	Coef.	std.err	p-value
Education	Auto.	-0.77	0.50	0.13	-0.37	0.52	0.47	-0.81	1.02	0.43
	Comp.	0.63	0.54	0.24	0.78	0.55	0.16	1.16	1.11	0.29
	Rela.	0.15	0.49	0.75	-0.36	0.51	0.48	-0.01	0.95	0.99
Work	Auto.	-0.92	0.65	0.16	0.17	0.66	0.79	-0.50	1.51	0.74
	Comp.	0.66	0.90	0.47	-0.56	0.94	0.55	3.37	2.12	0.11
	Rela.	-0.60	0.81	0.46	-0.39	0.86	0.65	0.75	2.09	0.72
Leisure	Auto.	0.02	0.76	0.98	0.38	0.78	0.63	-2.03	1.44	0.16
	Comp.	0.09	0.70	0.90	-0.02	0.73	0.98	0.21	1.27	0.87
	Rela.	0.33	0.61	0.59	-0.68	0.63	0.28	1.06	1.09	0.33
Family	Auto.	**-1.62**	**0.79**	**0.04**	-0.54	0.83	0.51	-0.63	1.56	0.69
	Comp.	0.97	0.77	0.20	-0.91	0.79	0.25	0.19	1.47	0.90
	Rela.	0.59	0.79	0.46	0.86	0.83	0.30	2.54	1.42	0.07
Friends	Auto.	-1.21	0.83	0.15	-0.86	0.87	0.32	-0.43	1.54	0.78
	Comp.	0.21	0.76	0.78	-1.47	0.79	0.06	0.16	1.47	0.91
	Rela.	0.73	0.73	0.32	**1.70**	**0.76**	**0.02**	2.33	1.39	0.09

	Father's s. b.		Mother's wage		Father's wage

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		Coef.	std.err	p-value	Coef.	std.err	p-value	Coef.	std.err	p-value
education	Auto.	0.18	0.91	0.85	0.34	0.24	0.15	-0.10	0.41	0.69
	Comp.	1.12	0.98	0.25	-0.49	0.24	0.04	0.08	0.30	0.80
	Rela.	-0.65	0.95	0.49	0.00	0.24	0.99	0.23	0.26	0.36
Work	Auto.	-1.09	1.34	0.42	0.20	0.35	0.57	-0.50	0.23	0.18
	Comp.	1.85	1.68	0.27	-0.81	0.46	0.08	-0.36	0.57	0.53
	Rela.	-2.74	1.64	0.10	**1.03**	**0.42**	**0.01**	0.25	0.50	0.62
Leisure	Auto.	0.04	1.31	0.98	0.15	0.34	0.65	0.03	0.84	0.94
	Comp.	1.62	1.30	0.21	-0.25	0.30	0.41	0.13	0.38	0.74
	Rela.	-1.02	1.04	0.33	-0.30	0.27	0.27	0.01	0.30	0.98
Family	Auto.	**-3.28**	**1.39**	**0.02**	-0.06	0.36	0.86	0.41	1.29	0.36
	Comp.	2.54	1.36	0.06	0.02	0.40	0.97	-0.34	0.46	0.46
	Rela.	0.05	1.35	0.97	-0.44	0.36	0.23	0.64	0.44	0.14
Friends	Auto.	0.52	1.44	0.72	-0.41	0.41	0.32	-0.19	0.67	0.67
	Comp.	-0.19	1.30	0.89	-0.36	0.40	0.37	-0.24	0.42	0.57
	Rela.	1.18	1.29	0.36	0.34	0.35	0.33	0.51	0.40	0.21

Note: Coefficients in bold are significant at a 5 percent level.

Panel B: Life satisfaction regressed on domain specific need satisfaction, interactions, OLS coefficients.

		Gender			Age			Immi.		
		Coef.	std.err	p-value	Coef.	std.err	p-value	Coef.	std.err	p-value
Education	Auto.	0.03	0.05	0.57	-0.03	0.05	0.61	0.09	0.08	0.28
	Comp.	0.03	0.06	0.62	0.06	0.06	0.27	0.01	0.09	0.87
	Rela.	**-0.26**	**0.05**	**0.00**	-0.07	0.05	0.17	**-0.16**	**0.08**	**0.04**
Work	Auto.	**0.22**	**0.07**	**0.00**	0.05	0.07	0.44	-0.09	0.11	0.40
	Comp.	0.05	0.10	0.61	-0.13	0.10	0.19	-0.26	0.15	0.08
	Rela.	0.03	0.09	0.72	-0.07	0.09	0.45	**0.47**	**0.14**	**0.00**
Leisure	Auto.	0.05	0.08	0.58	0.03	0.08	0.76	-0.19	0.12	0.11
	Comp.	0.00	0.08	0.96	-0.08	0.08	0.28	**0.30**	**0.11**	**0.01**
	Rela.	-0.09	0.07	0.18	**-0.17**	**0.07**	**0.01**	0.08	0.10	0.43
Family	Auto.	-0.07	0.08	0.43	0.03	0.08	0.75	-0.05	0.12	0.69
	Comp.	-0.02	0.08	0.83	-0.03	0.08	0.67	-0.02	0.12	0.85
	Rela.	-0.07	0.08	0.43	-0.10	0.08	0.23	0.05	0.12	0.70
Friends	Auto.	-0.09	0.09	0.31	-0.14	0.09	0.11	-0.14	0.13	0.30
	Comp.	**0.23**	**0.08**	**0.01**	-0.09	0.08	0.26	0.01	0.12	0.92
	Rela.	-0.11	0.08	0.18	0.09	0.08	0.27	0.02	0.12	0.88
		Mother's edu.			Father's edu.			Mother's s. b..		
		Coef.	std.err	p-value	Coef.	std.err	p-value	Coef.	std.err	p-value
Education	Auto.	-0.02	0.05	0.68	-0.02	0.06	0.68	**-0.26**	**0.11**	**0.02**
	Comp.	0.02	0.06	0.68	0.06	0.06	0.34	**0.23**	**0.12**	**0.05**
	Rela.	0.06	0.05	0.24	-0.03	0.05	0.53	-0.12	0.10	0.24
Work	Auto.	-0.06	0.07	0.36	0.00	0.07	0.96	-0.12	0.16	0.46
	Comp.	**0.24**	**0.10**	**0.01**	-0.14	0.10	0.18	-0.26	0.23	0.26

		Coef.	std.err	p-value	Coef.	std.err	p-value	Coef.	std.err	p-value
	Rela.	-0.08	0.09	0.37	0.05	0.09	0.61	**0.57**	**0.22**	**0.01**
Leisure	Auto.	-0.07	0.08	0.39	0.02	0.08	0.82	0.12	0.15	0.45
	Comp.	0.03	0.08	0.68	0.02	0.08	0.83	-0.13	0.14	0.32
	Rela.	0.06	0.07	0.40	-0.06	0.07	0.40	0.06	0.12	0.59
Family	Auto.	-0.15	0.08	0.07	**-0.19**	**0.09**	**0.03**	-0.14	0.17	0.41
	Comp.	0.11	0.08	0.18	-0.13	0.08	0.12	0.21	0.16	0.18
	Rela.	-0.05	0.08	0.59	0.07	0.09	0.41	0.09	0.15	0.56
Friends	Auto.	-0.10	0.09	0.25	-0.17	0.09	0.07	-0.05	0.17	0.77
	Comp.	-0.07	0.08	0.38	**-0.20**	**0.09**	**0.02**	-0.04	0.16	0.82
	Rela.	**0.20**	**0.08**	**0.01**	**0.27**	**0.08**	**0.00**	-0.02	0.15	0.90

		Father's s. b.			Mother's wage			Father's wage		
		Coef.	std.err	p-value	Coef.	std.err	p-value	Coef.	std.err	p-value
education	Auto.	-0.18	0.10	0.06	0.02	0.03	0.38	-0.04	0.01	0.13
	Comp.	0.19	0.10	0.07	-0.04	0.03	0.14	-0.00	0.03	0.96
	Rela.	0.07	0.10	0.47	-0.03	0.02	0.20	0.00	0.03	0.93
Work	Auto.	-0.02	0.14	0.90	0.02	0.04	0.66	-0.00	0.08	0.99
	Comp.	-0.35	0.18	0.05	-0.05	0.05	0.34	-0.11	0.06	0.09
	Rela.	0.23	0.18	0.19	0.03	0.04	0.53	-0.00	0.05	0.96
Leisure	Auto.	-0.21	0.14	0.13	-0.04	0.04	0.24	0.02	0.11	0.59
	Comp.	**0.31**	**0.14**	**0.03**	0.04	0.03	0.22	-0.07	0.04	0.08
	Rela.	-0.08	0.11	0.45	**-0.10**	**0.03**	**0.00**	-0.00	0.03	0.96
Family	Auto.	0.06	0.15	0.70	-0.03	0.04	0.50	0.02	0.11	0.69
	Comp.	0.14	0.14	0.34	0.02	0.04	0.70	-0.02	0.05	0.61
	Rela.	-0.03	0.14	0.86	-0.07	0.04	0.09	0.02	0.05	0.68
Friends	Auto.	0.18	0.16	0.24	-0.06	0.04	0.15	0.03	0.12	0.52
	Comp.	0.19	0.14	0.18	-0.04	0.04	0.38	**-0.09**	**0.05**	**0.04**
	Rela.	-0.13	0.14	0.33	0.07	0.04	0.07	**0.08**	**0.04**	**0.05**

Note: Coefficients in bold are significant at a 5 percent level.

Figure A1a: Association between global wellbeing and no. of needs satisfied within a domain (N=1,717), incl. controls. OLS coefficients.
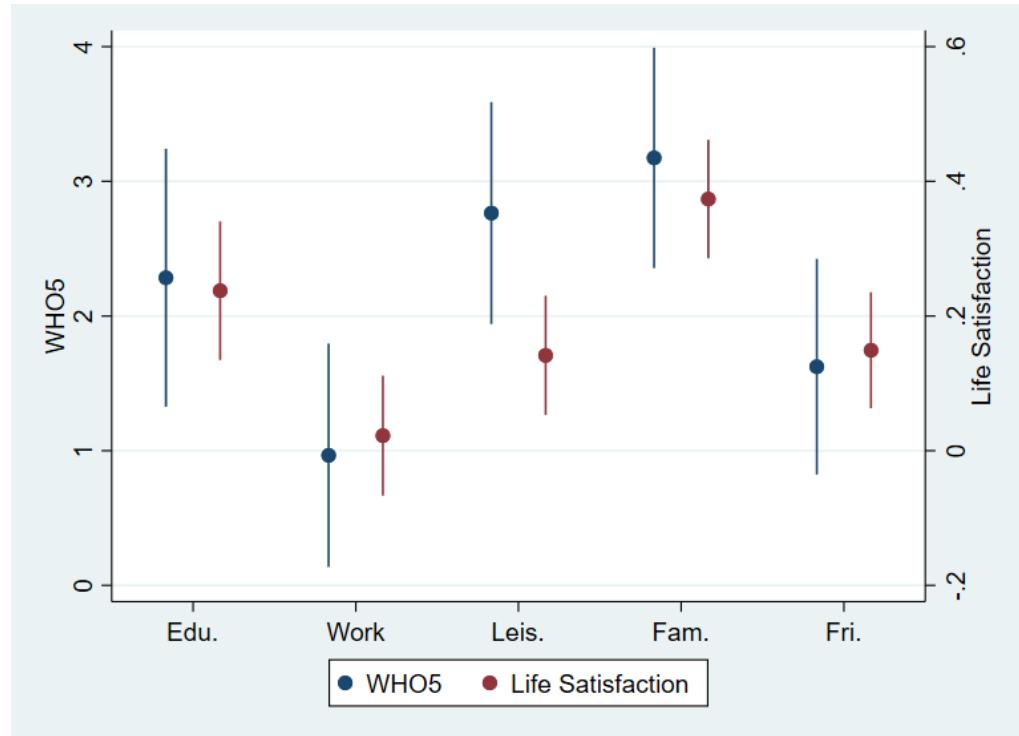

Figure A1b: Association between global wellbeing and no. of needs satisfied within selected domains
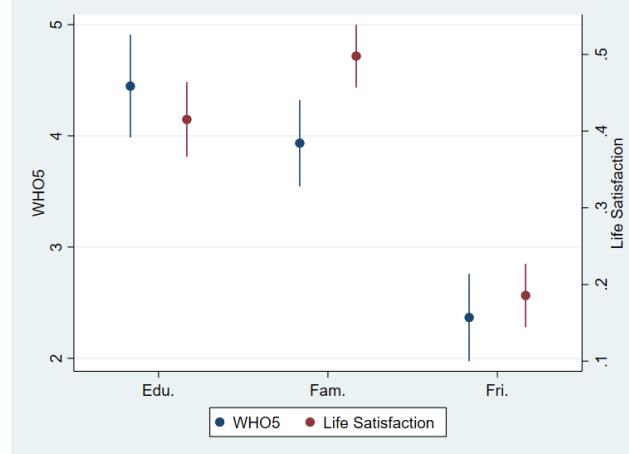
Panel A: Edu., family & friends (N=6,018)   Panel B: Edu., family, friends & leisure (N=3,634)
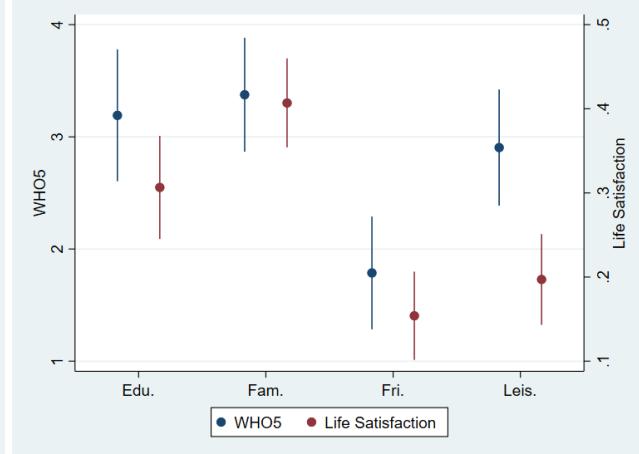
Figure A2: Association between global wellbeing and all needs satisfied within a domain (N=1,717), incl. controls. OLS coefficients.
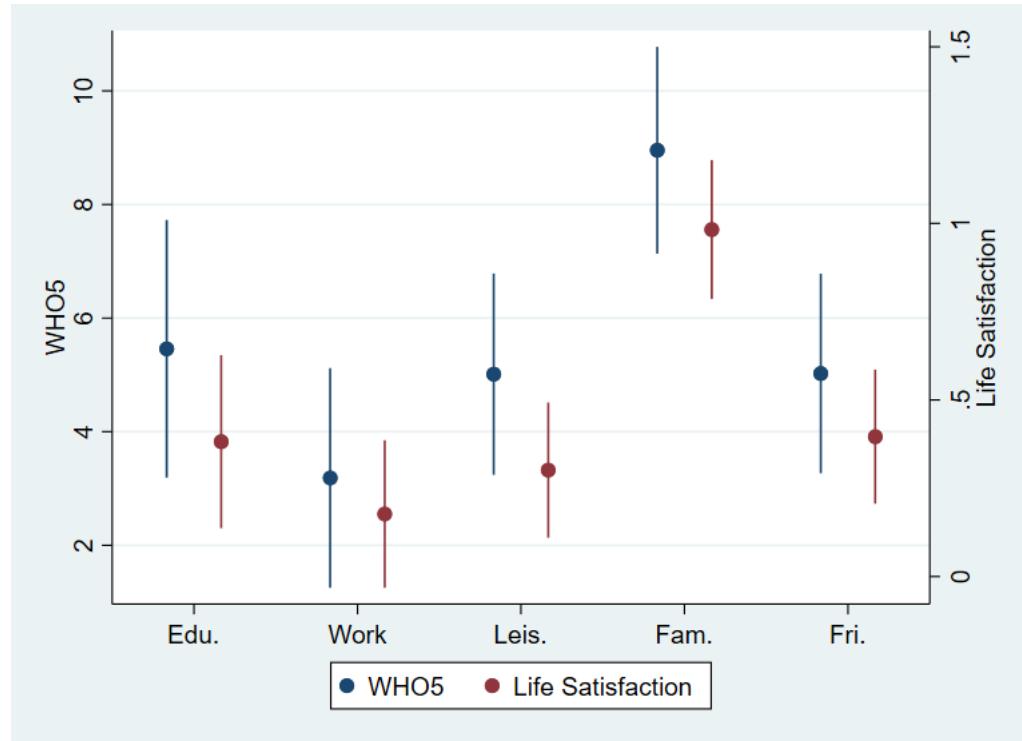
Figure A2b: Association between global wellbeing and all needs satisfied within selected domains
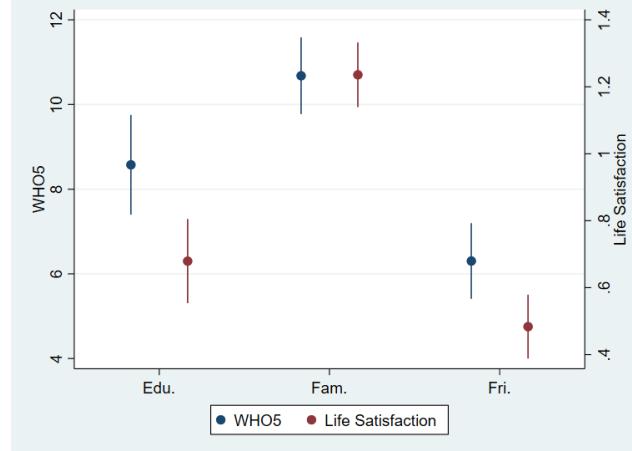
Panel A: Edu., family & friends (N=6,018)   Panel B: Edu., family, friends & leisure (N=3,634)
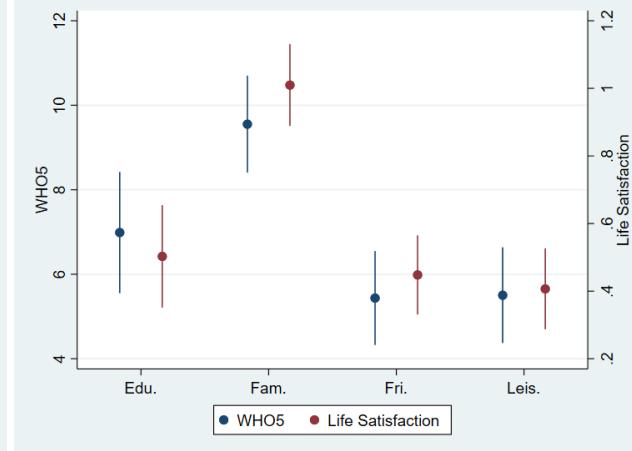
Figure A3:

Panel A: Wellbeing measures regressed on domain specific need satisfaction, incl. controls. OLS coefficients.
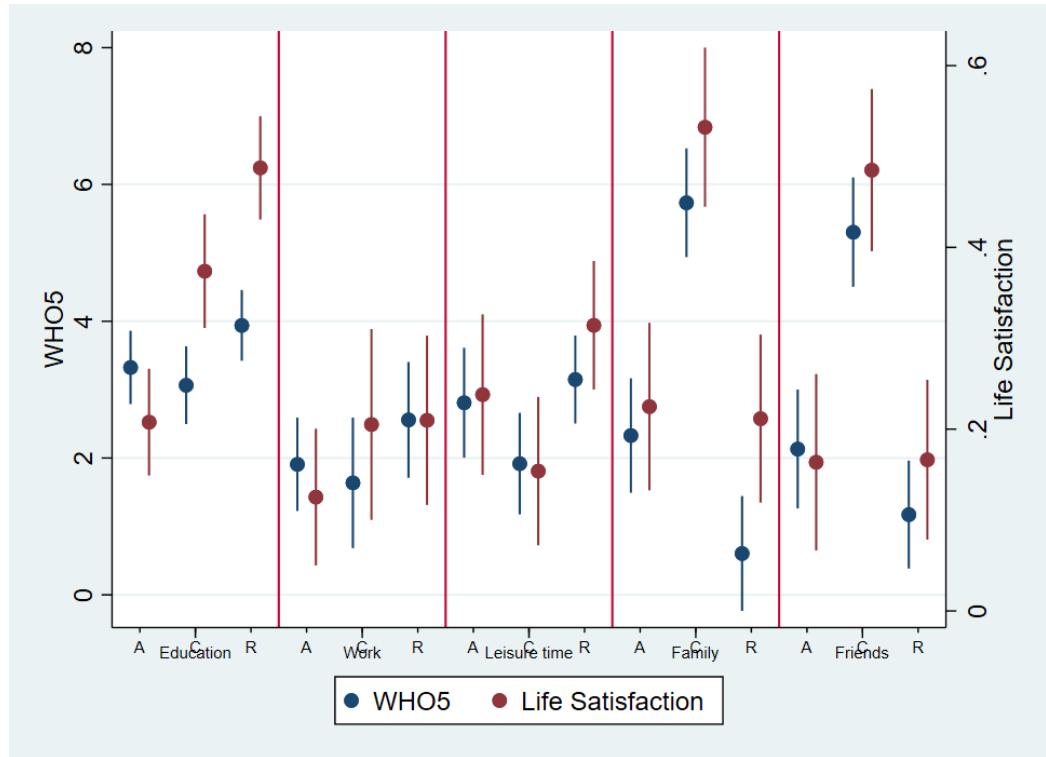
Panel B: Wellbeing measures regressed on domain specific need satisfaction, joint estimation of all needs, across domains (N=1,717). OLS coefficients.
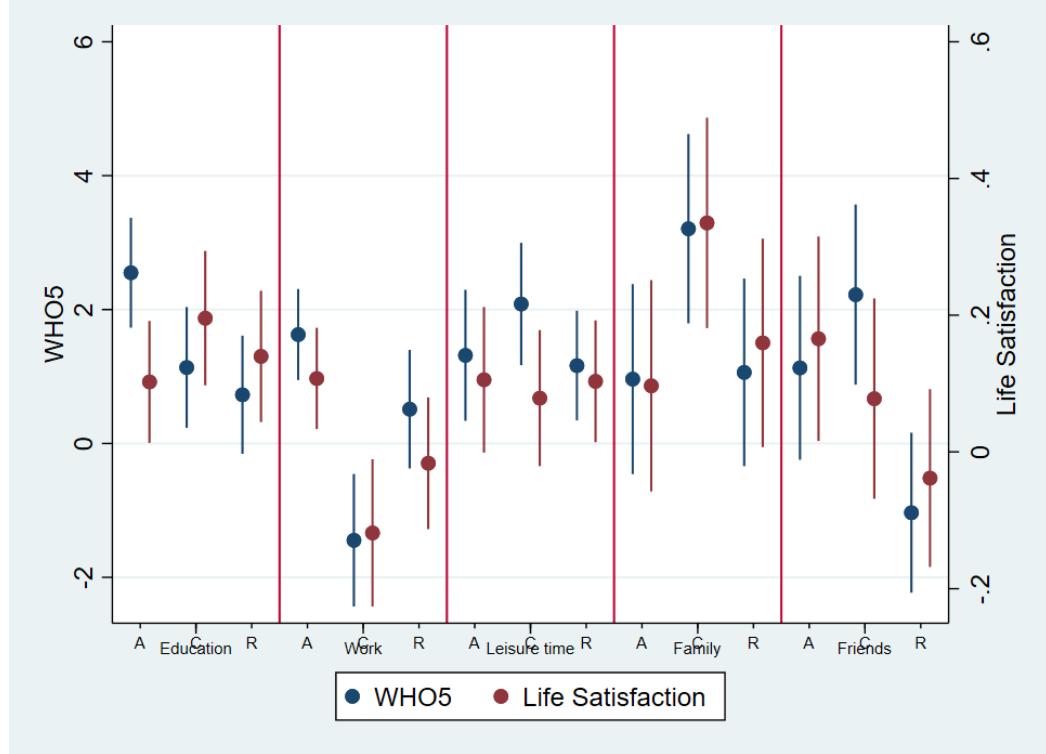
Figure A4: Subgroup analyses, all needs satisfied
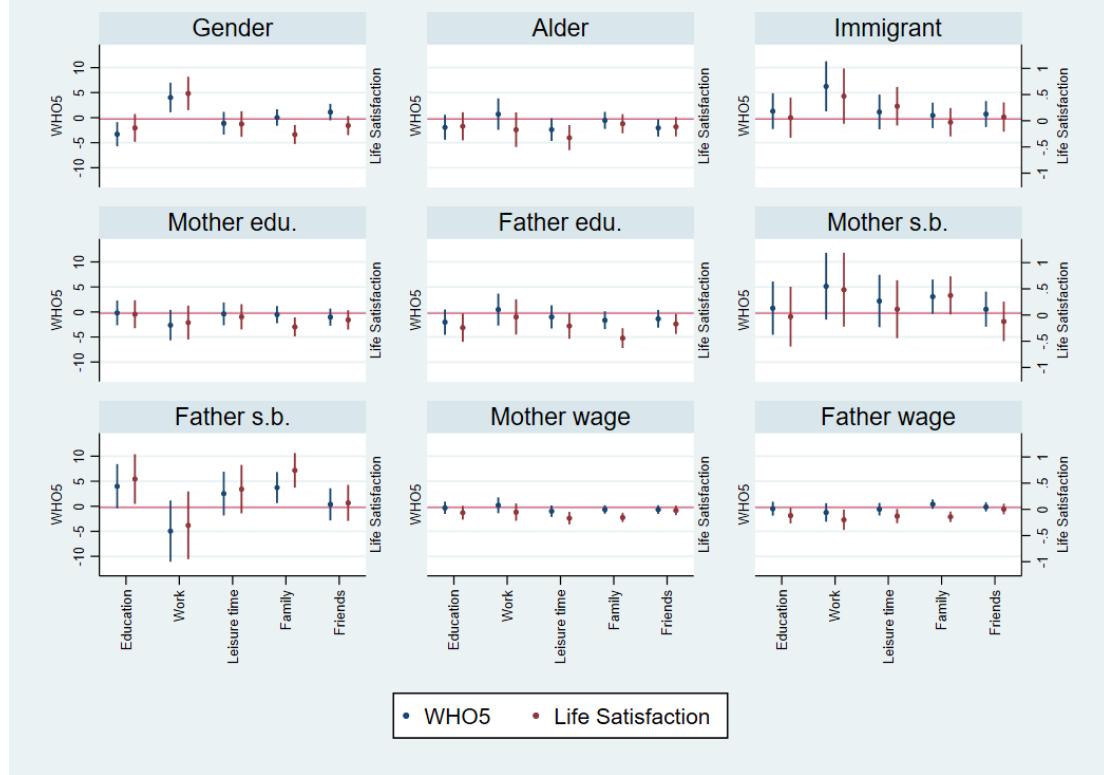
Figure A5: Subgroup analyses, domain specific need satisfaction
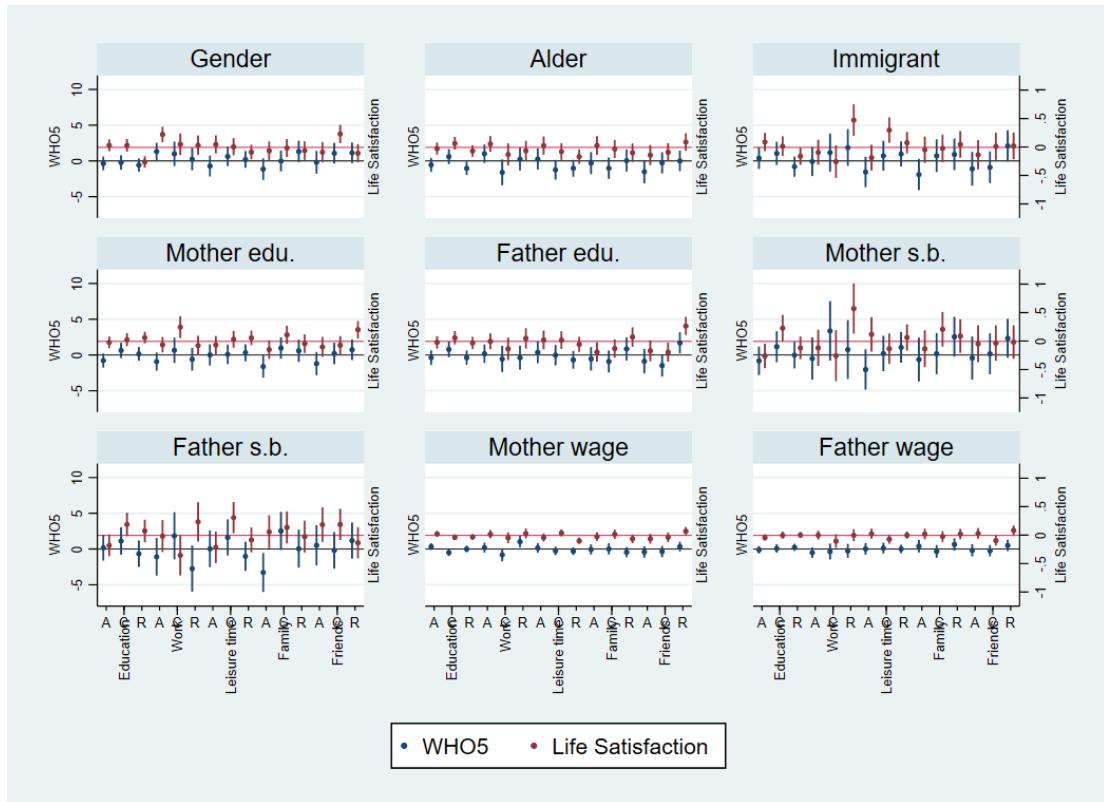
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