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To cite this article:

Reichenberg, M. (2021). Predictors of Swedish teachers' attitudes and willingness towards research-based teaching: Results of a survey study. *International Journal on Social and Education Sciences (IJonSES)*, 3(3), 504-517. <https://doi.org/10.46328/ijonSES.191>

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Predictors of Swedish Teachers' Attitudes and Willingness towards Research-based Teaching: Results of a Survey Study

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Article Info

Article History

Received:

24 September 2020

Accepted:

07 April 2021

Keywords

Teacher attitudes

Professional development

Special education

Researchers

Social capital

Abstract

Teachers' and special educators' attitudes towards research-based work differ but remains poorly understudied. This study predicts Swedish teachers' and special educators' attitudes towards (a) research-based work and (b) inviting researchers to schools. The data comes from a survey with a convenience sample of more than 300 teachers and special educators. The analysis combines methods such as: factor analysis, bootstrapped linear regression, and ordinal regression. Theoretically, this study derives predictions from professional capital theory. First, the results show how teachers and special educators differ in attitudes towards research-based work. Second, the results show how teachers with greater social capital have a higher probability of willingness to invite researchers to the school. This study concludes support for professional capital theory.

Introduction

Teachers' - including special educators - professional development does not end with teacher education. Rather teachers develop professional knowledge from formal as well as informal settings over their careers (Brint, 1993; Brouwer & Korthagen, 2005; Day, 2002). Formal settings include e.g. research, conferences, courses, seminars and workshops. Informal settings include e.g. talk to colleagues and students and lesson planning (Mizell et al., 2011; Weitze, 2017). Since education is an ever changing field, teachers must be lifelong learners to meet the needs of a diverse student population (e.g. culture, socioeconomic status, disabilities, motivation) (Brouwer & Korthagen, 2005; Munthe & Rogne, 2015; Schleicher, 2012).

Considerable attention has been devoted to professional development in teacher education. However, less attention has been devoted to how teachers continuously engage in research-based work (Desimone & Garet, 2015; Martinovic et al., 2012). Sweden illustrates a case of professionalization in teaching – including teaching in special education. According to the Swedish Education Act, teacher education is to rest on scientific grounds and proven experience (SFS 2010:800, Chapter 1, Section 5). This means that teachers are to base the exercise of their profession on research and that school development is to be permeated by a scientific approach. Consequently, one would expect that teachers would be very positive to professional development.

Research about teachers' opportunities for professional development, for instance attending seminars and

conferences, is not missing e.g. Teaching and Learning International Survey (TALIS) (OECD, 2019) and Darling-Hammond et al. (2009). However, these studies just investigate teachers' participating in professional development in formal settings, what they do not investigate is teachers' attitudes to professional development in informal settings. Consequently, there is a need to investigate what predicts Swedish teachers' (a) research-based attitudes (i.e., one's evaluation of an object; Dewey, 1929, 2013) and (b) willingness to invite researchers to schools. In the present study, I extend upon previous research on teachers' attitudes towards research-based work (Evans, 2011; Martinovic et al., 2012; Torff & Sessions, 2008; Varga-Atkin et al., 2009;) by studying Swedish teachers' attitudes to research and inviting researchers to school (Fullan et al., 2015; Ghaith & Yaghi, 1997; Hargreaves & Fullan, 2013).

Purpose and Research Questions

In the present study, I aim to predict Swedish teachers' attitudes and willingness to research-based work. I operationalize the concepts as: attitudes towards professional development (ATPD) and willingness to invite researchers to the school (WTIR). Next, I operationalize professional capital as: age, experience, special education and social capital. My research questions follow:

1. How does teachers' professional capital, on average, relate to ATPD?
2. How does teachers' professional capital predict the probability of WTIR?

I structured the article as follows. Firstly, I discuss previous research with a special attention to the dimensions of professional development. Secondly, I discuss the theoretical framework of the study, where I elaborate upon professional capital theory. Thirdly, I describe the data and methods used. Fourthly, I report the results of the study using linear regression and ordinal regression. Finally, I discuss the mixed support for professional capital theory.

Professional Development: Attitudes and Willingness

Professional development is any type of continuing education effort which allows teachers to learn both from (a) research: new teaching styles, techniques, teaching materials and (b) interacting with educators from their own as well as from other areas in order to improve their own teaching which hopefully affects teacher behaviour in the classroom (Desimone, 2009; Mizell et al., 2011). While professional development stresses teacher behaviour, I argue that we also need to consider teachers' attitudes towards professional development (Evans, 2011; Martinovic et al., 2012; Torff, & Sessions, 2008; Varga-Atkins et al., 2009). In the previously mentioned TALIS, only teachers' measurable behavior in formal settings, such as attending conferences, seminars, and coursework is captured. Thus, the informal dimension of professional development is neglected: staffroom conversations, teacher meetings, "hallway" discussions with other teachers, lesson planning, a new strategy to test, a new thought about how to manage students with e.g. learning disabilities (Desimone, 2009; Weitze, 2017).

One way to investigate teachers' disposition to act during informal learning opportunities is ethnographic work

but it is costly due to extensive observations (Atkinson & Hammersley, 1994). Another less costly way is to investigate teachers' attitudes and willingness to act. Following Deweyian tradition, I define attitudes (=evaluation of an object) and willingness to act (=habitual disposition) as tendency for action during informal learning opportunities (Dewey, 2013). Attitudes and willingness should capture the disposition to act during informal learning opportunities on the job- for instance, how teachers tend to act in staff conversations, teacher meetings or during lesson planning. Attitudes have value in their own right as dispositions for actions or as outcomes of formal education. Indeed, studies suggest that attitudes may be a better predictor for professional development behaviors (actions), than teacher characteristics (Haney et al., 1996). Although professional development matters for teaching, researchers do not understand what predicts (a) attitudes and (b) willingness towards professional development. In the current study, I make a theoretical contribution by arguing that professional capital predicts attitudes and willingness towards professional development. I will discuss professional capital next.

Theoretical Framework: Professional Capital Theory

I use the theory of professional capital as the framework for the study (Hargreaves & Fullan, 2013). The theory of professional capital proposes that: Schools that invest in professional capital will improve teachers' professional work, professional capacity, and professional effectiveness. However, professional capital theory does not elaborate on its significance for teacher attitudes or willingness. Nevertheless, professional capital could be extended to include predictions of outcomes such as attitudes and willingness, beyond returns in teachers' work and effectiveness. As mentioned above, I make a theoretical contribution by applying professional capital to professional attitudes and willingness. Consequently, I argue that professional capital correlates [positively] with (a) attitudes towards professional development and (b) willingness to invite researchers. The theory divides professional capital into three distinct components: human, social and decisional capital.

Human capital is the talent, ability and skill of the staff, in other words, how effective teachers are in the classroom in terms of their subject knowledge, understanding of pedagogy and their ability to unite these into high-quality lessons (Becker, 2009; Hargreaves, 2012; Hargreaves & Fullan, 2013). Researchers have proposed that we can measure human capital by years of experience, age, and education (Evans, 2011; Ghaith & Yaghi, 1997; Torff & Sessions, 2008). Each additional year marks either an investment (linear) or skill loss (non-linear). Even if one grows in wisdom over the life course one's skills become outdated over the years. The issue of skill loss marks the ups and downs of teachers' careers. During their first years, teachers are very busy: they are seeking new methods, and they have to face professional challenges. To engage in research takes a lot of time and energy, not just in the classroom but also due to the paperwork and meetings involved. Consequently, experienced teachers probably have more time remaining for research and so on. More experienced teachers have also learnt what works in the classroom and are likely to spend less time on lesson preparations than do less experienced teachers (Hargreaves & Fullan, 2013). Thus, they have time left for research. The ups and downs may also capture the opposition between young and experienced teachers (Evans, 2011; Ghaith & Yaghi, 1997; Hargreaves & Fullan, 2013; Torff & Sessions, 2008). In other words, support for professional

development varies non-linearly with age and experience. Consequently, we should expect a non-linear relationship to attitudes towards professional development.

H1a: *On average, age and experience should exhibit a nonlinear relationship with attitudes towards professional development.*

H1b: *On average, age and experience should exhibit a nonlinear relationship with willingness to invite researchers.*

In teaching, I propose that special education degree serves as a proxy for such investment. Although special education does not measure years of education, it nevertheless captures the investments made by teachers from an educational perspective. Special education – which is an advanced level degree - is to rest on scientific grounds. In this training there is much focus on research for instance in reading and writing difficulties, mathematical difficulties, cognitive disabilities and teaching methods (Reichenberg & Andreassen, 2019).

Consequently, I extend the proposition of Hargreaves and Fullan (2013) and Fullan et al. (2015) by including special education degrees. As such I expect that special educators should have a higher score on attitudes to professional development compared to teachers without a special education degree. Accordingly, I hypothesize that:

H2a: *Special educators should have a higher score, compared to teachers without a special education degree, on attitudes towards professional development, on average.*

H2b: *Special educators should have a higher likelihood, compared to teachers without a special education degree, of willingness to invite researchers.*

However, individual human capital is not enough for professional development. Human capital has to be complemented by what is called social capital (Hargreaves, 2012).

Social capital – the way in which teachers and other members of the staff within a school collaborate and work together in a collegiate and supportive culture. Teacher may collaborate on lesson planning, instructional materials (textbooks, tablets), assessment etc. (Varga-Atkins et al., 2009). Collaborating teachers foster diffusion of pedagogical ideas and advice giving. In other words, teachers that collaborate test new ideas because they do not stick to old habits (Harris & Jones, 2010; Moolenaar, 2012; Weitze, 2017). The consequences of teachers' social capital for professional development follow. The more teachers are encouraged to work together, learn from each other, the more teachers commit to research-based learning activities. Such activities foster school improvement and effectiveness (Hargreaves, 2012; Hargreaves & Fullan, 2013; Fullan et al., 2015; Varga-Atkins et al., 2009).

H3a: *On average, teachers' social capital should vary with higher scores on attitudes towards professional development.*

H3b: *On average, teachers' social capital should vary with higher likelihood, of willingness to invite researchers.*

Decisional capital. Decisional capital is about how individuals and groups develop their capabilities over time, particularly their capacity to judge. All professions involve judgment in situations and circumstances where the evidence and the answers are not totally clear (Fullan et al., 2015; Hargreaves & Fullan, 2013). However, no

agreement exists on how to measure decisional capital. While important to theory, I suspect that the concept serves best for qualitative inquiries (Hargreaves, 2012). Consequently, I will not include the concept in my analysis.

Method

I begin by describing the data characteristics. Next, I discuss the measurement and variables used. Finally, I discuss the data analysis with an emphasis on regression. All analysis was conducted in R (R Core Team, 2014).

Data

The data was collected as a convenience sample of 320 teachers across all educational stages (1-12). After deletion of missing cases, 285 remained in the analysis. The average teacher in the sample was well above middle age (see Table 1). Most had a decent experience of teaching (see Table 1); although strongly correlated age and experience did differ (e.g. teachers receiving their degree later in life). Accordingly, the sample may be somewhat less representative of young teachers. A minority had, besides their teaching degree for mainstream schools also a degree as special educators- which is an advanced level degree. A small fraction was males (as expected).

Measurement and Variables

The first scale I developed measure attitudes to professional development. The scale consists of five items with five categories. The categories include fully disagree, disagree, do not know, agree, and fully agree.

- I consider it important to search the web for school research.
- I consider it important to keep up to date about school research.
- I consider it important to keep up to date about educational research.
- I consider it important to keep up to date about research in mathematics.
- I consider it important to keep up to date about research about reading and writing.

For simplicity, I estimated an exploratory factor analysis (principal axis) to validate that the factors formed a principal factor. For rotation I used the common option “varimax”.

I decided to estimate a principal axis factor analysis (PAF) treating the item as quantitative. The main advantage of PAF is that it is less sensitive to small samples and more robust to non-normality than other exploratory factor methods. Compared to principal component analysis, PAF actually assumes a latent variable, i.e. an unobservable theoretical variable. To fit the models I used the “psych”-package in R (Revelle, 2017).

For the second scale I used three items that all emphasized teachers’ social capital:

- I can discuss teaching materials with my principal.
- I can discuss teaching materials with my colleagues.
- I can discuss teaching with my colleagues at the schools.

The scale measures teachers that can get support for trying ideas about teaching and teaching materials. Again the scale had five categories. The categories include fully disagree, disagree, do not know, agree, and fully agree. Again I used the PAF. The PAF is available from the author upon request.

Table 1. Special Education, Age, Gender, Years of Experience: Means, SD, Min, and Max, Medians, and IQR (interquartile range) for Ordinal Sale Variables

	mean	sd	min	max
Special education(Ref: None)	0.14		0.00	1.00
Age	47.42	9.57	25.00	65.00
Experience (Years teaching)	16.77	9.85	1.00	42.00
Males(Ref: Females)	0.32		0.00	1.00
	median	IQR (interquartile range)	min	max
<i>Attitudes towards professional development</i>				
ATPD item 1	4.00	2.00	1.00	5.00
ATPD item 2	4.00	1.00	2.00	5.00
ATPD item 3	4.00	1.00	2.00	5.00
ATPD item 4	4.00	2.00	1.00	5.00
ATPD item 5	4.00	1.00	2.00	5.00
<i>Willingness to invite researcher</i>				
WTIR	2.00	2.00	1.00	5.00
<i>Social capital</i>				
SC item 1	2.00	2.00	2.00	5.00
SC item 2	4.00	1.00	2.00	5.00
SC item 3	4.00	2.00	1.00	5.00

Note: ATPD=Attitudes towards professional development; WTIR =Willingness to invite researchers to the school; Ref=Reference category

For the second research question I used a single item concerning willingness to invite researchers to the school (WTIR). The response options ranged from 1 (=fully disagree) to 5 (=fully agree). Finally, I included variables of: special education (Yes=1, otherwise=0), gender (1=males, 0=females), age (z-score), experience as years of teaching (z-score). I used z-scores to simplify the interpretation as scaled by standard deviations instead of years.

Data Analysis: Linear Regression and Ordinal Regression

To analyze the data for the first research question I used linear regression with the factor scores as outcomes. The factor scores capture the unobservable variables. After fitting a linear regression, the regression diagnostics indicated concerns (Fox, 2015). I found non-normal residuals, with unequal variance, and influential data points. To address the concerns, I computed a linear regression with bootstrapped confidence intervals. Bootstrapping means drawing repeated random samples from the data to generate a non-parametric sample distribution. The procedure validates inference testing as well as issues with the residuals (Fox, 2015).

For the second research question I used ordinal regression. Here, I modeled the probability of willingness to invite researchers to the school (WTIR). Since the participants used the options sparsely, I collapsed the 1-to-5 scale to a 1-to-3 scale. Forming the response options of: <fully disagree>, <disagree >, <do not know, agree, fully agree>. I defend the choice because of the sparse distribution of responses in option=3 and option=5. After collapsing the 1-to-5 scale, the Brant test indicated that the slopes had the same association across the two cut-points in the model (Brant, 1990). The cut-point indicates the threshold for moving from one response option to the next. A model with three options has two cut-points.

Results

I organized the result section in two parts. First, I address attitudes towards professional development (hereafter: ATPD). Second, I analyze willingness to invite researchers (hereafter: WTIR).

A Linear Regression of Attitudes towards Professional Development (ATPD)

Attitudes towards professional development work as a prime indicator of scientific-based work. Indeed, attitudes come before the actual behavior, e.g. course-taking, attending seminars, lesson studies. Attitudes may be reflected in staffroom conversations, teacher meetings, and lesson planning at schools.

Here I consider the linear regression. In the linear regression we model the average change (or difference) in the mean of the outcome, i.e. ATPD. Table 2 reports the coefficients with the 95 % bootstrapped confidence intervals (C.I.). When the bootstrapped confidence intervals do not contain a zero, we can interpret the result as statistically significant. However, the converse does not necessarily hold. In Table 2, gender is statistically significant even though the C.I. contains a zero. The average deviation in the model is about half a legit.

Table 2. Special Education, Age, Years of Experience: Linear Regression with Bootstrapping

Outcome: ATPD	Est.	LCI	UCI
Intercept	0.15	-0.01	0.30
Social Capital	0.16	0.04	0.29
Special educator (Ref: No)	0.50	0.19	0.78
Age(z-score)	0.01	-0.14	0.16
Age(z-score) squared	-0.01	-0.15	0.12
Experience(z-score)	0.09	-0.06	0.25
Experience(z-score)squared	-0.08	-0.20	0.04
Gender (Ref: Female)	-0.39	-0.64	-0.13

Note: ATPD=Attitudes towards professional development; Significant predictors in bold. 95 % UCI and LCI (=upper and lower) confidence intervals. ATPD as outcome

The linear regression indicates that three predictors stand out: special educators, social capital, and gender. Special educators have 0.50 higher factor score in professional development compared to teachers without a

special education, on average, after adjusting for other predictors in the model. It means that the estimated difference is moderate. As the CI does not contain a zero, the coefficient is statistically significant.

Accordingly, I find support for the theory that special educators have, on average, a higher score on ATPD. Thus, I find that the education seems to promote a scientific attitude which may be considered an educational outcome in its own right. An education concerns not only knowledge but attitudes as well. Considering the individual indicators, we may even say that the education promotes a lifelong development.

Next, teachers with one additional factor score in social capital have a 0.16 higher factor score in ATDP, on average, after adjustments. Thus, we should consider the difference as small but substantive. The C.I. ranges from 0.05 to 0.3. Again the difference is statistically significant.

Although not of theoretical interest for my study I note that males have lower ATDP compared to females. The magnitude is moderate and statistically significant. Consequently, the results support **H2a** and **H3a**, but not **H1a**.

An Ordinal Regression of Willingness towards Inviting Researchers to the School (WTIR)

Now, I consider the ordinal regression for willingness towards inviting a researcher (WTIR) to the school (see Table 3). Inviting researchers indicate the willingness to integrate educational research into instruction. Inviting researchers also indicates the willingness to collaborate with research facilities (e.g. universities).

Table 3. Ordinal Regression with Standard Errors

Outcome: WTIR	Est.	S.E.
ATPD	0.14	0.13
Social Capital	0.38	0.14
Special educator(Ref: No)	-0.45	0.34
Gender (Ref: Female)	0.34	0.26
Age (z-score)	-1.21	2.74
Age (z-score) squared	5.07	2.50
Experience (z-score)	0.90	2.67
Experience (z-score)squared	0.50	2.40
1 2	-0.77	0.17
2 3:5	0.99	0.17

Note: WTIR =Willingness to invite researchers to the school; ATPD=Attitudes towards professional development; Significant predictors in bold. WTIR as outcome

In Table 3, social capital was statistically significant, but not ATDP or special education. Teachers with higher social capital have a higher likelihood of WTIR. Teachers with one unit greater social capital have 46% higher odds of responding the higher alternatives compared to the lowest alternative (i.e. $(\exp(0.38)-1)*100$).

Beyond social capital, there is also a statistically significant association between years of age and WTIR. However, the association is curve-linear. In other words the association does not fit a straight line but a curve. For special education the likelihood of WTIR goes down. For ATPD the direction of the coefficient makes sense (positive). However the coefficient has large standard errors.

One problem with ordinal regression is that we cannot meaningfully interpret the estimates. Thus, we will consider predicted probabilities next (Fox, 2015). Predicted probabilities are bounded between 0 and 1 for each response option. Using the effects package (Fox, 2003) I graphed the corresponding probabilities for age and social capital (see Figure 1).

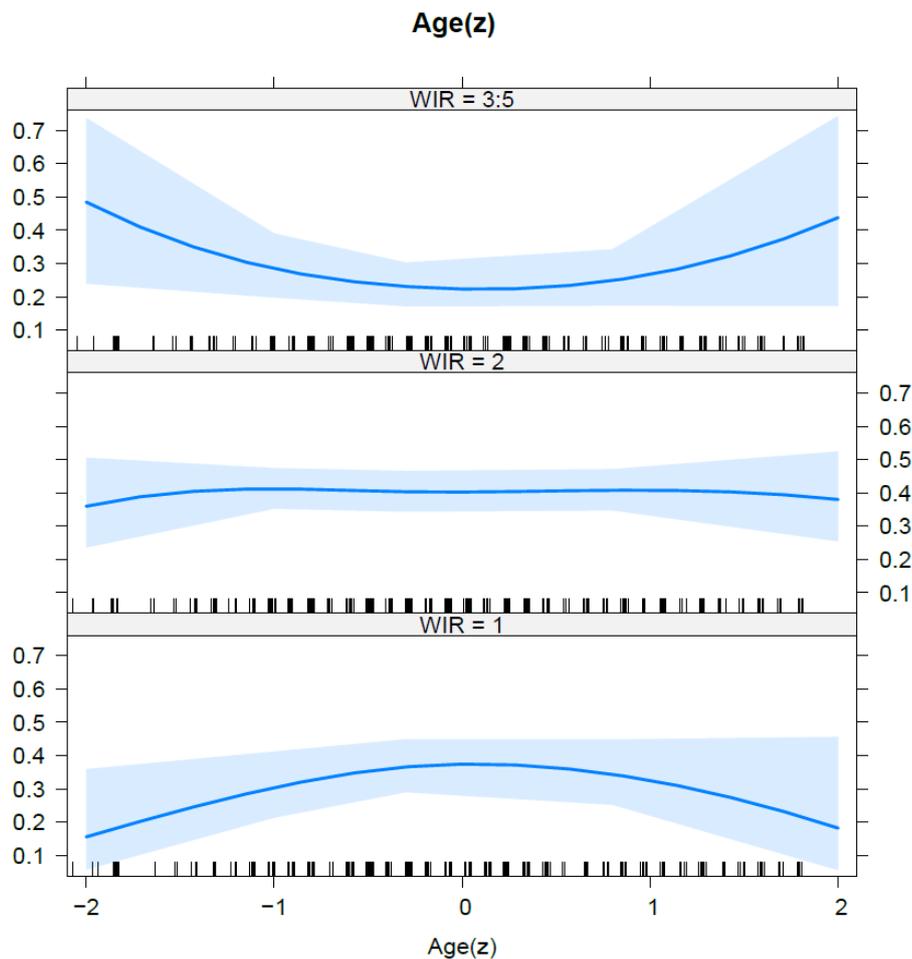


Figure 1. Predicted Probabilities of WTIR (=Willingness to invite researchers to the school) on the y-axis:
WTIR as Predicted by Age on the x-axis

In Figure 1 I place probabilities on the y-axis and age on the x-axis. For the lower options the probability goes down. For the lowest response option the probability goes up and then down with age, i.e. inverse U-shaped. For the highest response options, the probability goes down and then up with age, i.e. U-shaped. However, as the data is cross-sectional I cannot distinguish “aging” from age, but only differences in life phases.

Next, in Figure 2, I plotted the probabilities for social capital. For the lowest response option the probability

falls as social capital goes up. For the highest response option, the probability rises as social capital increases. I suggest that social capital matters most in terms of explaining the absence of WTIR. The scarcity of social capital contributes to understanding why WTIR is so low. Consequently, the results support H1b and H3b but not H2b.

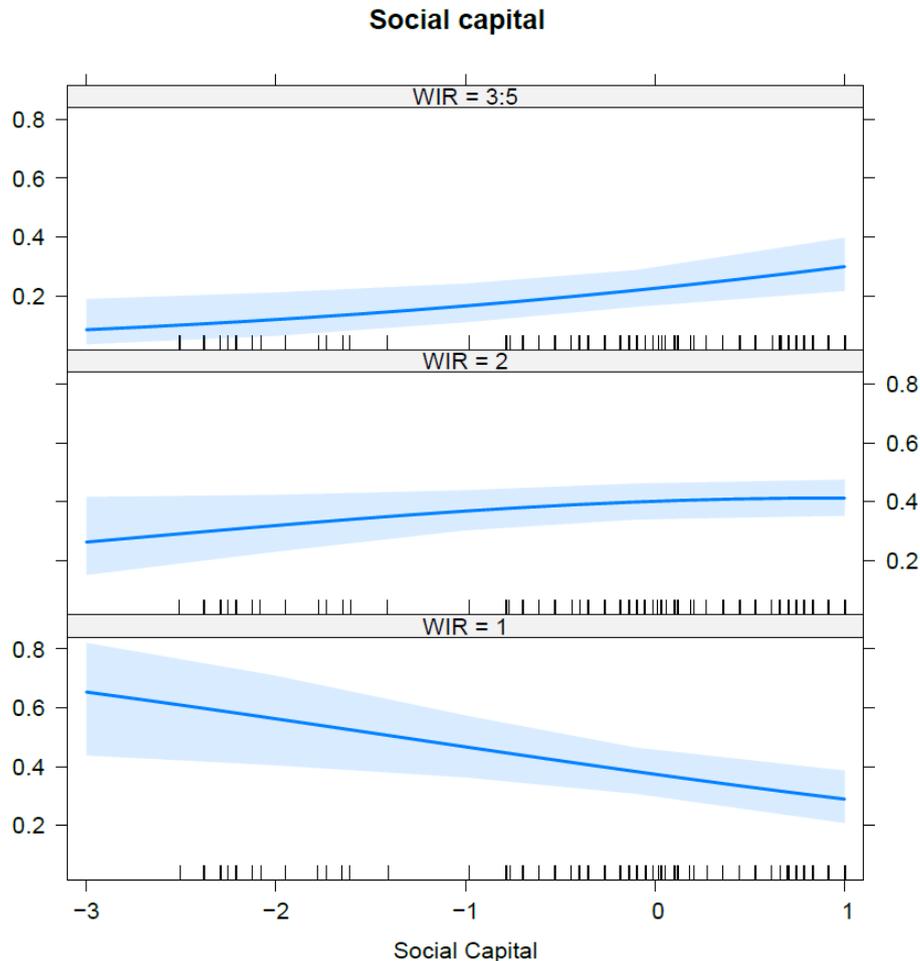


Figure 2. Predicted Probabilities of WTIR (=Willingness to invite researchers to the school) on the y-axis:
WTIR as Predicted by Social Capital on the x-axis

Discussion and Conclusion

In a series of regressions, the present study analyses teachers' - including special educators - attitudes and willingness to research-based work such as: attitudes towards professional development and willingness to invite researchers to the school. My conclusions follow:

1. When compared to other teachers, the special educators in the sample had higher scores on attitudes towards professional development. Social capital also predicted higher scores on attitudes towards professional development. The results support **H2a** and **H3a**, but not **H1a**.
2. Teachers with greater social capital had higher probability for willingness to invite researchers to the school. Age had a curve-linear relation of willingness to invite researchers to the school. The results support **H1b** and **H3b**, but not **H2b**.

Now, I will consider my results in a broader educational context. Despite limitation, I contend that the patterns in my study have bearings on broad issues in educational research. As expected by professional capital theory (Hargreaves & Fullan, 2013), education makes a difference for teachers' attitudes towards professional development. However, the present study extends the scope of professional capital theory to special education as a specific type of human capital. Compared to other teachers, special educators gain more exposure to research because of participation in the special education programs, on average (Reichenberg & Andreassen, 2019; Hausstätter & Takala, 2008).

The study suggests that; schools that invest in human capital in form of special educators may expect returns in teachers' average scientific attitudes, compared to schools refraining from investing in special educators. Consequently, the study contributes to the large share of studies supporting the importance of human capital for teachers (Evans, 2011; Hargreaves 2012; Hargreaves & Fullan, 2013; Fullan et al., 2015). Thus, at a first glance, my study seems to support for policies favoring schools investing in more special educators. However, the result seems more complex. Contrary to professional capital theory, special educators do not have a higher probability of willingness to invite researchers to the school, compared to teachers without a special education degree. I find the result somewhat surprising. In their special education training, the special educators have been exposed to much research (Reichenberg & Andreassen, 2019; Hausstätter & Takala, 2008). Thus, one would have expected that the exposure fosters professional standards, i.e. a commitment to scientific based work (Brint, 1993; Evans, 2011). Suggesting that investment in special educated teachers offers an inconsistent return. Perhaps the result agrees with the argument that teachers exercise a great deal of autonomy as an occupation. Thus allowing researchers into the schools interferes with teachers' autonomy and jurisdiction (Brante, 2011).

Let us consider the other indicators of human capital, years of age and experience. Here I find inconclusive support for professional capital theory. Experience predicts support for willingness to invite researchers, as proposed by professional capital theory (Ghaith & Yaghi, 1997; Torff & Sessions, 2008; Evans, 2011; Hargreaves, 2012; Hargreaves & Fullan, 2013; Fullan et al., 2015)

As expected by professional capital theory, investment in social capital promotes attitudes towards professional development and willingness to invite researchers. It means that teachers who discuss instructional materials, discuss teaching ideas, or try out new teaching ideas also promote inviting researchers. Several studies have documented the importance of teachers' networks for diffusion of ideas (Varga-Atkins et al., 2009). The current study adds to the literature on teachers' social capital (Hargreaves, 2012; Hargreaves & Fullan, 2013; Fullan et al., 2015). Thus, the results agree with what I expected based on professional capital theory.

My results cannot be understood properly without considering its limitations. First, the study uses a non-random sample, i.e. by convenience. Accordingly, the data analysis cannot be generalized, but rather only addresses patterns in the data. Bootstraps trace to samples, as samples trace to populations. Patterns may still be instructive and guide future studies with ambition to generalize to the population of Swedish (or European) teachers. Second, the sample size may also be a concern. Ideally, the methods used require large samples. Nevertheless, doing something is better than doing nothing to address model concerns. Third, I cannot rule out omitted

variable bias. I have not adjusted for important predictors of teaching attitudes: teachers' self-efficacy, personality, and motivation. The fourth one is the self-reporting nature of the survey responses (OECD, 2019). Fifth, teachers tend to be clustered into schools and neighborhoods (or school districts), e.g. schools average socioeconomic status or segregation index. My analysis fails to account for such clustering. Accounting for clustering would be a straightforward extension of my study using multilevel models. Finally, I do not discuss decisional capital (Hargreaves & Fullan, 2013).

Future Studies

Future studies may benefit from an ethnographic design to capture decisional capital in the making. By ethnographic studies of decisional capital one may analyze its relation to attitudes and willingness to professional development.

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