

**Spirituality and health: their associations
and measurement problems**

Klára Maliňáková

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Contents

CHAPTER 1	6
Introduction	
CHAPTER 2	22
Data sources	
CHAPTER 3	27
The Spiritual Well-Being Scale: psychometric evaluation of the shortened version in Czech adolescents.	
<i>Published in the Journal of Religion and Health, 2017, 56(2): 697-705</i>	
CHAPTER 4	38
Adolescent religiosity and spirituality – are they associated with leisure-time choices?	
<i>Published in PLOS One, 2018, 13(6): e0198314.</i>	
CHAPTER 5	58
“I am spiritual, but not religious.” Does it protect adolescents from health-risk behaviour?	
<i>Published in the International Journal of Public Health, 2018, 64(1): 115-124.</i>	
CHAPTER 6	75
Religiosity and mental health: their association depends on how and where you measure them	
<i>Submitted</i>	
CHAPTER 7	94
Hidden in emotions: a new approach to measuring implicit attitudes	
<i>Submitted</i>	
CHAPTER 8	115
General discussion	
Summary	131
Samenvatting	134
Souhrn	137
Acknowledgements	140
About the author	141
Olomouc University Social Health Institute	142
Groningen Graduate School of Medical Sciences – Research Institute SHARE	142

Introduction

Religiosity and spirituality (R/S) are connected with many areas of human life and are being recognised, especially in recent decades, as protective factors regarding human health. Positive associations are usually reported both with physical and mental health; however, a minority of studies come to different conclusions. Possible explanations could be due to measurement problems, cultural differences and the type of spirituality that is being analysed. Understanding the underlying mechanisms may add to our insight into the concept of R/S and its meaning for health. Therefore, the aim of this thesis is to assess the associations of R/S with different areas of health, focusing on various pathways to health as well as on approaches to measurement. This chapter summarises our knowledge in the area of R/S and describes the aim of the study and its research questions.

1.1. Religion, health and its measurement: a summary of the evidence

This section gives the theoretical background of the problematics of R/S and health. We will focus on religiosity and spirituality, their prevalence in the Czech Republic compared to other countries, their definitions and measurement, the pathways from these concepts to health, and finally their associations with health. We will also describe some potential reasons for the discrepancies in research findings in this area, with special attention to measurement problematics, not only in the area of R/S, but also in behavioural sciences in general.

1.1.1. Prevalence of religiosity: a specific place of the Czech Republic

A worldwide survey conducted by the Pew Research Center (2018) reported that in 2010, only 16% of the world population did not identify with any religious group and that nearly three-quarters of the world's population live in countries where their religious group represents a majority. This is, however, not the case of the Czech Republic, which has a leading position in the number of religiously unaffiliated people (76.4%) in the world, followed by North Korea (71.3%), Estonia (59.6%), Japan (57.0%), Hong Kong (56.1%) and China (52.2%) (Pew Research Center, 2014). This means that more than three-quarters of Czech inhabitants describe themselves as atheist, agnostic or "nothing in particular."

Spirituality and health: their associations and measurement problems

The Czech Republic has also experienced the most dramatic shift towards greater secularisation of all Central and Eastern European countries, as the share of the public identifying themselves as Catholic dropped from 44% in 1991 to 21% in 2017 (Pew Research Center, 2017). This trend is probably related to the history of the country. Though the attitudes against the church were reinforced by 40 years of the communist regime (Nesporova & Nespor, 2009), they were already present very early in the country's history. This could be related to the Czech reformation (Hussitism) in the 14th century or to a forced re-Catholicisation in the 17th and 18th century; however, Hamplova and Nespor (2009) link this movement preferably to a rise of nationalism in the late 19th and early 20th centuries. This nationalistic movement associated the broadly opposed Austro-Hungarian monarchy with the Catholic Church, which was closely connected with it. Consequently, the Church was rejected together with the monarchy.

This might be a reason why the Czech Republic also differs from its Central European neighbours, who show a considerably lower percentage of non-affiliated inhabitants: 5.6% for Poland, 24.7% for Germany, 13.5% for Austria and 14.3% for Slovakia (Pew Research Center, 2014). Thus, the Czech Republic represents an example of a relatively very secular society. This very specific setting represents a unique research environment in the area of R/S.

1.1.2. Definitions of religiosity and spirituality

Religiosity and spirituality are related, multidimensional constructs that include attitudes, behaviours and beliefs (Hooker et al., 2014). For centuries, there was a close overlap between these two terms, and many studies still connect spirituality with religiosity. However, the rise of secularism in the 20th century and the dissatisfaction with religious institutions (Turner et al., 1995) resulted in a process of a growing separation of these two constructs.

For centuries, the term religion included both individual and institutional dimensions (Hill & Pargament, 2003). However, in the last decades it has started to be more associated with religious institutions, prescribed theology and rituals and institutional beliefs and practices, such as church membership or attendance, which are designed to facilitate closeness to a High Power (Zinnbauer et al., 1997). For the purpose of this thesis, we used questions on religious attendance or religious affiliations as a marker of the external dimension of religiosity. This question was accompanied either by a question on the perceived closeness of God or on spirituality in order to also map a more internal dimension.

In contrast, spirituality was originally used to describe a deeply religious attitude. However, as the term spirituality started to be used also in health care settings, the term was used more broadly in order to include people from diverse religious backgrounds and even non-religious individuals (Koenig, 2008). In recent studies, spirituality has often been defined as a more subjective search for peace, harmony, meaning in life and connection

with the sacred (Koenig, 2008). In our study, spirituality is also understood in this broader sense: as the internal individual contentedness, one's perceived closeness to God, one's sense of meaning of life and of spiritual well-being (Ellison, 1983).

1.1.3. Measuring spirituality and religiosity

At present, in quantitative research R/S is assessed almost exclusively through self-reported questionnaires which generally assess attitudes, emotions and/or behaviours. However, a comparison of the various studies is complicated by the variability of these approaches and related heterogeneity in the definitions of R/S. Both religiousness and spirituality emphasize a search for the sacred; nevertheless, they might differ in the means they use to reach this goal. Instruments used to measure spirituality reflect this trend (Koenig, 2008). This results in a high number of different spirituality questionnaires, as summarised e.g. by Meezenbroek et al. (2012) and Monod et al. (2011). Among the widely used instruments are the Spiritual Well-Being Scale (Paloutzian & Ellison, 1982), the Self-Transcendence Scale (Reed, 1991), the Spiritual Transcendence Scale (Piedmont, 1999), the Expressions of Spirituality Inventory (MacDonald, 2000) and the Spirituality Assessment Scale (Howden, 1992). Furthermore, the Multidimensional Measure of Religiousness/Spirituality (Fetzer Institute, 1999), The Functional Assessment of Chronic Illness Therapy-Spiritual Well Being (Peterman et al., 2002) and the Daily Spiritual Experience Scale (Underwood & Teresi, 2002) are also used.

Of the above-mentioned questionnaires, the Spiritual Well-Being Scale (SWBS) (Ellison & Smith, 1991; Paloutzian & Ellison, 1982) is one of the most extensively studied measures of spirituality, or in a narrower sense, of subjective and spiritual well-being. It measures spiritual well-being consisting of two dimensions: religious and existential well-being. The vertical dimension, Religious Well-Being (RWB), focuses on one's relationship to God, while the horizontal dimension, Existential Well-Being (EWB), emphasises the sense of life-purpose and life satisfaction (Ellison, 1983). This questionnaire is also broadly used in research on the associations of R/S with health and shows good internal consistency and test-retest reliability (Bufford, Paloutzian, & Ellison, 1991).

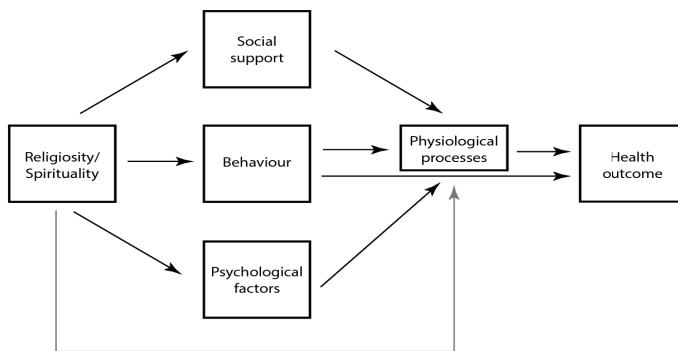
1.1.4. Pathways of interactions of R/S with health

An exponentially growing number of studies report positive associations of R/S with health, but the mechanisms through which R/S could influence health are not yet clear. Several theoretical pathways and mechanism have been suggested, e.g. by Masters (2008), Koenig (2012) and Aldwin et al. (2014), who each proposed models. In these models, R/S factors are generally seen as having indirect effects on health outcomes via three main pathways: social support, behaviour and psychological factors. These models are supported by accumulating scientific evidence. Masters (2008) also mentions the possibility of an additional pathway for a direct effect of R/S on health, which is difficult to measure, however, due to a lack of

Spirituality and health: their associations and measurement problems

agreement on what represents sufficient evidence and since the data in various studies may not capture all possible mediating or moderating mechanisms. A pathway for a direct effect of R/S via physiological processes seems likely though. This pathway could be represented e.g. by possible changes in the neurochemistry of the brain during spiritual practices, leading to a sense of peace, happiness and security (Newberg & Waldman, 2009). A model based on the pathways suggested in the above-mentioned studies is presented in Figure 1.1. To simplify the figure, we do not show the mutual relationships between dependent social support, behaviour and psychological factors, though we suppose them to exist.

Figure 1.1 A proposed simplified model of R/S and health



1.1.4.1. Behavioural pathway

A first pathway through which R/S can influence health is via the regulation of behaviour. R/S are not only connected with personal values (Hooker et al., 2014; Uzefovsky et al., 2016), but religion also comprises norms and behavioural expectations that can lead to a preferring or avoiding certain activities (Tarakeshwar et al., 2003). Thus, by keeping their religious obligations, people might protect their health through avoiding certain health-damaging behaviours or through a more intentional care for their health (Mahoney et al., 2005). So far, R/S has been reported as protective factors in both adolescent and adult health-risk behaviour, including the prevention of smoking (Pitel et al., 2012); alcohol (Piko et al., 2012), cannabis (Longest & Vaisey, 2008) and drug use (Razali & Kliewer, 2015); and sexual behaviour (Hardy & Raffaelli, 2003; Miller & Gur, 2002; Nonnemaker et al., 2003). R/S were also associated with a lower prevalence of suicidality (VanderWeele et al., 2016). Religiosity may also inhibit the exposure to stressors flowing from consequences that would certain behaviours have (e.g. gambling, other forms of risk behaviour etc.).

1.1.4.2. Psychological pathway

The second pathway regards the psychological influence of R/S, leading to positive self-appraisals, such as perceived control, self-esteem (Oates, 2016), a higher sense of

the meaning of life (Peres, Kamei, Tobo, & Lucchetti, 2018), used by religious and spiritual respondents to cope with their everyday problems as well as with major life difficulties. This so-called positive religious coping has been associated with a higher level of happiness (Lewis, Maltby, & Day, 2005), a better quality of life (Tarakeshwar et al., 2006), lower levels of distress, worries and anxiety (Nurasikin et al., 2013), and better physical health (Ironson, Kremer, & Lucette, 2016; Ross, Hall, Fairley, Taylor, & Howard, 2008).

1.1.4.3. Social pathway

The third pathway involves positive psychological effects resulting from religiously based social support. This might hold especially for religious respondents, because religion is often perceived as strengthening social bonds (Pew Research Center, 2017) and beyond participation in liturgy, churches often offer also other types of church-related activities and generally support social contact (Diener et al., 2011). Moreover, R/S was associated with a higher satisfaction in marriage (Olson et al., 2016) and a higher stability of relationships (Lambert et al., 2012).

1.1.5. Associations with health

R/S was found to be related to a better self-rated physical health (Kalkstein & Tower, 2009) and a generally lower mortality (McCullough et al., 2000). It has been further associated with a better functioning of the cardiovascular (Masters & Spielmans, 2007) and the immune system (Ironson et al., 2002), and a protective role in cell ageing (Koenig et al., 2016).

Furthermore, R/S has also been associated with better mental health (Koenig, 2012). Research findings show an association of R/S with a lower prevalence of anxiety and depression (Paine & Sandage, 2017), suicidal tendencies (VanderWeele et al., 2016) and substance use (Yonker et al., 2012). R/S has also been positively associated with a higher life-satisfaction and meaning in life (George et al., 2002), with better cognitive functioning (Reyes-Ortiz et al., 2008) and with coping with stress (Tix & Frazier, 1998).

Thus, a majority of studies reports a positive association of R/S and health. However, a small proportion of these studies reports either mixed or negative associations, e.g. with depression, anxiety, schizophrenia, blood pressure, Alzheimer's Disease and pain and somatic symptoms and physical functioning (Koenig, 2012). It is important to understand the source of these deviating findings to get insight in to whether and under what conditions the above-mentioned findings on the concept of R/S and its associations with health could be generalised.

1.1.6. Potential sources of contrasting findings in the associations of R/S with health

These discrepancies in research findings might complicate the implementation of such results into practice. Specifically, if the discrepancies are not due to measurement errors,

Spirituality and health: their associations and measurement problems

we need to understand under which circumstances spirituality can serve as a protective factor in human health. Therefore, it is important to explore the possible sources of these discrepancies, which could include the socio-cultural context (Stavrova, 2015), the specific type of spirituality involved (Tarakeshwar et al., 2006) and problems with measurement (Koenig, 2008).

1.1.6.1. Socio-cultural environment

With regard to the role of the socio-cultural environment, some authors report a protective role of R/S only in religious countries (Okulicz-Kozaryn, 2010; Stavrova, 2015); others even report the opposite for the secular ones (Bjorck et al., 1997; Hayward & Elliott, 2014). Given the fact that most studies on the relationship between R/S and health have been conducted in mainly religious countries (Lucchetti & Lucchetti, 2014), the first possible source of discrepancies in findings on R/S and health could be neglecting the socio-cultural factors and context (Dein et al., 2012).

1.1.6.2. Different types of religiosity/spirituality

The second explanation may lay in the type of R/S that it regards. Though studies show a protective role of positive religious coping (Ironson et al., 2016; Tarakeshwar et al., 2006), they also report the opposite for so-called negative religious coping (Ghorbani et al., 2017). This negative religious coping involves e.g. seeing God as cruel or punishing. It has been associated with a higher level of anxiety (Franklin, 2016; King et al., 2017), depression and distress (Rosmarin et al., 2009), poor quality of life (Tarakeshwar et al., 2006) and a higher risk of suicide (Currier et al., 2017) and substance use (Parenteau, 2017). A negative image of God was further associated with a lower self-esteem (Benson & Spilka, 1973), and with increased anger and fear (Exline et al., 2000). Given the variety of assessment measures in the area of R/S, there is a possibility that individuals who score high in the negative religious coping could be considered highly religious or spiritual according to other measures. These different ways of measuring R/S may explain the heterogeneous research findings. Therefore, assessing the nature of the spirituality also seems important.

1.1.6.3. Measurement problems

The third and also the most often suggested explanation is, however, problems with quantitative measurement (Koenig, 2008). These are related to the fact that both spirituality and religiosity are hard to measure multidimensional constructs (Hooker et al., 2014) and their definitions can differ to a high degree, especially regarding spirituality (Koenig, 2008). Moreover, measuring these implicit attitudes represents a problem because of social desirability and because participants themselves sometimes might not be aware of their own deeper feelings (Shedler et al., 1993). Thus, measuring R/S is related to the broader problematics of research in the behavioural sciences, in particular that of social desirability.

1.1.7. Social desirability bias in behavioural sciences

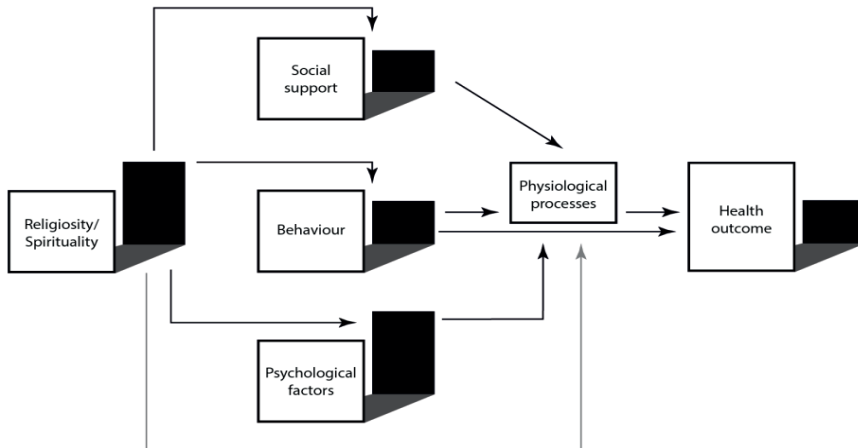
Social-desirability bias (SDB) is considered to be one of the biggest problems affecting the validity of research findings in psychology and the social sciences (Nederhof, 1985). It can be understood as pervasive tendency of individuals to present themselves in a more favourable manner related to prevailing social norms and moral expectations (King & Bruner, 2000). According to Zerbe and Paulhus (1987), social desirability consists of two components. The first component, *self-deception*, refers to the unconscious tendency to see oneself in a favourable light, and the participants actually believe the information they report. In contrast, the second component, *impression management*, represents the conscious presentation of a false front, such as deliberately falsifying test responses to create a better impression.

Researchers suggests that the tendency to respond in a socially desirable way may be stronger in some research areas. E.g., while some researchers report no negative influence of social desirability on self-reported health-risk behaviour (Crutzen & Goritz, 2010), social desirability has been reported to distort results in the area of religious orientation, religious coping and daily spiritual experiences (Jones & Elliot, 2017). Similarly, Shedler et al. (1993) refer to the so-called “illusion of mental health”, pointing to the fact that standard mental health scales may not be able to distinguish between genuine good mental health and the facade or illusion of mental health created by psychological defences. These defences, however, have physiological costs and may be a risk factor for medical illness (Shedler et al., 1993). Therefore, bias due to social desirability may to a considerable degree explain the problems in measuring spirituality, especially in its associations with mental health issues.

Thus, especially in some cases the research on the associations of R/S with mental health might resemble the famous Plato’s cave, in which a group of people lives chained to the wall of a cave. They face a blank wall, and watch and name shadows projected on the wall from objects passing in front of a fire behind them. These shadows are the prisoners’ reality. Analogously, when the effect of social desirability is not considered, we might actually consider and treat as a reality what is only its “shadow”, a part of the reality distorted by measurement error (see Figure 1.2).

Spirituality and health: their associations and measurement problems

Figure 1.2 Potential distortion due to social desirability bias in the assessment of R/S and health



Social desirability bias can be reduced by wording questions in a neutral fashion and by requiring anonymous self-administration. However, besides that, more specific approaches are needed and are developed. One approach regards indirect questioning, in which participants are asked to assess the probability that, rather than the participant, another person would undertake a certain action or decision (Cohen et al., 1993). However, this approach might be misleading in the situation when the respondent really holds an attitude different from the majority of a population.

Another way to cope with social desirability is a direct measurement approach, which involves the implementation of special scales into the research surveys. Examples of these scales are the Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960) and its shortened version, the Strahan–Gerbas Scale (Strahan & Gerbas, 1972), the Balanced Inventory of Desirable Responding Scale (Paulhus, 1991) or the Social Desirability Response Set (Hays et al., 1989). In statistical analyses, social desirability is then treated as a covariate. The problem is that in some studies the reliabilities of those scales are relatively low (Yang et al., 2017) and participants might be more self-deceptive in some areas than in other ones.

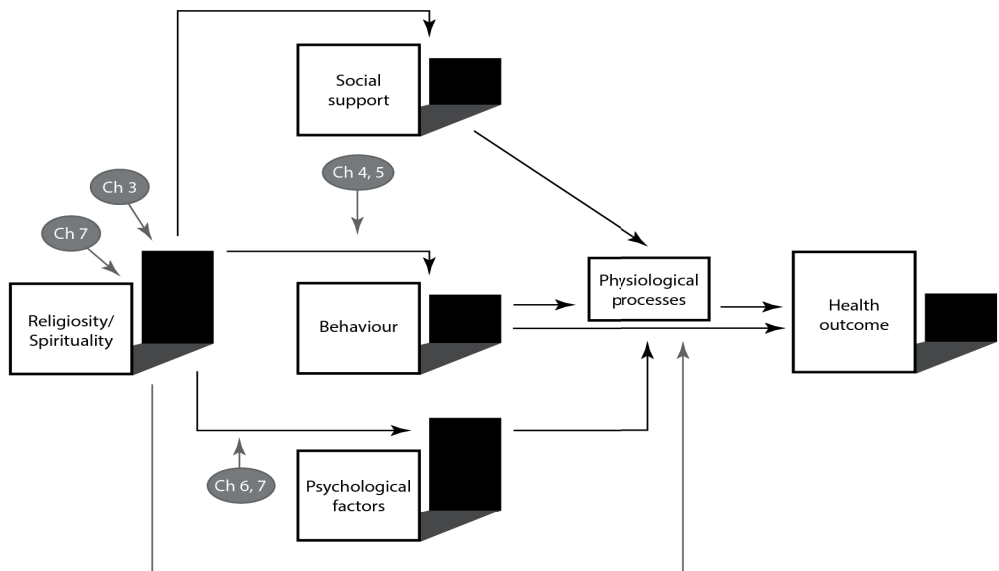
More complex methods to obtain truthful responses on sensitive questions are represented by the randomized response technique and the bogus pipeline. The randomized response technique (RRT) was first introduced by Warner (1965). It allows the interviewees to maintain privacy through the use of a randomization device. Due to introducing random noise, there is no direct link between a participant's response and their attitude (Moshagen et al., 2010). The bogus pipeline (Jones & Sigall, 1971) tries to obtain more truthful responses by using a fake polygraph. An assumption is that people tend to report their true feelings if they believe they are monitored by a lie detector. However, while these approaches might address the impression management, they may not cover the self-deception of the

participants. Therefore, there is a need for quantitative research approaches that would simultaneously address both dimensions.

1.2. Aims of the study and research questions

The general aim of this thesis is to examine the relationships between R/S and various aspects of human health. A further aim is to explore possible sources of the discrepancies between the findings of various research studies in this area, with a special focus on measurement problematic. Finally, this thesis offers two tools for measuring spirituality, an adapted version of a classical spirituality scale and a new tool for measuring implicit attitudes in the area of R/S. Figure 1.3 presents the proposed model of the relationships of R/S and health (see Figure 1.1) with the research questions as examined within this thesis.

Figure 1.3 Research questions of this thesis in relation to the proposed model of R/S and health



Spirituality and health: their associations and measurement problems

Five main research questions were formulated based on the previously stated aims.

Research question 1:

What are the psychometric properties of the shortened version of the Spiritual Well-Being Scale in Czech adolescents? (Chapter 3)

Research question 2:

Does an association exist between spirituality and religious attendance (both separately and jointly) and leisure-time choices, specifically screen-based activities and organised leisure time activities, among adolescents in a highly secular environment? (Chapter 4)

Research question 3:

Is there an association of spirituality and religious attendance with adolescent health-risk behaviour in a highly secular environment? Does spirituality modify the association of religious attendance, or does religious attendance mediate that of spirituality? (Chapter 5)

Research question 4:

Is there an association of religiosity measured more specifically (i.e. as perceived closeness of God and of the stability of religious attitudes) with mental health (i.e. attachment insecurity and other mental health problems) in a secular environment? (Chapter 6)

Research question 5:

Could a new method, Emotion Based Approach (EBA) represent a reliable alternative to classical questionnaires with regards to assessment of attitudes? What are the characteristics (structure, psychometric properties) of the two EBA tools that are presented (EBA Spirituality tool and EBA Actual Stress tool)? Do these vary for implicit (i.e., assessment with recording of the selection process) and explicit (i.e., assessment of only the final responses to items) EBA approaches? (Chapter 7)

1.3. Structure of the thesis

Chapter 1 provides general information and the scientific background on the key theoretical constructs of this thesis: religiosity, spirituality, their associations with health and possible reasons for mixed findings in this area, i.e. the cultural environment, the type of spirituality assessed and measurement problems. The aim of the study as well as the research questions are formulated in this chapter.

Chapter 2 contains a description of the three research samples used in this thesis. It also provides information on the design of the partial studies, measures and statistical analyses. Chapter 3 presents the results of a psychometric evaluation of a shortened version of Spiritual Well-Being Scale, identifies the problem related with the measurement of spirituality in a secular environment of the Czech Republic and offers an adjusted version of the tool.

Chapter 4 explores the associations of religiosity and spirituality, both separately and in interaction, with adolescent leisure-time choices (excessive use of television and playing of computer games, involvement in sport activities and organised leisure time activities, regular physical activity, playing a musical instrument and reading of books). Furthermore, gender, age, perceived family support and socioeconomic differences are assessed.

Chapter 5 focuses on the associations of religiosity and spirituality, both separately and in interaction, with adolescent health-risk behaviour (tobacco, alcohol, cannabis and drug use, early sexual intercourse). Furthermore, gender, age and socioeconomic differences are assessed.

Chapter 6 explores whether a different categorisation of respondents based on their religiosity and spirituality leads to different outputs with regards to mental health and explores the dynamic of change of religious views in a secular country. Furthermore, gender, age and socioeconomic differences regarding these relationships are assessed.

Chapter 7 offers a new tool for measuring implicit attitudes that addresses social desirability bias in quantitative measurement. The chapter describes the characteristics of the tool and compares its measurement ability to that of classical verbal measures.

Chapter 8 summarises and discusses the main findings of this thesis. It also explores the strengths and limitations of the study and its implications for further practice, policy and research.

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Data sources

This chapter provides a description of the study samples (2.1), measures (2.2) and statistical analyses (2.3) as used in this thesis.

2.1. Study samples and procedures

This thesis is based on three different samples from two national surveys and one online survey, as summarised in Table 2.1. Sample 1 was derived from the Health Behaviour in School-aged Children (HBSC) study conducted in 2014 and was used in the Chapters 3, 4 and 5. Sample 2 was collected as a nationally representative sample of the Czech adult population in 2016 and was used in the Chapter 6. Sample 3 was collected as an online sample in 2017 and was used in the Chapter 7.

For Sample 1, we obtained data on a nationally representative sample of Czech boys and girls from the 2014 Health Behaviour in School-aged Children (HBSC) study. According to the HBSC study protocol, schools were selected randomly after stratification by region, school size and type of school (primary schools vs. secondary schools). Out of 243 contacted schools 242 agreed to participate (response rate 99.6%). Then, classes from the 5th, 7th and 9th grades, in general corresponding to age categories of 11-, 13- and 15-year-olds were selected at random, one class from each grade per school. Data from 14,539 pupils were obtained (response rate 89.2%). The majority of non-response was due to illness or other reasons, e.g. sports or academic competitions (10.6%), and 30 children refused to participate in the survey (0.2%). Data were collected between April and June 2014. Questionnaires were distributed by trained administrators with no teachers present in the classroom in order to reduce response bias. Respondents had one school lesson (45 minutes) dedicated to completing the questionnaire. The spirituality questionnaire was offered to only half of the adolescents from the 7th and 9th grades, so for the purpose of these chapters the dataset included 4,889 adolescents who filled out this section. Of these adolescents, some had to be excluded for the subsamples used in Chapters 3-5 because of incomplete information on age, gender, spirituality, religious attendance or concrete research questions specific for each chapter. This led to a final sample of 4,217 respondents (mean age=14.4, 48.8% boys) in Chapter 3, and a sample of 4,182 respondents (mean age=14.4, SD=1.1, 48.6% boys) in Chapter 4. In Chapter 5, where possible, missing values were estimated using multiple imputation, leading to a sample of 4,566 respondents (mean age=14.4, SD=1.09, 48.8% boys).

Spirituality and health: their associations and measurement problems

For Sample 2, a national sample of the Czech population aged fifteen years and older was obtained using a two-step procedure. In the first step, the questionnaire and all further procedures were piloted among 206 participants. This led to the final version of the survey. In the second step, a different 2,184 participants were randomly chosen with the help of quota sampling and asked to participate in a study on the problematics of health, life experiences, attitudes and lifestyle. Of these respondents, 384 (17.6%) did not want to participate in the survey. Non-participants reported a lack of time (39.2%), a lack of interest in or distrust in research in general (24.0%), the personal nature of the questions (17.2%) and the length and difficulty of the questionnaire (11.2%) among the main reasons for their non-participation. Data was collected by professionally trained administrators in September and October 2016, with a standardized interview with the respondents (face-to-face). Because of incomplete information on religiosity, 5 questionnaires were excluded, leading to a final sample of 1,795. The sample is a representative sample of the Czech population aged 15 years and over (mean age 46.4, SD=17.4; 95% confidence interval 45.6-47.2; 48.7% men).

For Sample 3, we obtained data on a sample of 533 Czech respondents aged 15 years and over (April 2017-November 2017). However, 11 respondents were excluded from the online survey because of the extremely short time of filling the survey (i.e. less than 15 minutes), which basically did not allow them to fill the survey thoughtfully. This led to a final sample of 522 respondents (mean age 30.3, SD=12.63; 27.0% men) of which 157 respondents also participated in the retest study and 46 respondents in the cortisol assessment study. For the cortisol assessment, the inclusion criteria were university attendance and age within the range 19-28 years. The exclusion criteria were: recent dependency on illegal drugs (6 months), pregnancy or breast-feeding, endocrine problems, shift work and mouth redness due to infection or injury.

Participation in all the surveys was anonymous and voluntary. The study designs were approved by the Ethics Committee of the Faculty of Physical Culture, Palacký University in Olomouc (No. 17/2013; Sample 1) and by the Ethics Committee of the Olomouc University Social Health Institute, Palacký University Olomouc (No. 2016/3; Samples 2 and 3).

Table 2.1 Basic characteristics of the samples

Sample	Origin	Chapter
1	HBSC 2014	3, 4, 5
2	Adult representative sample 2016	6
3	Online sample 2017	7

2.2. Measures

This section provides an overview of the variables used in this study. Brief information on the origin of the measures and a short description is provided in Table 2.2.

Table 2.2 Overview of the variables used in this thesis

Measure	Source	Role in analysis	Chapters	Indicator of
Spiritual Well-Being Scale	HBSC 2014	Independent	3, 4, 5	spirituality
Daily Spiritual Experience Scale	Online sample 2017	Independent, dependent	7	spirituality
Emotion Based Approach Spirituality tool	Online sample 2017	Independent	7	spirituality
Religious attendance	HBSC 2014	Independent	3, 4, 5	religiosity
Religiosity	Adult representative sample 2016	Independent	6	religiosity
Perceived closeness of God	Adult representative sample 2016	Independent	6	religiosity
Conversion experience	Adult representative sample 2016	Independent	6	religious stability
Stability of non-religious attitudes	Adult representative sample 2016	Independent	6	religious stability
Emotion Based Approach Actual Stress tool	Online sample 2017	Independent	7	mental health
Weekly smoking	HBSC 2014	Dependent	4	health-risk behaviour
Weekly drinking	HBSC 2014	Dependent	4	health-risk behaviour
Recent cannabis use	HBSC 2014	Dependent	4	health-risk behaviour
Lifetime drugs use	HBSC 2014	Dependent	4	health-risk behaviour
Early sexual intercourse	HBSC 2014	Dependent	4	health-risk behaviour
Excessive television use	HBSC 2014	Dependent	5	health behaviour
Excessive computer games playing	HBSC 2014	Dependent	5	health behaviour
Excessive Internet use	HBSC 2014	Dependent	5	healthy life-style
Team sports	HBSC 2014	Dependent	5	healthy life-style
Individual sports	HBSC 2014	Dependent	5	healthy life-style
Elementary art school...	HBSC 2014	Dependent	5	active leisure time choices
Sufficient physical activity	HBSC 2014	Dependent	5	active leisure time choices

Spirituality and health: their associations and measurement problems

Table 2.2 (continued)

Measure	Source	Role in analysis	Chapters	Indicator of
Children and youth organisations	HBSC 2014	Dependent	5	active leisure time choices
Activities in leisure-time centres	HBSC 2014	Dependent	5	active leisure time choices
Church activities	HBSC 2014	Dependent	5	active leisure time choices
Regular reading of books	HBSC 2014	Dependent	5	active leisure time choices
Regular playing musical instrument	HBSC 2014	Dependent	5	active leisure time choices
Regular creative activities	HBSC 2014	Dependent	5	active leisure time choices
Anxiety in close relationships	Adult representative sample 2016	Dependent	6	mental health
Brief Symptom Inventory (BSI-53)	Adult representative sample 2016	Dependent, independent	6, 7	mental health
Cortisol level	Online sample 2017	Dependent	7	stress
Dopen Questionnaire Lie Score	Online sample 2017	Dependent	7	social desirability
Perceived Family Support	HBSC 2014	Confounder	4	support from the family
Family affluence	HBSC 2014	Confounder	3, 4	socioeconomic status
Perceived level of stress	Online sample 2017	Confounder	7	stress
Recent high use of alcohol	Online sample 2017	Confounder	7	substance use
Recent dependency on illegal drug	Online sample 2017	Confounder	7	substance use
Endocrine problems	Online sample 2017	Confounder	7	hormone use
Use of steroids	Online sample 2017	Confounder	7	hormone use
Use of contraception	Online sample 2017	Confounder	7	hormone use
Day of menstrual cycle	Online sample 2017	Confounder	7	phase of a menstrual cycle
Length of menstrual cycle	Online sample 2017	Confounder	7	phase of a menstrual cycle

2.3. Statistical analyses

Several statistical methods were used across this study. All analyses with the exception of the mediation analysis were performed using the statistical software package IBM SPSS 21. Each chapter provides detailed information about the performed statistical analyses.

Generally, in the first step we described the background characteristics of the sample. Further analyses reflected the aim of the article. The assessment of the psychometric properties of measurement tools included the calculation of internal consistency indicators – Cronbach’s alpha (α) and Mean Inter-Item Correlation (Chapter 3 and 7) and an exploratory factor analyses (Chapter 3). For the assessment of associations between the observed variables, we used binary logistic or multinomial regression analyses, both crude and adjusted for potential confounders (Chapters 4, 5 and 6). Independent variables were usually assessed separately and then in interaction. Potential mediating effects (Chapter 5) were assessed via the mediation package in R. For the assessment of associations in Chapter 7, we used Spearman’s rank order correlation coefficients after we had tested the role of potential confounders with linear regression analyses.

The Spiritual Well-Being Scale: psychometric evaluation of the shortened version in Czech adolescents

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Abstract

The aim of this study was to psychometrically evaluate the shortened version of the Spiritual Well-Being Scale (SWBS) in Czech adolescents. A nationally representative sample of 4,217 adolescents participated in the 2014 Health Behaviour in School-aged Children survey. The internal consistency of the SWBS was assessed using Cronbach's alpha (α) and Mean Inter-Item Correlation values (MIIC). The factor structure was evaluated using Principal Component Analyses. After adjustment, our new seven-item version of the scale supports a two-factorial model of the SWBS with satisfactory internal consistency ($\alpha=0.814$, MIIC=0.379). This version of the SWBS is suitable for measuring spiritual well-being in a secularising environment.

Keywords: shortened SWBS; adolescents; spirituality; religiosity; psychometric evaluation

3.1. Introduction

Spirituality is a multidimensional construct (Hooker et al., 2014); therefore, its many definitions differ according to the dimension being emphasised by the authors. The concept of spirituality has been changing over time. Originally, it was connected with religiosity, but during the last decades its meaning has been further extended and has started to include additional concepts, such as purpose and meaning in life, connectedness with others, peacefulness, harmony and well-being (Koenig, 2008).

There is a growing body of literature that recognises the importance of both spirituality and religiosity and their possible role in physical and mental health (e.g. Aldwin et al., 2014; Hill & Pargament, 2003; Weber & Pargament, 2014). Therefore, the need for having effective ways of measuring spirituality is increasing. Meezenbroek et al. (2012) and Koenig (2008) both mentioned a high number of different spirituality questionnaires. One of the most extensively studied measures of subjective and spiritual well-being is the Spiritual Well-Being Scale (SWBS) (Ellison & Smith, 1991; Koenig, 2008; Paloutzian & Ellison, 1982). The SWBS measures spiritual well-being, while distinguishing between its two interrelated yet distinct aspects: religious and existential well-being. The vertical dimension, Religious Well-Being (RWB), focuses on one's relationship to God, while the horizontal dimension, Existential Well-Being (EWB), emphasises the sense of life-purpose and life satisfaction (Ellison, 1983).

Many studies have focused on spirituality among adults (e.g. Lawler-Row & Elliott, 2009; Unterrainer et al., & Fink, 2010), but fewer on adolescents. Consequently, also the number of suitable tools for measuring adolescent spirituality is more limited. One of the possible instruments could be the shortened version of the SWBS, as used by Cotton et al. (2005).

Spiritual development is a part of psychosocial and cognitive development (Sifers & Warren, 2012). It is important to have a closer look at the possible protective role of spirituality regarding adolescent risk behaviour. Spirituality is of special interest in the conditions prevailing in the Czech Republic, as 76.4% of the population is religiously unaffiliated (Pew Research Center, 2014). Therefore, it is important to explore and clarify the problem of measuring adolescent spirituality under conditions of a highly secular society. The aim of this study is to psychometrically evaluate the shortened version of the SWBS in Czech adolescents.

3.2. Methods

3.2.1. Participants and procedure

We obtained data on a nationally representative sample of Czech boys and girls from the 2014 Health Behaviour in School-aged Children study. Schools were selected randomly after stratification by region, school size and type of school (primary schools vs. secondary schools). Out of 243 contacted schools 242 schools agreed to participate (response rate

99.6%). Then, classes from 5th, 7th and 9th grades, in general corresponding to age categories of 11-, 13-, and 15-year-olds, were selected at random, one from each grade per school. Data from 14,539 pupils was obtained (response rate 89.2%). The majority of non-response was due to illness or other reasons, e.g. sports or academic competitions (10.6%) and 30 children refused to participate in the survey (0.2%).

Our study was restricted to half of the adolescents from the seventh and ninth grades who had the SWBS included in the questionnaire. This reduced the sample size to 4889. Because of incomplete information on age, gender or any of the responses on SWBS items, 672 questionnaires were excluded, leading to a final sample of 4217 respondents (mean age=14.4, 48.8% boys).

Data was collected between April and June 2014. The questionnaires were distributed by trained administrators while the teachers were not present in the classroom to reduce the response bias. Respondents had one school lesson (45 minutes) dedicated to completing the questionnaire. Participation in the survey was anonymous and voluntary. The study design was approved by the Ethics Committee of the Faculty of Physical Culture, Palacký University in Olomouc.

3.2.2. Measures

The SWBS was translated from English by two independent Czech native speakers. Both versions were subsequently discussed in a working group of translators and researchers in order to create one tool. This was afterwards translated using the back-translation method by a professional native English translator, fluent in Czech, and compared with the original SWBS. After agreeing on the final version, the item clarity and understanding were tested on a focus group with satisfactory results.

The SWBS is composed of twenty items and measures two dimensions of spiritual well-being (Paloutzian & Ellison, 1982). The Religious Well-Being Subscale (RWB) provides a self-assessment of one's relationship with God, while the Existential Well-Being Subscale (EWB) gives a self-assessment measure of one's sense of life purpose and life satisfaction. Each item is answered on a 6-point Likert scale ranging from 'strongly agree' (1) to 'strongly disagree' (6). Eight items are worded in a reverse direction and were reversely scored. The overall score from the SWBS is computed by summing the responses to all twenty items after reversing the negatively worded items. It ranges from 20 to 120, with a lower score representing greater spiritual well-being. For specific purposes, e.g. focusing only on one's relationship with God or only on the existential well-being, the authors also admit the usage of only one subscale. For the purpose of this study the shortened version of the SWBS was used. According to Cotton et al. (2005), the number of items was reduced to 10, 5 of them belonging to the RWB and 5 to the EWB. In their study, the authors report a good internal consistency of the shortened scale with Cronbach's $\alpha = 0.87$. The total score of this shortened version ranges from 10 to 60. Of the total, 3 items are worded in a reverse direction.

Religiosity was measured by the frequency of attending church or religious sessions (religious attendance). The wording of the question was ‘How often do you go to church or to religious sessions?’ with possible answers: several times a week/approximately once a week/approximately once a month/a few times a year/never. Those who reported attending religious sessions at least once a week were considered as attending.

3.2.3. Statistical analyses

Firstly, descriptive analyses for the study sample were performed. The Chi-square and Mann-Whitney U test (2 groups) were used to test for statistical significance of gender differences in spiritual well-being (SBW, RWB and EWB) and church attendance. As a second step we calculated internal consistency indicators – Cronbach’s alpha (α) and Mean Inter-Item Correlation (MIIC) – for the whole SBWS as well as for the RWB and EWB subscales. As a third step we conducted an exploratory factor analyses (FA) with Principal component analyses (PCA) and oblique rotation. Items with high shared loadings were deleted item by item and in every step the internal consistency and factor structure were recalculated. The procedure was stopped when we reached satisfactory internal consistency and low shared loadings (lower than 0.15). Only the initial and final models are herein presented. All analyses were performed using the statistical software package IBM SPSS version 21.

3.3. Results

As you might see in Table 3.1, boys showed significantly higher existential and overall spiritual well-being than girls, while there were no gender differences according to religious well-being and church attendance.

Table 3.1 Descriptive analyses of the shortened version of the SWBS of Czech adolescents for the whole sample and by gender.

	Total (n=4217)	Boys (n=2056)	Girls (n=2161)	p-value
Church attendance: n (%)				.114 ^a
attending	302 (7.2)	134 (6.5)	168 (7.8)	
not attending	3915 (92.8)	1922 (93.5)	1993 (92.2)	
SWB score: Mean (SD)	36.0 (7.73)	36.5 (7.63)	35.6 (7.80)	.000 ^b
RWB score: Mean (SD)	13.2 (5.76)	13.3 (5.91)	13.1 (5.60)	.488 ^b
EWB score: Mean (SD)	22.8 (4.93)	23.2 (4.85)	22.4 (4.97)	.000 ^b

Notes: SD – standard deviation; ^aChi-square test; ^bMann-Whitney U-test

Spirituality and health: their associations and measurement problems

The initial visual inspection of data showed an unexpected abnormal shape, especially in the RWB histogram, with a solitary peak at the exact value of 10. This score was obtained by more than one-quarter of all respondents. A closer look showed a response pattern that pointed to a possible problem with the negatively worded item 5 (“I don’t get much personal strength and support from God”). Also a more detailed inspection of the two remaining negative EWB items (item 1 and 8) showed their major influence on the abnormal distribution of the EWB subscale.

The ten questions designed to assess the degree of overall spiritual well-being had relatively low internal consistency ($\alpha=0.633$, MIIC=0.153). The RWB ($\alpha=0.726$, MIIC=0.374) and EWB ($\alpha=0.643$, MIIC=0.268) subscales showed slightly better internal consistency.

As a next step, an exploratory factor analysis with Principal component analyses was employed. The scale’s developers used Varimax rotation (Ellison, 1983), as well as some other researchers (Fernander et al., 2004; Miller et al., 1998). Other authors (Ledbetter et al., 1991), however, argue that because of the correlation between RWB and EWB subscales, an oblique rotation is more appropriate. For comparison purposes both Varimax and Oblimin rotations were performed and showed only negligible differences, therefore only the results of the Oblimin rotation are presented. The initial solution yielded three potential factors with an eigenvalue higher than one, but the scree plot indicated only a two-factor solution. The test for legitimacy of the factor analysis resulted in the following coefficients: Determinant of the correlation matrix=0.012, Kaiser-Meyer-Olkin measure (KMO) of sampling adequacy=0.825 and Barlett’s Test of sphericity ($p < 0.001$). The initial analysis with ten items yielded the three-factor solution shown in Table 3.2. The factor loadings revealed that items 2, 3, 6 and 9 constitute Factor 1, which corresponds with the RWB subscale, while items 4, 7 and 10 constitute Factor 2, which corresponds with the EWB subscale. The remaining three items (1, 5 and 8) created a third factor not proposed by the authors of the scale. A closer inspection of this factor showed that it was formed by the three negatively formulated statements. This three-factor solution explained 68.5% of the overall variance.

Table 3.2 Factor Structure of the shortened version of the Czech SWBS using Oblimin rotation

Items		Factor 1	Factor 2	Factor 3
		(RWB)	(EWB)	(NFS)
6	I believe that God is concerned about my problems.	.920	.197	-.249
	I have a personally meaningful relationship with God.	.915	.152	-.280
9	My relationship with God contributes to my sense of well-being	.902	.157	-.270
2	I believe that God loves me and cares about me.	.891	.233	-.220
7	I feel good about my future.	.136	.845	.039
4	I feel very fulfilled and satisfied with my life.	.152	.836	.099
10	I believe there is some real purpose for my life.	.222	.760	.054
8	Life doesn't have much meaning.	-.180	.235	.769
1	I don't know who I am, where I came from, or where I'm going	-.188	.132	.749
5	I don't get much personal strength and support from God	-.243	-.229	.532

Note: NFS=negatively formulated statements

The negatively formulated items were the same items that had high shared loading and were problematic regarding internal consistency, so we decided to delete them item by item. In every step the internal consistency and the factor structure were recalculated. The procedure was stopped when we reached satisfactory internal consistency and low shared loadings (lower than 0.15). Finally, items 1 and 8 (belonging to EWB) and item 5 (belonging to RWB) were excluded. After excluding those items the internal consistency of the subscales increased remarkably for the RWB ($\alpha=0.928$; MIIC=0.765) and slightly for the EWB ($\alpha=0.760$; MIIC=0.516). The overall internal consistency for the new seven-item scale increased to $\alpha=0.814$ with MIIC=0.379. After deleting all three items, we applied once more the test for legitimacy of the factor analyses, again with satisfactory results (Determinant of the correlation matrix=0.017, KMO=0.822 and Bartlett's Test of Sphericity $p < 0.001$). The recalculated factor analyses resulted in a two-factor solution (shown in Table 3.3) that explained 76.3% of the overall variance.

Table 3.3 Factor Structure of the shortened version of the Czech SWBS with the deleted items using Oblimin rotation

Items	Factor 1 (RWB)	Factor 2 (EWB)
3 I have a personally meaningful relationship with God	.920	
6 I believe that God is concerned about my problems.	.916	
9 My relationship with God contributes to my sense of well-being.	.903	
2 I believe that God loves me and cares about me.	.890	
7 I feel good about my future.		.852
4 I feel very fulfilled and satisfied with my life.		.842
10 I believe there is some real purpose for my life.		.774

Factor loadings smaller than 0.29 were suppressed.

Note: The original English language Spiritual Well-Being Scale (SWBS) is in the *Journal of Psychology and Theology*, 1983, 11(4), p. 340. English SWBS © 1982, C.W. Ellison & R.F. Paloutzian. Czech translated SWBS © 2015, R.F. Paloutzian. All rights reserved. Translation courtesy of Klara Malinakova and Peter Tavel. Not to be duplicated unless express written permission is granted by copyright holder.

3.4. Discussion

The aim of this study was to psychometrically evaluate the shortened version of the Spiritual Well-Being Scale in Czech adolescents. The first outputs of the internal consistency and factor analyses pointed to a problem with some of the items of the scale that created a separate factor. A closer inspection of this factor showed that it was formed by the three negatively formulated statements. Repeating the analyses after excluding those items was linked with a remarkable increase of the Cronbach’s alpha and Mean Inter-Item Correlation values and a reduction of the number of factors from original 3 to 2. Those correspond to the existing Religious and the Existential subscales of the SWBS.

Our results support the two-factorial model, consistent with the reports of the first study made by the authors of the scale (Ellison, 1983) and other studies (Fernander et al., 2004; Genia, 2001). However, some other authors report in their studies three (Gow et al., 2011; Musa & Pevalin, 2014) or more factors (Miller, Fleming, & Brown-Anderson, 1998). The differences could be explained partly by the different cultural context regarding the expression of spirituality (Utsey et al., 2005). Moreover, factor analytic studies of the SWBS used various samples that differ in age, religiosity or education of respondents and also used different statistical techniques (Genia, 2001; Musa & Pevalin, 2012). Bufford et al. (1991) suggested that because of the ceiling effect the scores are negatively skewed, and so the assumptions of parametric correlational techniques are not met and factor analysis of the SWBS could lead to variable solutions.

We initially found a separate third factor consisting of the negatively worded items,

which is consistent with the findings of other authors who studied negatively worded items. Several studies have shown that the factor analyses of scales containing both positive and negative items often reveals that an extra factor commonly emerges that is unique to the negatively worded items (DiStefano & Motl, 2006). For example, Scott et al. (1998) describe in their study as a result of factor analysis 3 factors, one of which (Affiliation) consists of the positive items, while the two remaining (Alienation and Dissatisfaction with life) of the negative ones. Gow et al. (2011) also report three factors, the first one formed by 10 RWB items and 1 EWB item, while the second by the positive EWB items and a third one by the negative EWB items. Schmitt and Stults (1985) showed that even when only 10% of respondents paid less attention to the wording, a separate factor loading on the negatively worded statements could be found. The study of Barnette (2000) reports that negatively worded items produce a lower Cronbach's alpha. Including just a few negative items in an otherwise positively worded questionnaire seems to foster the tendency to misread the negative item because the person is being asked to shift a mental gear in processing the information (Roszkowski & Soven, 2010). Taking into account that the SWBS used in our study was placed at the very end of the HBSC questionnaire, it might be possible that adolescents did not notice the reverse scoring of the items because of the tiredness and subsequent carelessness.

There is also another aspect that might have contributed to the confusion around the statement "I don't get much personal strength and support from God" (item 5). As the focus group of older Czech adolescents, which was done in a consequent study, revealed, many of them chose the option "I totally disagree" as an expression of an overall disagreement with the question that speaks about the support from God they do not recognise. However, as a consequence of a negative formulation of the item their response was, after inversion, interpreted as a statement about maximal support. It may be that the negatively worded religious items lack the opportunity to express disagreement with the whole concept of the question that implicitly assumes the existence of God. Inasmuch as the majority of studies were performed on samples with distinctly higher rate of religious respondents, this study brings a new view on the usability of the SWBS in a secular environment.

3.4.1. Strengths and limitations

This study has several important strengths, the most important being the large and representative sample size of adolescents and the high response rate. It is also the first study that works with the shortened version of the SWBS in the Czech environment, a typical example of a secular society. On the other hand, a limitation of our study could be that due to incomplete data, which might have been caused by the length of the HBSC questionnaire battery, 13.7% of questionnaires had to be excluded. Nevertheless, the proportion of religious/non-religious respondents correspond to its prevalence in the population, so we might expect that our data are still representative. Another limitation might be an information bias, as our data were based on self-reports of adolescents, which can be

Spirituality and health: their associations and measurement problems

inaccurate or influenced by social desirability. However, high levels of social desirability might be expected by religious respondents, who represent only 7.2% of our sample. On the other hand, the wording of some items was not appropriate for non-believers, which might lead to information bias as well, e.g. “I don’t get much personal strength and support from God”. That item was finally the one with the highest shared loading and had to be excluded from the questionnaire.

3.4.2. Implications

After removal of the negatively worded items, we found the 2-factor model of the shortened SWBS to be the most reliable. For adolescents in secular environment only this adjusted and shortened 7-item SWBS should be used. Generally, in this type of environment special attention should be paid to negative religious items where exclusion or some other way of dealing with the problem, e.g. including the option “does not apply to me”, should be considered. Further studies of religion and spirituality should consider that they are multidimensional constructs and that there might be an overlap with mental health (Koenig, 2008). Using a scale that at the same time taps, e.g., mental or physical health should be avoided. Furthermore, it would be appropriate to compare samples of children with religious and secular attitudes.

3.5. Conclusion

Our finding suggests that the adjusted shortened SWBS containing 7 items is suitable for measuring both religious and non-religious spirituality in a secularising environment. The adjusted, shortened SWBS (including 7 positively formulated items) might be a helpful instrument for future research.

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Adolescent religious attendance and spirituality - are they associated with leisure-time choices?

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Abstract

Background: Spirituality and religious attendance (RA) have been associated with personal attitudes and values, and this may affect lifestyle. The aim of this study was to explore their association with adolescent leisure-time choices in a highly secular environment.

Methods: A nationally representative sample of adolescents ($n=4,182$, 14.4 ± 1.1 years, 48.6% boys) participated in the 2014 Health Behaviour in School-aged Children cross-sectional study. We measured RA, spirituality (adjusted shortened version of the Spiritual Well-Being Scale), excessive television, computer games, and internet use, as well as participation in organized leisure-time activities.

Results: Compared to non-attending and non-spiritual respondents, respectively, both attending respondents and spiritual respondents were less likely to watch television and play computer games excessively, with odds ratios (ORs) ranging from 0.6 (95% confidence interval 0.5-0.8) to 0.9 (0.9-0.99). Only attending and only spiritual respondents were more likely to use the internet excessively, but this was not the case for those that were both attending and spiritual. Moreover, religious and spiritual respondents were more likely to be involved in at least one organised activity. ORs were 2.9 (1.9-4.3) for RA and 1.3 (1.2-1.4) for spirituality compared to their counterparts. The same regarded sporting and non-sporting activities combined (ORs 4.6 (3.0-7.1) and 1.5 (1.4-1.7), respectively) and regularly reading books or playing a musical instrument.

Conclusions: Adolescent RA and spirituality are associated with a more active way of spending leisure-time. Further research should focus on understanding potential mechanisms that underlie these associations.

Keywords: screen-based activities; organised leisure-time activities; adolescence; religious attendance; spirituality

4.1. Introduction

Recently, the amount of time spent on screen-based activities (SBA) has emerged as an important and independent risk factor for the physical and mental health of children and adolescents (Suchert et al., 2015). Excessive amounts of SBA have been shown to be associated with overweight (Mitchell et al., 2013), unfavourable levels of several cardiovascular risk factors (Grontved et al., 2014) as well as a higher occurrence of headache and irritability and reports of feeling low and nervous (Brindova et al., 2015). Some of the content of SBA seem to add to these risks. For example, playing violent computer games or watching violent television programs was linked to aggressive thoughts, hostility and less pro-social behaviour (Bickham & Rich, 2006; Subrahmanyam et al., 2000). Higher levels of screen-based sedentary behaviours have also been linked to other health damaging behaviours, such as substance use (Iannotti et al., 2009).

A current criterion for excessive adolescent screen-based activity is spending more than two hours a day on recreational screen time (Inchley et al., 2016), but most adolescents exceed this limit. Moreover, screen time is growing in North America and Europe (Bucksch et al., 2016), including the Czech Republic (Sigmund et al., 2015). The fact that sedentary behaviour tracks from childhood into adulthood (Craigie et al., 2011) highlights the need to address this issue in adolescence and to support healthier alternatives for adolescent leisure-time choices.

Organised leisure-time activities (OLTA) are sometimes mentioned as a healthy alternative for SBA. They have also been associated with other positive outcomes, such as lower substance use (Fredricks & Eccles, 2006), better school performance and attachment to school (Petr Badura et al., 2016) and better physical and mental health (Badura et al., 2015). Several factors are known to be associated with adolescent participation in OLTA, such as parental support of the activity, friends, self-efficacy, academic achievement, psychopathological problems and environmental factors (Denault & Poulin, 2009; Eisman et al., 2016; Fawcett et al., 2009; Manz et al., 2016). However, it seems that adolescents themselves associate their involvement in structured leisure activities especially with their intrinsic motivation (Fawcett et al., 2009).

Religiosity and spirituality could be of special interest in leisure choices, because they are connected with many dimensions of human life and personal values (Hooker et al., 2014; Uzefovsky et al., 2016) and also comprise both an organization of norms and behavioural expectations that can lead to a preference for certain activities above others (Tarakeshwar et al., 2003). Thus far, this potentially important group of determinants has not often been studied, and if it has, it was mostly done in the United States, in which a significant segment of the population identifies with a religious institution. In contrast, the Czech Republic is the country with the highest percentage (76.4%) of people that do not have a religious affiliation in the world (Pew Research Center, 2014), meaning religion is not a major determinant of main stream youth culture. This makes it a unique population for research in this field, enabling the specific effect of religion to be established apart from only that of main stream youth culture.

Therefore, the aim of this study is to assess the relationship between religious attendance and spirituality (both separately and jointly) and leisure-time choices, specifically SBA and OLTA, among adolescents in a highly secular environment. For the purpose of this article, *spirituality* is understood as internal individual contentedness, one's perceived closeness to God and one's sense of meaning of life and of spiritual well-being (Ellison, 1983).

4.2. Methods

4.2.1. Participants and procedure

We obtained data on a nationally representative sample of Czech boys and girls from the 2014 Health Behaviour in School-aged Children (HBSC) study. This cross-sectional WHO collaborative study focused on health and health-related behaviour and their socioeconomic determinants in 11-, 13-, and 15-year-old children. The HBSC study has been conducted at 4-year intervals since 1983/84 and now includes 44 countries across Europe and North America (Roberts et al., 2009). According to the HBSC study protocol, schools were selected randomly after stratification by region, school size and type of school (primary schools vs. secondary schools). Out of 243 contacted schools 242 schools agreed to participate (response rate 99.6%). Then, classes from the 5th, 7th and 9th grades, in general corresponding to age the categories of 11-, 13- and 15-year-olds, were selected at random, one from each grade per school. Data from 14,539 pupils were obtained (response rate 89.2%). The majority of non-response was due to illness or other reasons, e.g. sports or academic competitions (10.6%), and 30 children refused to participate in the survey (0.2%).

Data were collected between April and June 2014. Questionnaires were distributed by trained administrators with no teachers present in the classroom in order to reduce response bias. Respondents had one school lesson (45 minutes) dedicated to completing the questionnaire. The spirituality questionnaire was offered to only half of the adolescents from the 7th and 9th grades, so for the purpose of this paper the dataset included 4,889 adolescents who filled out this section. Of these, 707 were excluded because of incomplete information on age, gender, spirituality or religious attendance, or because of an age outside of the intended age-bracket, i.e. 12.5 to 16.4 years. This led to a final sample of 4,182 respondents (mean age=14.4, SD=1.1, 48.6% boys).

Participation in the survey was anonymous and voluntary. The Czech HBSC study was conducted under the auspices of the Ministry of Education, Youth and Sports of the Czech Republic and the World Health Organization Country Office in the Czech Republic. The study design was approved by the Ethics Committee of the Faculty of Physical Culture, Palacký University in Olomouc (No. 17/2013), and conducted in accordance with the ethical requirements formulated by the Convention on Human Rights and Biomedicine (40/2000 Coll.). Other information regarding the ethical issues connected with this study can be found in the study of Petr Badura et al. (2016), which dealt with the same primary data.

4.2.2. Measures

Religious attendance was measured as the frequency of attending church or religious sessions using the question: “How often do you go to church or to religious sessions?” Possible answers were: several times a week; approximately once a week; approximately once a month; a few times a year; or never. Those who reported attending religious sessions at least once a week were considered *attending*.

Spirituality was measured using the adjusted shortened version of the Spiritual Well-Being Scale (SWBS) (Malinakova et al., 2017) measuring overall spiritual well-being. Response possibilities for all seven items regarded a 6-point scale that ranged from ‘strongly agree’ (1) to ‘strongly disagree’ (6), leading to scores from 7 to 42. A lower score represented greater spiritual well-being. In the analyses, spirituality was used as a continuous variable, but for the purpose of dichotomisation for sensitivity analysis, participants with a score of 34 or higher (the upper quartile of the scores) were considered as spiritual, and the rest as non-spiritual. Cronbach’s alpha was 0.81 in our sample.

SBA was assessed using three variables: excessive use of television, the internet, and computer games. *Excessive television use* was assessed by the question: “About how many hours a day do you usually watch television (including YouTube and similar pages), a DVD or similar programs on a screen in your free time?” with nine response categories ranging from ‘I do not watch at all’ to ‘About seven or more hours a day’. Following the HBSC dichotomisation (Currie et. al., 2009), watching television for two or more hours per day on weekdays was classified as excessive.

Excessive playing of computer games was measured with the question: “About how many hours a day do you usually play games on a computer, games console, tablet (e.g. iPad), smartphone or other electronic device (do not count physical fitness games) in your free time?” with nine response categories ranging from ‘not at all’ to ‘about seven or more hours a day’. Following the HBSC dichotomisation (Currie et. al., 2009), playing computer games two or more hours on weekdays was classified as excessive.

Excessive internet use was measured with the Excessive Internet Use scale (Skarupova et al., 2015), which assesses the frequency of five behaviour symptoms of excessive internet use (“I felt uncomfortable when I could not be on the internet.”; “I found myself surfing the internet, even though I did not enjoy it.”; “I neglected my family, friends, school work or hobbies because of the time spent on the internet.”; “I tried to reduce the time spent on the internet, but without success.”), with responses being Very often / Often / Sometimes / Almost never. ‘Often’ and ‘Very often’ in any of the items were classified as using the internet excessively.

Participation in organized leisure-time activities (OLTA) was assessed by the question: “In your free time, do you do any of these organized activities?” with the explanation: “We mean activities you do in sports or other clubs or organizations” followed by six items dealing with different types of leisure-time activities (team sports, individual sports, art school, youth organizations, activities in leisure-time centres and church meetings or singing), including country-specific examples. The possible answers were ‘Yes’ or ‘No’. For

the purpose of a more detailed analysis, the respondents clustered as follows: 1) Not active (not involved in a sporting or a non-sporting activity); 2) Active only in sports; 3) Active only in non-sporting activity; 4) Active in both sporting and non-sporting activity.

Moderate-to-vigorous physical activity (MVPA) was measured with the question: “Over the past 7 days, on how many days were you physically active for total of at least 60 minutes per day?” with the introductory instruction: “Physical activity is any activity that increases your heart rate and makes you get out of breath some of the time”, which was followed by a few examples of possible kinds of physical activity. According to the WHO recommendation (Wiegand & Weiss), the participants who reported being physically active 7 days in a week were considered as having a sufficient MVPA while the remaining participants as not having a sufficient MVPA.

Additional leisure time activities were assessed by the question: “In your free time, how often do you devote yourself to the following activities?” followed by the concrete specifications of the activities (reading books, playing a musical instrument, creative activities) with five response categories ranging from ‘Daily’ to ‘Never’. ‘Daily’ and ‘A few times a week’ were classified as a practicing the activity regularly, with the rest classified as non-regular.

The socioeconomic status of the respondents’ families was used as a covariate and was assessed by The Family Affluence Scale (FAS) (Currie). The scale examines the number of cars owned by the family, having one’s own bedroom, number of computers in the household, number of family holidays outside of the country, number of bathrooms, and dishwasher ownership. The summary score ranges from 10 to 13 and following HBSC recommendations it was converted into a fractional rank (ridit) score, leading to transformation of ordinal data to an interval scale with a normalised range (from 0 to 1, with higher score indicating higher socioeconomic position) and distribution.

Perceived family support was used as a covariate and was measured using the Multidimensional Scale of Perceived Social Support (MSPSS) family subscale (Zimet et al., 1988), which is assessed with four items. Response options ranged from 1 (very strongly disagree) to 7 (very strongly agree). For the purpose of the analysis, a mean MPSS score was used.

4.2.3. Statistical analyses

First, we described the background characteristics of the sample. We then assessed the associations of religious attendance (Model 1) and spirituality standardized to z-scores (Model 2) separately, their combination (Model 3) and their interaction (Model 4) with three types of screen-based activities using a binary logistic regression model adjusted for gender, age, socioeconomic status and perceived family support. Each of the independent variables was assessed in a separate model. In the same way we assessed the associations of religious attendance and religiosity with the OLTA, first the associations with the binary overall OLTA variable (at least one activity vs. inactive) using a binary logistic model, and

next the associations with the various OLTA clusters using a multinomial logistic regression model. In the last step we used a binary logistic model to assess the associations of religious attendance and spirituality with the selected additional leisure time activities.

We repeated the analyses with spirituality as dichotomised instead of as a continuous variable, leading to similar results. Therefore, we used the dichotomised variable for the graphical representation of the associations with screen-based activities and OLTA. In the tables, however, we present only the results of analyses with the continuous variable. All analyses were performed using the statistical software package IBM SPSS version 21.

4.3. Results

4.3.1. Description of the population

The background characteristics of the sample are presented in Table 4.1. Of the respondents, as measured here, 7.1% were religiously attending, and 9.1% were spiritual, i.e. scored in the highest quartile of the spirituality scale. Religious attendance and spirituality were moderately correlated ($r=0.4$).

4.3.2. Screen-based activities

Table 4.2 shows the associations of screen-based activities with religious attendance and spirituality. Both attending (Model 1) participants and spiritual (Model 2) participants were less likely to report excessive use of television and computer games. Moreover, in the case of excessive playing of computer games, a significant interaction showed that religious attendance reinforced the association of spirituality with this behaviour. We found no significant associations of excessive internet use with religious attendance or spirituality separately, or in their combination (Model 3). However, their interaction (Model 4) was associated with a significantly lower likelihood of excessive internet use among participants who were both attending and spiritual (or non-attending/non-spiritual) compared with those who either only attended or were more spiritual. For a graphical representation of sensitivity analysis of the interaction using the dichotomised spirituality variable, see Figure 4.1.

Table 4.1 Description of the characteristics of the study population

	Number	%
Gender		
Boys	2,034	48.6
Girls	2,148	51.4
Age		
13 years old (7 th grade)	2,091	50.0
15 years old (9 th grade)	2,091	50.0
Religious attendance		
Attending (≥ 1/week)	296	7.1
Non-attending (< 1/week)	3,886	92.9
Spirituality		
Spiritual (score 34-42)	399	9.5
Non-spiritual (score 7-33)	3,783	90.5
Screen-based activities ^a		
Excessive television use	2,519	60.5
Excessive computer games playing	1,746	42.1
Excessive internet use	1,297	31.7
Participation in each OLTA separately ^b		
Team sports	1,880	45.0
Individual sports	1,131	27.0
Elementary art school	1,218	29.1
Children and youth organisations	452	10.8
Activities in leisure-time centres	654	15.6
Church activities	271	6.5
OLTA clusters ^d		
Not active	930	22.2
Active: only sports	1,403	33.5
Active: only other activity	772	18.5
Active: sport + other activity	1,077	25.8
Additional leisure time activities		
Sufficient physical activity	786	18.9
Regular reading of books	1,335	32.1
Regular playing musical instrument	827	20.0
Regular creative activities	737	17.8
Total	4,182	100

Notes: Number of missing cases per variable: Religious attendance - 0; spirituality - 0; Excessive television use - 16; Excessive computer games playing- 35; Excessive internet use - 86; Organised activities – 65; Sufficient physical activity - 27; Regular reading of books - 18; Regular playing of a musical instrument -38; Regular creative activities – 65.

^a Only the respondents with the occurrence of the excessive behaviour are presented.

^b Only the active respondents are presented

Table 4.2 Associations of adolescent excessive television use, excessive computer games playing and excessive internet use with religious attendance and spirituality^a

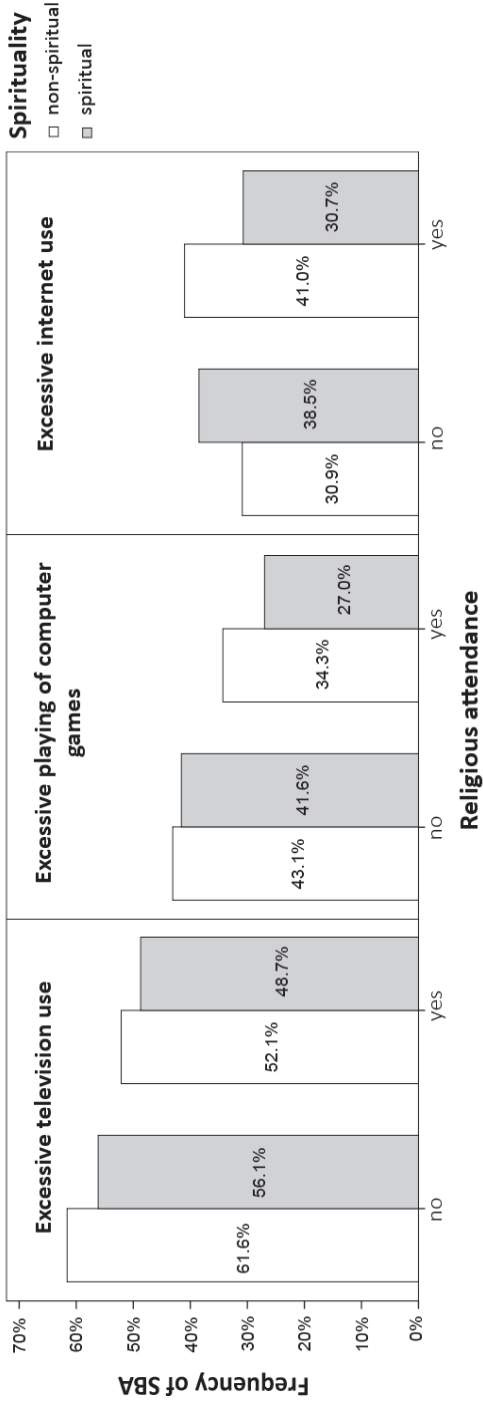
	Excessive television use		Excessive computer games playing		Excessive internet use	
	n (%)	OR (95% CI)	n (%)	OR (95% CI)	n (%)	OR (95% CI)
Model 1: Religious attendance only						
Non-attending	2,370 (61.2)	1	1,657 (43.0)	1	1,193 (31.4)	1
Attending	149 (50.3)	0.6 (0.5-0.8)***	89 (30.5)	0.6 (0.4-0.7)***	104 (35.6)	1.2 (0.9-1.5)
Model 2: Spirituality only (per SD)		0.9 (0.9-0.99)*		0.9 (0.8-0.96)**		1.04 (0.97-1.1)
Model 3: Religious attendance and spirituality combined						
Attending vs. Non-attending		0.7 (0.5-0.9)**		0.6 (0.5-0.8)**		1.1 (0.8-1.5)
Spirituality (per SD) ^b		0.96 (0.9-1.03)		0.9 (0.9-1.01)		1.03 (0.95-1.1)
Model 4: Interaction of religious attendance and spirituality						
Attending vs. Non-attending		0.7 (0.5-1.1)		0.8 (0.6-1.3)		1.5 (0.997-2.2)
Spirituality (per SD)		0.97 (0.9-1.05)		0.96 (0.9-1.03)		1.1 (0.97-1.1)
Religious attendance x Spirituality (per SD)		0.9 (0.7-1.1)		0.8 (0.6-0.999)*		0.8 (0.6-0.998)*

Notes: *p<0.05, **p<0.01, ***p<0.001

^aAll associations were adjusted for age, gender socioeconomic status (FAS) and family support (mean MSPSS).

^bSpirituality (per SD) = spirituality score standardized to z-scores

Figure 4.1 Frequency of adolescent excessive television use, excessive computer games playing and excessive internet use with dichotomised spirituality and religious attendance



4.3.3. Organised leisure-time activities (OLTA)

Most adolescents were involved in at least one of the six types of organized activities, the average number of activities being 1.3 (SD=1.1) in the total sample. Attending respondents participated on average in 2.3 (SD=1.3) different activities, while non-attending in 1.3 (SD=1.0) ($p<0.001$). The rate of participation of attending respondents was higher in all observed non-sporting activities ($p<0.001$). Regarding participation in sporting activities, no significant differences were observed among the groups.

The results of binary logistic regression using the dichotomised overall OLTA variable showed that both attending respondents and spiritual respondents were more likely to be involved in at least one OLTA, with OR=2.9 (1.9-4.3) for religious attendance and OR=1.3 (1.2-1.4) for spirituality ($p<0.001$). There were no statistically significant interactions of religious attendance and spirituality. This implies in a logistic model that risks multiply. See Figure 4.2 for a graphical representation.

We next performed multinomial logistic regression analyses with the inactive cluster being the reference category (Table 4.3), which showed that both attending and being spiritual tended to have more non-sporting activities or a mixture of both sporting and other activities (Figure 4.2). The attending respondents were approximately two-times less likely to be involved exclusively in sporting activities, but they did not differ significantly regarding general participation in such activities (not shown).

4.3.4. Additional leisure-time activities

Table 4.4 shows the associations of selected adolescent leisure-time activities with religious attendance and spirituality. Both attending (Model 1) participants and spiritual (Model 2) participants were more likely to read books and to play a musical instrument; those with a high level of spirituality were more likely to have sufficient physical activity. Regression model was not significant in the case of regular art activities. Similarly, the interaction effect was not significant for any of these variables.

Table 4.3 Association of participation in various types of organised leisure time activities (OLTA) with religious attendance and spirituality^a

	Only sports activity		Only non-sports activity		Both sports and non-sports activities	
	n (%)	OR (95% CI)	n (%)	OR (95% CI)	n (%)	OR (95% CI)
Model 1: Religious attendance						
Non-attending	1,376 (35.4)	1	666 (17.1)	1	944 (24.3)	1
Attending	27 (9.1)	0.6 (0.4-1.05)	106 (35.8)	5.3 (3.5-8.2)***	133 (44.9)	4.6 (3.0-7.1)***
Model 2: Spirituality only (per SD)						
		1.1 (1.04-1.3)**		1.4 (1.3-1.6)***		1.5 (1.4-1.7)***
Model 3: Religious attendance and spirituality combined						
Attending vs. Non-attending		0.5 (0.3-0.9)*		4.0 (2.5-6.3)***		3.1 (2.0-4.8)***
Spirituality (per SD) ^b		1.2 (1.1-1.3)**		1.2 (1.1-1.4)***		1.4 (1.2-1.5)***
Model 4: Interaction of religious attendance and spirituality						
Non-attending (vs. Attending)		0.8 (0.4-1.5)		2.9 (1.6-5.3)**		3.0 (1.7-5.2)**
Spiritual (vs. Non-spiritual)		1.2 (1.1-1.3)***		1.2 (1.1-1.3)**		1.4 (1.2-1.5)***
Attending x Spiritual		0.6 (0.4-1.002)		1.4 (0.9-2.00)		1.1 (0.7-1.5)

Notes: *p<0.05, **p<0.01, ***p<0.001

^a All associations were adjusted for age, gender socioeconomic status (FAS) and family support (mean MSPSS).

^b Spirituality (per SD) = spirituality score standardized to z-scores

Figure 4.2 Associations of adolescent OLTA clusters with dichotomised spirituality and religious attendance

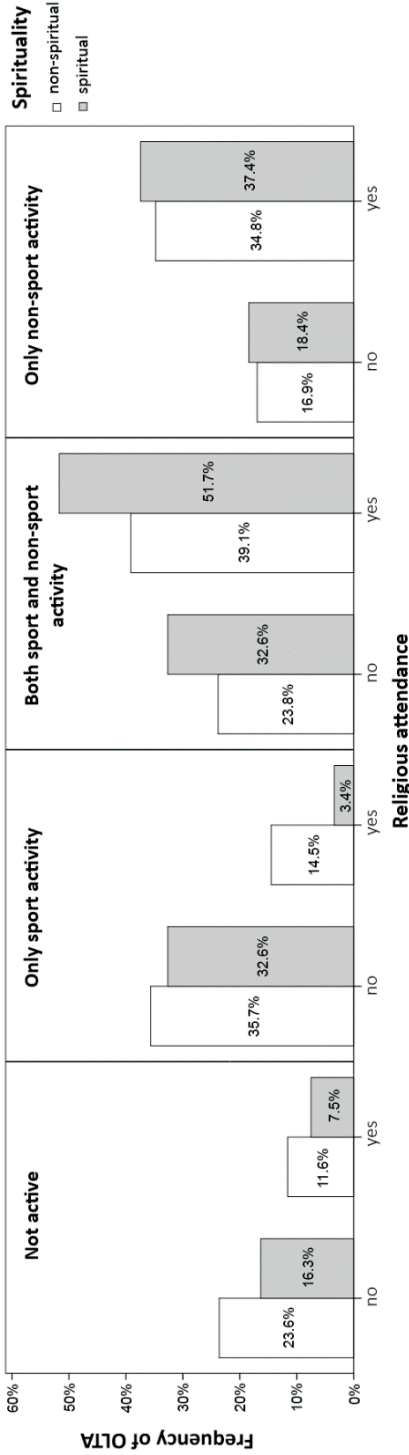


Table 4.4 Associations of selected adolescent leisure time activities with religious attendance and spirituality^a

	Sufficient physical activity		Reading books		Playing musical instrument		Regular creative activities	
	n (%)	OR (95% CI)	n (%)	OR (95% CI)	n (%)	OR (95% CI)	n (%)	OR (95% CI)
Model 1: Religious attendance only								
Non-attending	733 (19.0)	1	1,194 (30.8)	1	702 (18.2)	1	674 (17.5)	1
Attending	53 (18.2)	0.99 (0.7-1.3)	141 (48.1)	2.1 (1.6-2.7)***	125 (43.1)	3.4 (2.6-4.4)***	63 (21.6)	1.3 (0.9-1.7)
Model 2: Spirituality only (per SD)^b	1.1 (1.02-1.2)*		1.1 (1.01-1.2)*			1.4 (1.3-1.5)***		1.1 (0.98-1.2)
Model 3: Religious attendance and spirituality combined								
Attending vs. Non-attending		0.8 (0.6-1.2)		2.1 (1.6-2.7)***		2.6 (1.9-3.4)***		1.2 (0.9-1.7)
Spirituality (per SD) ^b		1.1 (1.04-1.2)**		0.999 (0.9-1.1)		1.2 (1.1-1.3)***		1.05 (0.95-1.1)
Model 4: Interaction of religious attendance and spirituality								
Attending vs. Non-attending		1.2 (0.7-1.8)		2.1 (1.4-3.1)***		2.2 (1.4-3.3)***		1.5 (0.97-2.3)
Spirituality (per SD)		1.2 (1.1-1.3)**		0.999 (0.9-1.1)		1.2 (1.1-1.3)***		1.1 (0.97-1.2)
Religious attendance x Spirituality (per SD)		0.8 (0.6-1.02)		0.99 (1.001-1.3)		1.1 (0.9-1.5)		0.8 (0.6-1.1)

Notes: *p<0.05, **p<0.01, ***p<0.001

^a All associations were adjusted for age, gender socioeconomic status (FAS) and family support (mean MSPSS).

^b Spirituality (per SD) = spirituality score standardized to z-scores

4.4. Discussion

We found that religious attendance and spirituality separately were associated with a lower prevalence of excessive television use. The same held for excessive playing of computer games, where in addition, religious attendance reinforced the protective effect of spirituality. Regarding excessive internet use, respondents who were either only attending or only spiritual were more likely to use the internet excessively. However, the combination of attending religious activities and being spiritual was protective with respect to excessive internet use. We further found that attending respondents, as well as spiritual respondents, were more likely to be involved in at least one activity and tended to have a greater variety of OLTA (a combination of sporting and non-sporting activities). They were also more likely to regularly read books and to play a musical instrument. Spirituality was also associated with higher chances of having sufficient physical activity.

We found that both attending respondents and spiritual respondents were less likely to watch television or play computer games excessively, while religiosity and spirituality did not show any significant association with excessive internet use unless they were in interaction. The limited evidence on religiosity and television viewing has yielded contrasting findings (Finn, 1992; Hamilton & Rubin, 1992), and this also holds for excessive internet use (Armfield & Holbert, 2003; Lau & Yuen, 2013). However, recent studies among adolescents observed that religious and spiritual youths watched less television and played fewer video games (Braun et al., 2016; Smith & Denton, 2005; Thomsen & Rekve, 2003), which corresponds with our findings. One of the possible explanations regarding our results could be that in families with high religiosity/spirituality parents tend to keep more oversight of adolescent behaviour (Holmes & Kim-Spoon, 2016; Kim & Wilcox, 2014; Mahoney, 2010). This may promote internalisation of adult behavioural norms (Holmes & Kim-Spoon, 2016). Thus the parents' attitudes and behaviour can be a model that shapes adolescent leisure choices. Some parents put a higher emphasis on the positive developmental outcomes of leisure activities (Shannon, 2006). Unstructured activities such as television viewing and playing computer games may be seen as less desirable within families that regularly attend religious activities if the content does not reflect the same or similar value systems.

In our study we observed that attending as well as spiritual respondents were more likely to participate in at least one OLTA, and they tended to participate in a greater variety of activities. In addition, when considering sporting versus non-sporting activities, they were less likely to be involved solely in sports. Moreover, they were more likely to regularly read books and to play a musical instrument. Spirituality was also associated with higher chances of having sufficient physical activity. There are several possible explanations for these results. First, approximately half of the religious and one-third of the spiritual respondents reported being engaged in some kind of church activity, which itself elevated the number of attended activities. Second, given that care for children and their development is seen as a relatively important value in religious families (Mahoney et al., 2003), attending various activities as well as reading or playing a musical instrument may be supported by parents who see these

activities as promoting child development. Third, within the local religious community, different activities are often offered, including sports (Adamczyk & Felson, 2012). Attending adolescents might be therefore more likely to get a multiple offer of activities of various kinds, which could also explain their lower exclusive involvement in sports. Fourth, religious programs can serve as a natural platform for the development of relationships (Le et al., 2016), and peers who are already involved in some activity may represent another motivation for participation in OLTA (Denault & Poulin, 2016). Moreover, religious congregations also represent places where adolescents can make significant encouraging contact with other adults (Smith & Denton, 2005), which may attract them to some activities. It is therefore possible that religious attendance and spirituality may promote involvement in organised activities via several routes of community belonging.

We further found that respondents who were both attending and spiritual were less likely to use the internet excessively. Moreover, a sensitive analysis with dichotomised spirituality revealed that in contrast respondents who were either only attending or only spiritual more likely to use the internet excessively. This suggests that in our population the respondents who did not have problem with internet overuse were either both attending and spiritual or they were neither of these. An association with an escape motive is commonly mentioned in the case of excessive internet use (Koo & Kwon, 2014). Therefore, it is possible that a combination of religious attendance and spirituality could serve as a coping resource which, together with higher social support, could lower the need for escape into a virtual world (Braun et al., 2016). At the same time, some research shows that the inconsistency in religiosity and spirituality levels is associated with a higher vulnerability to mental disorders or problematic behaviour (King et al., 2013; Williamson & Cullingford, 1998), which is in line with our results. Moreover, non-attending spiritual participants could be less likely to benefit from social support connected with an organised religion. Therefore, further analyses of separate as well as combined effects of religious attendance and spirituality and different aspects of human behaviour could help us to understand better the underlying mechanisms.

4.4.1. Strengths and limitations of this study

This study has several important strengths, the most important being the large and representative sample size of adolescents, the high response rate and the use of the well-established HBSC methodology. A limitation is the relatively small number of attending respondents, which may have affected our power to detect differences despite our large sample. However, this sub-sample still included 296 respondents. Another limitation might be our use of adolescent self-report, which can be inaccurate or influenced by social desirability. Given the prevailing secular attitude within the country, this may have led to some underreporting of RA and spirituality, and thus some underestimating of the associations. Regarding SBA, validation studies (Trnka et al., 2016) did not show the tendency to overestimate or underestimate daily amounts. A last limitation is the cross-sectional design of the study, which does not allow us to make conclusions on causality.

4.4.2. Implications

Our findings reveal that adolescent religious attendance and spirituality are associated with their leisure-time choices. This suggests that future studies should focus on understanding the direction and potential pathways for these relationships. Consequently, it could assess whether educational programs for adolescents aimed at fostering spiritual values could help lower the occurrence of undesirable behaviours.

4.5. Conclusion

To the best of our knowledge, this is the first study examining the associations of SBA, OLTA and adolescent religious attendance and spirituality. We found that both attending respondents and spiritual respondents were less likely to watch television or play computer games excessively. Respondents who were either only attending or only spiritual were more likely to use the internet excessively. However, the combination of attending religious activities and being spiritual was protective with respect to excessive internet use. These respondents were further more likely to be involved in organized activities, tended to participate in a greater variety of them and were more likely to regularly read books and to play a musical instrument. Spirituality was also associated with higher chances of having sufficient physical activity. This suggests that increasing secularisation might lead to further unfavourable changes in adolescent SBA and OLTA.

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“I am spiritual, but not religious.” Does one without the other protect against adolescent health-risk behaviour?

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Abstract

Objectives: Spirituality and religious attendance (RA) have been suggested to protect against adolescent health-risk behaviour (HRB). The aim of this study was to explore the interrelatedness of these two concepts in a secular environment.

Methods: A nationally representative sample ($n = 4566$, 14.4 ± 1.1 years, 48.8% boys) of adolescents participated in the 2014 Health Behaviour in School-aged Children cross-sectional study. RA, spirituality (modified version of the Spiritual Well-Being Scale), tobacco, alcohol, cannabis and drug use and the prevalence of sexual intercourse were measured.

Results: RA and spirituality were associated with a lower chance of weekly smoking, with odds ratios (OR) 0.57 [95% confidence interval (CI) 0.36–0.88] for RA and 0.88 (0.80–0.97) for spirituality. Higher spirituality was also associated with a lower risk of weekly drinking [OR (95% CI) 0.91 (0.83–0.995)]. The multiplicative interaction of RA and spirituality was associated with less risky behaviour for four of five explored HRB. RA was not a significant mediator for the association of spirituality with HRB.

Conclusions: Our findings suggest that high spirituality only protects adolescents from HRB if combined with RA.

Keywords: health-risk behaviour; adolescence; religious attendance; spirituality; HBSC study

5.1. Introduction

Adolescent health-risk behaviour attracts the attention of researchers worldwide, because it can leave a lasting effect over the whole life course. The earlier onset of substance use, for example, is associated with engaging in multiple health-risk behaviours (Hansen et al. 2010), and is often a predictor of adult health-risk behaviour (Grant et al. 2006; Virtanen et al. 2015). Similarly, an early initiation of sexual life is associated with other risk factors (Lara & Abdo 2016).

With regards to prevalence, both gender differences (MacArthur et al., 2012; Saewyc et al., 1998; Wang et al., 2010) and country differences (Inchley et al., 2016) exist in adolescent health and health-risk behaviour. E.g., in the 2005/2006 Health Behaviour in School-aged Children (HBSC) survey the frequency of drunkenness increased by an average of 40% in all participating eastern European countries compared to the 1997/1998 HBSC survey, but decreased by an average of 25% in 13 of the 16 Western European and North American countries included in the study. An increasing trend in the Czech Republic, Bulgaria, Croatia, and Hungary was reported also in the study of Kuntsche et al. (2011), which further pointed out that the prevalence remained stable or even decreased in countries such as Finland, Iceland, and Norway. This finding shows the importance of the wider cultural and economical context and probably also reflects an effect of different policies in this area. From this perspective, the search for possible protective factors in adolescent health-risk behaviour remains an urgent need in the Czech Republic. According to the last published HBSC survey (2013/2014) (Inchley et al., 2016), the prevalence of drunkenness decreased significantly between the years 2010 and 2014. However, the Czech Republic still holds its position in the most unfavourable third of the countries with data on adolescent weekly drinking, in the unfavourable half regarding weekly smoking and recent cannabis use and in the least favourable ten percent regarding early sexual intercourse.

Religiosity and spirituality have often been studied as protective factors in adolescent health-risk behaviour, including the prevention of smoking (Nonnemaker et al. 2006), alcohol (Piko et al. 2012) and cannabis use (Gmel et al., 2013) and sexual behaviour (Hardy & Raffaelli 2003; Nonnemaker et al. 2003). In a systematic review, Rew and Wong (2006) concluded that most studies (84%) showed that higher religiosity/spirituality was related to less health-damaging attitudes and behaviours. However, a minority of studies came to at least partially different conclusions. Burriss et al. (2011) found religiosity to be associated with less underage alcohol use, while spirituality was associated with more, and also described a similar pattern regarding adolescent sexual behaviour (Burriss et al. 2009).

The differences may be partly explained by the fact that both spirituality and religiosity are multidimensional constructs that include attitudes, behaviours and beliefs (Hooker et al., 2014). Nevertheless, many studies assess only one or two dimensions. Originally, the term religion included both individual and institutional dimensions (Hill & Pargament, 2003), however, later it started to be more associated with religious institutions, prescribed theology and rituals and institutional beliefs and practices, such as church

membership or attendance (Zinnbauer et al., 1997). In contrast, spirituality was originally used to describe a deeply religious attitude, however, recently it is often also understood as a more subjective search for peace, harmony, meaning in life, and connection with the sacred (Koenig, 2008). The above mentioned heterogeneity hinders comparison of the various studies. Though both religiousness and spirituality emphasize a search for the sacred, people who are religious or spiritual might differ in the means they use to find this. In the absence of religious commitment, an individual could actually even use alcohol, tobacco, hallucinogens or sexual intercourse, etc., as means to discover meaning, purpose, and connectedness with the self, others, or the transcendent (Burris et al., 2011).

However, other explanations may also hold for the varying associations of religiosity and spirituality. One of them is the degree of internalisation of religious attitudes (Powell et al. 2003), i.e., the inner content and experience of one's faith. This aligns with the spirituality level; therefore, it may be informative not only to analyse spirituality and religiosity separately, but also jointly, and to check a possible mediation effect. For the purpose of this article, we chose religious attendance as the external dimension of religiosity, and spirituality as the internal dimension. In our study, spirituality is understood in the broader sense: as the internal individual contentedness, one's perceived closeness to God, one's sense of meaning of life and of spiritual well-being (Ellison 1983).

Thus far, most studies on the relationship between religiosity/spirituality and adolescent health-risk behaviour have been conducted outside of Europe (Nonnemaker et al. 2006; Rew and Wong 2006), and only a very few within Central Europe (Brassai et al. 2015; Piko et al. 2012; Pitel et al. 2012). With regards to religious affiliation, the Czech Republic is a specific case in Central Europe. This might be the consequence of the historical development of the country, as the anticlerical attitudes that were already present, were further reinforced by the 40 years of the communist régime (Nesporova & Nespor, 2009). According to the Pew Research Center (2014) it is the country with the highest percentage (76.4%) of religiously unaffiliated people in the world, meaning that three quarters of the population do not affiliate themselves to any organised church, though they might have some kind of personal belief. This very specific setting may affect the protective role of religiosity and spirituality regarding both physical and mental health (Hayward & Elliott 2014).

Therefore, the aim of this study is to explore the association of spirituality and religious attendance, with adolescent health-risk behaviour in a highly secular environment, and to explore whether spirituality modified the association of religious attendance, or religious attendance mediated that of spirituality.

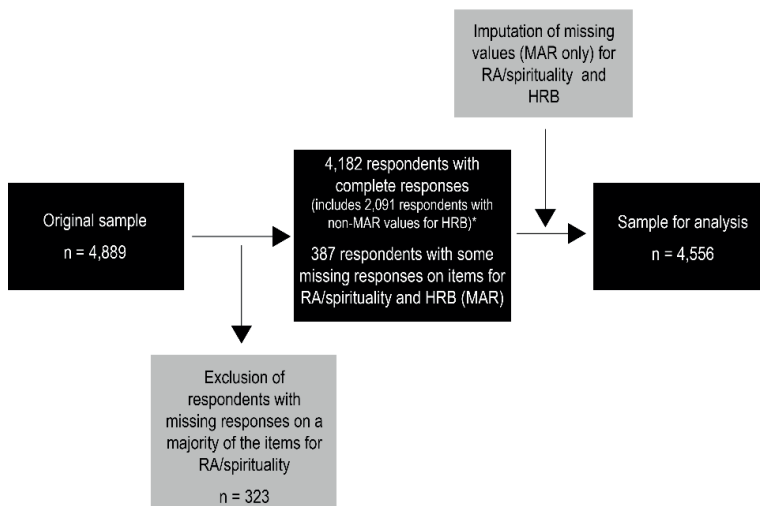
5.2. Methods

5.2.1. Participants and procedure

We obtained data on a nationally representative sample of Czech boys and girls from the 2014 HBSC study. This cross-sectional WHO collaborative study focuses on health and health-related behaviour and their socioeconomic determinants in 11-, 13-, and 15-year-old children. More detailed information about the survey can be found in Roberts et al. (2009). Schools were selected randomly after stratification by region, school size and type of school (primary schools vs. secondary schools). Out of 243 contacted schools 242 agreed to participate (response rate 99.6%). Then, classes from the 5th, 7th and 9th grades, in general corresponding to age categories of 11-, 13- and 15-year-olds, were selected at random, one from each grade per school.

Data from 14,539 pupils was obtained (response rate 89.2%). Most non-response was due to illness or other reasons, e.g. sports or academic competitions (10.6%), and 30 children refused to participate in the survey (0.2%). The spirituality questionnaire was included only in the surveys of half of the 13- and 15-years-old adolescents, so the dataset comprised 4,889 adolescents. Of these, 564 (11.5% of the sample) had not responded to at least one of the seven SWBS items. We used multiple imputation to estimate values for the respondents who had responded to the majority of the SWBS items. The remaining participants – who had not responded to 4 or more SWBS items – were excluded from the study (n=323). The final analytic sample thus included 4,566 respondents (mean age=14.4, SD=1.09, 48.8% boys). For a graphical illustration of the preparation of the sample see Figure 5.1.

Figure 5.1 Preparation of the sample



Note: *Items included only for the 15yrs-old respondents; RA = religious attendance; MAR = values missing at random; HRB = Health-risk behaviour

Data was collected between April and June 2014. The questionnaires were distributed by trained administrators with no teachers present in the classroom in order to reduce information bias. The consent to carry out the study was obtained through school management at all the schools involved in the survey. Participation in the survey was anonymous and voluntary and the parents of the pupils were informed about the survey. The Czech HBSC study was conducted under auspices of Ministry of Education, Youth and Sports of the Czech Republic and the World Health Organization Country Office in the Czech Republic. The study design was approved by the Ethics Committee of the Faculty of Physical Culture, Palacký University in Olomouc (No. 17/2013) and conducted in accordance with the ethical requirements formulated by the Convention on Human Rights and Biomedicine (40/2000 Coll.).

5.2.2. Measures

Religious attendance was measured by the question: “How often do you go to church or to religious sessions?” with possible answers: several times a week/approximately once a week/approximately once a month/a few times a year/exceptionally/never. Sunday attendance is a matter of obligation in most of the Christian churches/denominations; therefore, the participants who reported attending religious sessions at least once a week were dichotomized as *attending*.

Spirituality was measured using the modified shortened version of the Spiritual Well-Being Scale (SWBS) (Malinakova et al. 2017), measuring the overall spiritual well-being. Response possibilities for all seven items regarded a 6-point scale that ranged from ‘strongly disagree’ (1) to ‘strongly agree’ (6), leading to scores from 7 to 42. A higher score represented greater spiritual well-being. In the analyses, spirituality was used as a continuous variable, but for the purpose of dichotomisation for a sensitivity analysis, participants with a score of 34 or higher (upper quartile of the score) were considered as spiritual, and the rest as non-spiritual. Cronbach’s alpha was 0.81 in our sample.

Tobacco use was measured by the question: “How often do you smoke tobacco at present?” Respondents reported their experience with smoking as follows: (1) Every day; (2) At least once a week, but not every day; (3) Less than once a week; (4) I do not smoke. Following the HBSC dichotomisation (Currie et al., 2012), respondents who smoked at least once a week were classified as smokers, the rest as non-smokers.

Alcohol use was assessed by the question: “At present, how often do you drink anything alcoholic, such as beer, wine or spirits?” Respondents reported frequency of alcohol consumption for five types of alcohol drinks with the answers: (1) Every day; (2) Every week; (3) Every month; (4) Rarely; (5) Never. Following the HBSC dichotomisation (Currie et al., 2012), individuals were classified as alcohol-consumers if they reported consumption of any alcohol drink at least each week.

Cannabis use was assessed only in the 15-year-old respondents. They were asked the question: “Have you taken cannabis (grass) in the last 30 days?” with the possible answers (1) Never; (2) 1-2 days; (3) 3-5 days; (4) 6-9 days; (5) 10-19 days; (6) 20-29 days; (7)

30 days (and more). Following the HBSC dichotomisation (Currie et al., 2012), respondents who answered 'never' were classified as cannabis non-users, the rest of the respondents as users.

Experience with drug use was measured on 15-year-old respondents with the question "Have you ever taken one or several of these drugs in your life?" Respondents reported their lifetime experience with five kinds of drugs (ecstasy, pervitin, glue or solvents, LSD and a non-existing drug, netalin), with the same answers and dichotomisation as for cannabis use. The respondents, who reported an experience with netalin were not included in the analyses of lifetime drug use.

Early sexual intercourse, was measured only among 15-year-old respondents by the question: "Have you ever had sexual intercourse (sometimes this is called "making love", "having sex", etc.)?" (yes, no).

Age, gender and socioeconomic status were considered as potential confounding variables. The socioeconomic status of the respondents' families was used as a covariate and was assessed by The Family Affluence Scale (FAS) (Currie et al., 2014). The scale examines the number of cars owned by the family, having one's own bedroom, number of computers in the household, number of foreign family holidays, number of bathrooms, and dishwasher ownership. The summary score ranges from 10 to 13 and following HBSC recommendations it was converted into a fractional rank (ridit) score, leading to transformation of ordinal data to an interval scale with a normalised range (from 0 to 1, with higher score indicating higher socioeconomic position) and distribution.

5.2.3. Statistical analyses

As a first step, we performed a multiple imputation of missing data on item level, twenty times. It was assumed that data are missing at random (MAR). Then, we described the background characteristics of the sample and compared the respondents excluded from the analyses with the remaining ones. Next, we checked the effect of 'school', given the nested nature of the data. That showed that the intraclass correlation between students from the same school was negligible; therefore, we did not use multilevel modelling. We assessed the associations of only religious attendance (Model 1), only spirituality (Model 2), of both variables jointly (Model 3) and their multiplicative interaction (to assess moderation) (Model 4) with the various health-risk behaviours using binary logistic regression models. Each model was first tested as a crude one and then it was adjusted for gender, age and socioeconomic status. For the sensitivity analysis using the dichotomised spirituality, the prevalences of all types of health risk behaviour were compared with the proportion test. Finally, mediation analysis was performed using the bootstrap approach via *mediation* package in R. We tested whether religious attendance mediated the association of spirituality with health-risk behavior as well as whether spirituality mediated the association of religious attendance with health-risk behavior. All analyses were performed using the statistical software package IBM SPSS version 21. For the imputation of missing data, the *Hmisc* package in the R software was used.

5.3. Results

The background characteristics of the sample are presented in Table 5.1 which also describes prevalence of five kinds of health-risk behaviour both for attending and non-attending respondents. Of the 4,566 adolescents, 331 (7.2%) reported attending church services once a week or more. Religious attendance and spirituality (SWBS scale) were moderately correlated with Spearman's $r=0.30$ ($p<0.01$). The mean SWBS score was 22.15 (SD=7.61) with minimum 7 and maximum 42 (median 21). The SWBS was non-normally distributed, with skewness of 0.528 (SE=0.036) and kurtosis of 0.063 (SE=0.072). Of the highly spiritual respondents, i.e., those in the upper quartile of a score, 54.0% were boys and mean age was 14.31 (SD=1.12). Of these, 61.9% were attending religious sessions at least once a week. Of the participants, 1,202 (26.3%) were involved in at least one kind of health-risk behaviour, with the frequency being higher for non-attending (26.8%) than for attending (19.9%) respondents ($p<0.05$). Compared to included respondents, those excluded ($n=323$) were prevalently boys ($p<0.05$), were slightly older ($p<0.01$) and had a higher prevalence of recent cannabis ($p<0.05$) and drugs use ($p<0.001$), but did not differ significantly in regard to other health-risk behaviours.

Table 5.1 Characteristics of the sample

	Total		Religious attendance			
			Attending (≥ 1/wk)		Non-attending (< 1/wk)	
	Number	%	Number	%	Number	%
Gender						
Boys	2230	48.8	145	43.8	2085	49.2
Girls	2336	51.2	186	56.2	2150	50.8
Age						
13 years old (7 th grade)	2291	50.2	162	48.9	2129	50.3
15 years old (9 th grade)	2275	49.8	169	51.1	2106	49.7
Health-risk behaviour^a						
Weekly smoking	487	10.7	23	6.9	464	11.0
Weekly drinking	577	12.6	33	10.0	544	12.8
Recent cannabis use (only 15 year olds)	189	8.3	15	8.9	174	8.3
Lifetime drugs use (only 15 year olds)	186	8.3	18	10.9	168	8.0
Early sexual intercourse (only 15 year olds)	500	22.0	29	17.2	471	22.4
Total	4566	100	331	7.2	4235	92.8

^a Only numbers regarding the respondents with the occurrence of a health-risk behaviour are presented.

Table 5.2 shows the associations of religious attendance, spirituality and their interaction with various health-risk behaviours, adjusted for gender and age. Attending respondents were less likely to be involved only in weekly smoking, the other associations were not statistically significant (Model 1). Similarly, a one SD increase in spirituality was associated with a 12% decrease in the odds of weekly smoking and a 9% decrease in the odds of weekly drinking (Model 2). When religious attendance and spirituality were both added to the model (Model 3), neither of them was statistically significant for any type of health-risk behaviour. The interaction of religious attendance and spirituality (Model 4) showed that a one SD increase in spirituality for attending respondents was associated with 40% decrease in the odds of weekly smoking, 31% decrease in the odds of weekly drinking, 51% decrease in the odds of recent cannabis use and 52% decrease in the odds of lifetime drug use. With regards to early sexual intercourse, the result was significant only for the crude model (33% decrease in the odds), but not for the adjusted one.

Table 5.2 Associations of adolescent weekly smoking, weekly drinking, recent cannabis use, lifetime drugs use and early sexual intercourse with religious attendance, spirituality (standardized to z-scores), their joint associations and their interactions, adjusted for age, gender and socioeconomic status (FAS) (odds ratios, and 95% confidence intervals).

	Weekly smoking		Weekly drinking	
	Crude	Adjusted	Crude	Adjusted
Model 1: Religious attendance				
Non-attending	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Attending	0.61 (0.39-0.94)*	0.57 (0.36-0.88)*	0.75 (0.52-1.09)	0.74 (0.51-1.08)
Model 2: Spirituality (per SD)				
	0.84 (0.76-0.92)***	0.88 (0.80-0.97)*	0.91 (0.83-0.996)*	0.91 (0.83-0.995)*
Model 3: Religious attendance and spirituality mutually adjusted^a				
Attending vs. non-attending	0.75 (0.48-1.18)	0.64 (0.40-1.02)	0.84 (0.57-1.24)	0.82 (0.55-1.23)
Spirituality (per SD)	0.86 (0.77-0.95)**	0.91 (0.82-1.01)	0.93 (0.84-1.02)	0.92 (0.84-1.02)
Model 4: Interaction of attendance and spirituality^b				
Attendance vs. non-attendance	1.10 (0.68-1.80)	0.96 (0.58-1.60)	1.18 (0.75-1.87)	1.17 (0.73-1.88)
Spirituality (per SD)	0.89 (0.80-0.995)*	0.95 (0.85-1.06)	0.96 (0.87-1.06)	0.96 (0.86-1.06)
Religious attendance x spirituality (per SD)	0.61 (0.43-0.87)**	0.60 (0.41-0.87)**	0.69 (0.50-0.95)*	0.69 (0.50-0.95)*

Notes: *p<0.05, **p<0.01, ***p<0.001; SD – standard deviation

^aModel 3: $\text{logit}(\text{Health-risk behaviour}) = \alpha + \beta_1 * \text{RA} + \beta_2 * \text{spirituality} + \beta_3 * \text{gender} + \beta_4 * \text{age} + \beta_5 * \text{SES} + \varepsilon$

^bModel 4: $\text{logit}(\text{Health-risk behaviour}) = \alpha + \beta_1 * \text{RA} + \beta_2 * \text{spirituality} + \beta_3 * \text{RA} * \text{spirituality} + \beta_4 * \text{gender} + \beta_5 * \text{age} + \beta_6 * \text{SES} + \varepsilon$

Table 5.2 (continued)

	Recent cannabis use (15 years old)		Lifetime drugs use (15 years old)		Early sexual intercourse (15 years old)	
	Crude	Adjusted	Crude	Adjusted	Crude	Adjusted
Model 1: Religious attendance						
Non-attending	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Attending	1.08 (0.62-1.88)	1.03 (0.59-1.80)	1.40 (0.84-2.34)	1.39 (0.83-2.32)	0.72 (0.48-1.09)	0.67 (0.44-1.01)
Model 2: Spirituality (per SD)	0.93 (0.80-1.09)	0.91 (0.78-1.07)	1.05 (0.90-1.22)	1.06 (0.91-1.24)	0.98 (0.88-1.08)	0.95 (0.85-1.05)
Model 3: Religious attendance and spirituality mutually adjusted^a						
Attending vs. non-attending	1.22 (0.67-2.23)	1.19 (0.65-2.16)	1.39 (0.78-2.45)	1.35 (0.76-2.38)	0.71 (0.46-1.10)	0.68 (0.44-1.07)
Spirituality (per SD)	0.91 (0.77-1.08)	0.90 (0.76-1.07)	1.007 (0.85-1.19)	1.02 (0.86-1.21)	1.01 (0.90-1.13)	0.98 (0.88-1.10)
Model 4: Interaction of attendance and spirituality^b						
Attendance vs. non-attendance	2.00 (1.08-3.72)*	1.88 (1.01-3.53)*	2.54 (1.34-4.82)**	2.54 (1.34-4.83)**	1.04 (0.61-1.78)	0.96 (0.56-1.66)
Spirituality (per SD)	1.01 (0.84-1.20)	0.99 (0.82-1.18)	1.10 (0.92-1.31)	1.12 (0.94-1.34)	1.05 (0.93-1.18)	1.02 (0.90-1.14)
Religious attendance x spirituality (per SD)	0.47 (0.29-0.78)**	0.49 (0.30-0.82)**	0.50 (0.30-0.82)**	0.48 (0.29-0.80)**	0.67 (0.46-0.98)*	0.70 (0.47-1.02)

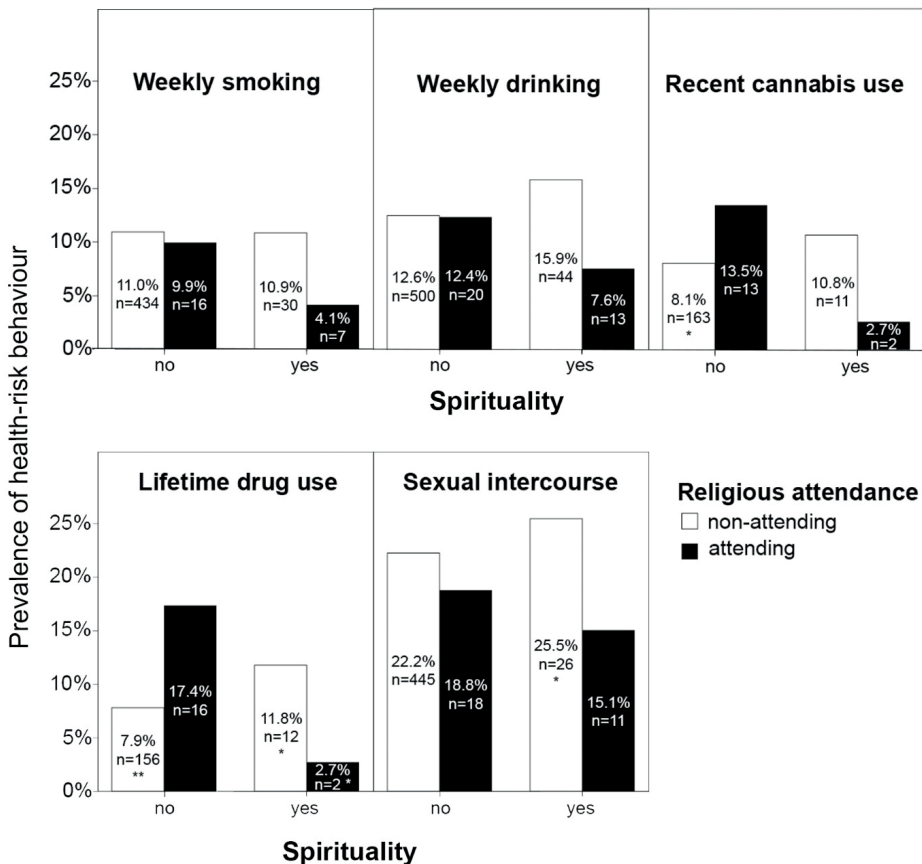
Notes: * p<0.05, ** p<0.01, *** p<0.001; SD – standard deviation

^aModel 3: $\text{logit}(\text{Health-risk behaviour}) = \alpha + \beta_1 * \text{RA} + \beta_2 * \text{spirituality} + \beta_3 * \text{gender} + \beta_4 * \text{age} + \beta_5 * \text{SES} + \varepsilon$

^bModel 4: $\text{logit}(\text{Health-risk behaviour}) = \alpha + \beta_1 * \text{RA} + \beta_2 * \text{spirituality} + \beta_3 * \text{RA} * \text{spirituality} + \beta_4 * \text{gender} + \beta_5 * \text{age} + \beta_6 * \text{SES} + \varepsilon$

The sensitivity analysis using the dichotomised spirituality (Figure 5.2) compared the prevalences of health risk behaviour in the respective groups with the proportion test. Non-spiritual attending group (NSA) was considered reference group for these comparisons in order to allow a more detailed assessment of the dissonance of religious attendance and spirituality.

Figure 5.2 Prevalence of adolescent weekly smoking, weekly drinking, recent cannabis use, lifetime drugs use and early sexual intercourse in groups with different combinations of spirituality and religious attendance.



Note: *p<0.05, **p<0.001

Comparison of prevalences of health risk behaviour (Figure 5.2) showed that there were no significant differences in the prevalence of smoking and weekly drinking in the respective groups. The recent cannabis use had significantly higher prevalence in the NSA (13.5%, 95% CI 9.6–17.4%) than the non-spiritual non-attending group (NSNA) (8.1%, 7.2–9.0%). The lifetime drug use had significantly higher prevalence in the NSA (17.4%, 13.1–21.7%) than all other groups: the NSNA (7.9%, 7.0–8.8%), the spiritual non-attending group (11.8%, 8.6–15.0%), and the spiritual attending group (2.7%, 0.0–8.5%). On the other hand, the prevalence of sexual intercourse in the NSA group was significantly lower (18.8%, 14.3–23.3%) than in the NSNA (25.5%, 21.2–29.8%).

Religious attendance was not a significant mediator for the association of spirituality with health-risk behaviour ($p > 0.10$ for all types of health-risk behaviour). On the other hand, spirituality was a significant mediator for the association of religious attendance with smoking only ($p = 0.03$); it was not a significant mediator for religious attendance with other types of health-risk behaviour ($p > 0.10$ for all types of health-risk behaviour except for smoking).

5.4. Discussion

The aim of this study was to assess the relationship of religious attendance, spirituality and their interaction with health-risk behaviour among adolescents in a highly secular environment. The results showed that mere religious attendance and spirituality were associated with only one or two kinds of health-risk behaviour, but their multiplicative interaction was associated with four of the five behaviours examined. Attending respondents and spiritual respondents were less likely to be regular smokers, and spiritual adolescents were less likely to overuse alcohol. The associations were not significant for cannabis, drug use and early sexual intercourse. We also found that religious attendance and spirituality were not associated with health-risk behaviour in case of mutual adjustment. Moreover, with the exception of smoking, the religious attendance and spirituality were not mediators for each other for the association with health-risk behaviour.

The association of religious attendance and spirituality with less risk behaviour as we found in our study is consistent with previous findings of other authors (Kub & Solari-Twadell 2013; Rew & Wong 2006). Religious attendance and spirituality may influence risk behaviour via several pathways. First, religious systems generally emphasize one's responsibility to care for health and discourage behaviours that could harm the body (Koenig, 2012). Second, parents of religious respondents show a stronger parental monitoring of adolescents' behaviour (Mahoney, 2010), which may to a certain degree prevent the occurrence of unwanted behaviours. Third, religious organisations offer different leisure-time activities which may also serve as a prevention of some risk behaviours (Adamczyk & Felson 2012).

It requires further analysis which would include also the additional variables to discriminate between these explanations.

However, we also found that the interaction of a low level of spirituality and religious attendance was associated with an increased level of health-damaging behaviours, which differs from the findings of Pitel et al. (2012). This study dealt with a similar issue in Slovak adolescents, but found the Religious/Non-spiritual group not to be so distinct from the other groups as we found. An explanation could be the different cultural contexts of Slovakia and the Czech Republic – religiosity is distinctly more prevalent in Slovakia (85.3% Christian) than in the Czech Republic (23.3% Christian) (Pew Research Center, 2014). A second explanation may be the different way of assessing spirituality, i.e., using a question on the importance of faith by Pitel et al. (2012) vs. using the spirituality questionnaire as we did, with the latter probably being a stronger measure.

Our finding of a higher prevalence of some risk-behaviours among adolescents who attend but are not spiritual raises important questions about this specific group, which has rarely been studied. Some adolescents may attend church services without an adequate internal conviction. We could argue that their religious practice is more the result of external pressure, usually from the family. Thus, the experienced discrepancy could result in a desire to rebel in some way, e.g., by health-damaging behaviour. In addition, this discrepancy may lead to substantial existential distress, causing individuals to regulate their emotions in maladaptive ways, e.g., through alcohol or drug use (Aldwin et al. 2014). At the same time, higher spirituality was associated with less likely weekly smoking and drinking, but not with the other risk-behaviours. Therefore, the popular being “spiritual, but not religious” might have only a limited impact on someone’s behaviour, as some other authors also concluded (Jang & Franzen 2013).

5.4.1. Strengths and limitations

This study has several important strengths, the most important being its large and representative sample and its high response rate. It is also the first study that uses the shortened version of the SWBS in the Czech environment. However, the high proportion of non-attending respondents (92.8%) and the correspondingly low number of attending respondents represent a limitation of our study, as it decreased the power of the study in particular regarding moderation. Another limitation might be information bias, as our data were based on self-reports of adolescents, which can be influenced by social desirability. A third limitation is the cross-sectional design of the study which does not allow us to make conclusions on causality.

5.4.2. Implications

Our findings suggest that taking care of the spiritual and religious needs of adolescents may affect their risk-behaviours. Such care could include, for example, family

and school education as well as pastoral care focussing on promoting the process of finding one's own identity and the healthy spirituality of the adolescent. We found that, in particular, religious attendance without strong spirituality may not be protective or can even increase the likelihood of health-risk behaviour. This could lead to educating parents on the deleterious effects of forcing adolescents to attend church without internal spiritual drive. Alternatively, our results support the idea that the more effective interventions would be the ones that lead to internalisation of the spiritual values. During adolescence, relationships with their peers represent a strong factor influencing the adolescents' behaviour and attitudes. Therefore, a useful strategy to prevent adolescent health-risk behaviour might be to create an environment where spiritual values are shared and respected by the whole group, e.g., in scout and other organizations, or different activities in youth centres.

Our results also show that the available evidence on religiosity and spirituality should be interpreted with caution. It is important to keep in mind the multidimensionality of both constructs and the consequent ambiguity in definitions and methods of measurement. A group of "religious respondents" may include participants with different levels of spirituality, which could lead to misinterpretation of results. Future research on this topic and on the causal pathway is therefore recommended.

5.5. Conclusion

Our findings suggest that religious attendance or spirituality separately have only limited impact on adolescent health-risk behaviour. Spirituality may only protect against health-risk behaviour if combined with religious attendance, and if not the reverse holds true for attendance without being spiritual. Thus, this study shows the importance of the internalisation of adolescent religious values with and its impact on health-risk behaviour, inviting for more attention for research on this theme.

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Religiosity and mental health: their association depends on how and where you measure them

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Submitted

Abstract

Background: Most studies report a positive association between religiosity and spirituality (R/S) and aspects of mental health (MH) while a small proportion reports mixed or negative associations. Explanations could be measurement problems, but also a failure to consider cultural factors and religious context. Therefore, the aim of this study was to assess the associations of religiosity measured more specifically, with MH in a secular environment.

Methods: We obtained a nationally representative sample of Czech adults (n=1795, age 46.4±17.4 years, 48.7% men). We measured religiosity, conversion experience, non-religious attitudes, mental health problems (Brief Symptom Inventory, BSI) and the Experiences in Close Relationships.

Results: Of all respondents 29.1% were unstable non-religious (USNR), and 3.3% were converts. Compared to stable non-religious respondents, USNR and converts who perceived God as distant (CGD) were more likely to experience anxiety in close relationships, with odds ratios (OR) of 1.31 (95%-confidence interval 1.02-1.69) and 2.59 (1.30-5.16), respectively, as well as higher risks of a worse MH, with BSI Global Severity Index (GSI) OR=1.55 (1.19-2.02) for USNR and OR=4.08 (2.03-8.22) for CGD. Stable religious who perceived God as distant had BSI GSI OR=1.36 (1.01-1.85).

Conclusions: Our findings support the idea that the heterogeneity of findings in associations of R/S with MH could be due to measurement problems as well as cultural background. Different categorisations of respondents lead to outcomes with different interpretations. A shift towards religiosity could be expected in a substantial part of non-religious respondents in problematic times.

Keywords: atheism; religiosity; spirituality; mental health; attachment; measurement

6.1. Introduction

Most studies report a positive association between religiosity and spirituality (R/S) and aspects of mental health (MH) (Koenig, 2012), such as a higher life-satisfaction and meaning in life (George et al., 2002), a lower prevalence of anxiety and depression (Kim et al., 2015; Paine & Sandage, 2017), suicidal tendencies (VanderWeele et al., 2016) and substance abuse (Yonker et al., 2012), and better cognitive functioning (Reyes-Ortiz et al., 2008). However, a small proportion of such studies report either mixed or negative associations (Koenig, 2012). Understanding why these findings deviate may add to our understanding of the underlying process.

Among the possible explanations, problems with measurement (Koenig, 2008) are most often mentioned, related to the fact that both spirituality and religiosity are hard to measure multidimensional constructs (Hooker et al., 2014). Religiosity is most often seen as participation in an organised religion, i.e. in an organized system of beliefs and practices (Koenig, 2012), while spirituality is usually considered a more personal, subjective experience (Hill & Pargament, 2003) that often includes a connection to the transcendent (e.g. one's relationship to God); a connectedness to oneself, others and the world; feelings of peace, love and harmony; and the sense of an ultimate meaning of life (Underwood, 2011). However, definitions can differ to a high degree, especially regarding spirituality (Koenig, 2008). This hinders comparison of the various studies, because results might differ due to the definitions used. Approaches that would touch both the external and internal aspect of R/S are probably the best solution.

Another explanation of the heterogeneous findings on R/S and mental health could be a failure to take into account socio-cultural factors and context (Dein et al., 2012). Most research so far has been done in predominantly religious countries (Lucchetti & Lucchetti, 2014), but associations may be different for those living in more secular countries. Some studies report that religious individuals show better subjective health only in countries in which religiosity is common and socially desirable (Okulicz-Kozaryn, 2010; Stavrova, 2015) and that having the same religion in two different cultural contexts may have opposite outcomes (Bjorck et al., 1997). Hayward and Elliott (2014) found R/S in secular countries to be associated with adverse health outcomes and linked explanations for this with the social norms and governmental policies in the country concerned. However, there is a lack of research that takes such individual factors more into account.

A third explanation for some heterogeneous findings on the association of R/S and MH regards more internal factors, such as the attachment styles, which also differ between various cultures (Schmitt et al., 2004). Moreover, the attachment style has already been associated with some dimensions of R/S. Research shows that a believer's perceived relationship with God meets the defining criteria for attachment relationships and can function psychologically much like other attachments (Granqvist et al., 2010), and that this relationship is also associated with mental (Steenwyk et al., 2010) and physical health (Ironson et al., 2011). Taking into account the participants' image of God may therefore

represent another way of taking into account the heterogeneous nature of religiosity and spirituality.

Kirkpatrick (1997) also linked attachment theory with the process of religious conversion and found that women with an anxious attachment style were more likely to become religiously converted than women with a secure or avoidant attachment style. Other studies support these findings (Granqvist & Kirkpatrick, 2004; Halama, 2015), which imply that religious instability may have similar roots as unstable emotional attachment. Religious conversion, or in general the stability of religious attitudes, could also contribute to the heterogeneity of the findings regarding R/S and MH in association with the socio-cultural context. In line with the person-environment fit model (Muchinsky & Monahan, 1987) which is defined as the degree to which individual and environmental characteristics match, we can assume a different conversion process in religious and secular countries. People often convert in times of distress in a difficult life situation (Ullman, 1982; Zinnbauer & Pargament, 1998). Nevertheless, while in predominantly religious countries people might turn to religion more easily because conversion is socially acceptable, in secular ones the “cost of the conversion” (Barro et al., 2010) is higher. Where a difficult life situation represents the main reason for conversion, we could expect a higher level of stress, i.e. a worse psychological condition among the converts. The Czech Republic is one of the most secular countries in the world. According to some sources it is even the country with the highest percentage (76.4%) of religiously unaffiliated people in the world (Pew Research Center, 2014) which represents a unique setting to assess the effects of conversion.

Therefore, the aim of this study was to assess the associations of religiosity measured more specifically (i.e. as perceived closeness of God and of the stability of religious attitudes) with MH (i.e. the attachment insecurity and other mental health problems) in a secular environment.

6.2. Methods

6.2.1. Participants and procedure

A national sample of the Czech population aged fifteen years and older was obtained using a two-step procedure. In the first step, the questionnaire and all further procedures were piloted among 206 participants. This led to the final version of the survey. In the second step, another 2184 participants were randomly chosen with the help of quota sampling and asked to participate in a study on the problematics of health, life experiences and attitudes and lifestyle. Of these respondents, 384 (17.6%) refused to participate in the survey. Participants reported a lack of time (39.2%), a lack of interest in or distrust in research in general (24.0%), the personal nature of the questions (17.2%) and the length and difficulty of the questionnaire (11.2%) among the main reasons for refusal.

Data was collected by professionally trained administrators in September and October 2016 with a standardized interview with the respondents (face-to-face). Because of incomplete information on religiosity, 5 questionnaires were excluded, leading to a final sample of 1795. Participation in the survey was anonymous and voluntary. The study design was approved by the Ethics Committee of the Olomouc University Social Health Institute, Palacký University in Olomouc (No. 2016/3).

6.2.2. Measures

Religious background and a stability of religious attitudes were assessed by the questions on religiosity, faith education, conversion experience, non-religion attitudes, stability of religious attitudes and God Image. MH was assessed by the Experiences in Close Relationships-Revised questionnaire and by the Brief Symptom Inventory (BSI-53). The translation process of all questionnaires was done according the forward-backward translation.

Religiosity was measured by the question: “At present, would you call yourself a believer?” with possible answers: yes, I am a member of a church or religious society; yes, but I am not a member of a church or religious society; no; no, I am a convinced atheist.

Conversion experience was assessed by the following questions: 1) “Have you ever experienced something that could be called a religious conversion (acceptance or change of denomination) with possible answers: yes; no. The participants with the conversion experience were further considered as *converts*. 2) For converts: “How important a role did the following factors have in your conversion?” Each factor (difficult life situation, personal religious experience, example of other people, religious literature or other) was assessed with the following possible answers: had a key role; partly contributed; had no role.

Stability of non-religious attitudes was assessed by the following question: “What circumstances would motivate you to pray personally or to attend a religious service?” with possible multiple answers: a difficult life situation (illness, death of a close person, financial problems); psychological problems (anxiety, depression); search for the meaning of life; gratitude; politeness towards family members, friends etc., need of a community (desire to belong somewhere), others (please specify); nothing. Participants who choose the options “politeness” or “nothing” were further considered as *stable non-religious* and the rest as *unstable non-religious*.

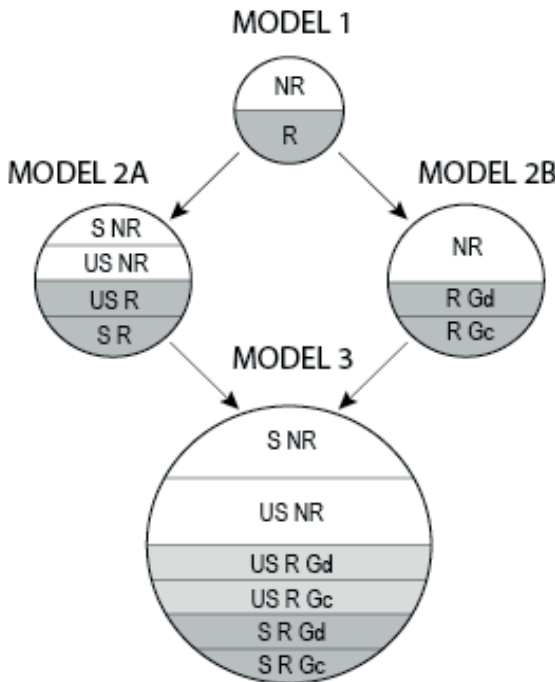
Perceived closeness of God was assessed using one question from the 2005 Baylor study: “How well do you feel that the word “distant” describes God?” Possible answers were: very well; somewhat well; not very well; not at all. Respondents who choose the option “not at all” were considered as perceiving God as close, the rest as perceiving God as distant.

The respondents were categorised based on the combination of religiousness with the other variables, to be used as independent variables in various models for the association with MH. In the first model (1), participants were dichotomised only according to their religiosity. In 2A religious participants were, in addition, categorised according

Spirituality and health: their associations and measurement problems

to perceived closeness of God. In Model 2B, participants were, in addition to Model 1, categorised according to the stability of religious attitudes: stable non-religious, unstable non-religious, unstable religious (converts) and stable religious. Model 3 included the independent variables of both model 2A and 2B, resulting in 6 categories (see Figure 6.1).

Figure 6.1 Categorisation of respondents according to religiousness combined with perceived closeness to God and stability of religiousness



Note: NR = non-religious; R = religious; S = stable;
 US = unstable; Gc = perceiving God as close;
 Gd = perceiving God as distant

The dependent variable *anxiety in close relationships* was assessed using the anxiety subscale of the Experiences in Close Relationships-Revised questionnaire (ECR-R) (Fraley, Waller, & Brennan, 2000). It is composed of 18 items rated on a seven-point scale with possible answers ranging from “totally disagree” (1) to “totally agree” (7) and measures the extent to which people are uncomfortable being close to others. In the main analyses, it was assessed as a binary variable created by dichotomizing the score into the subscale’s upper quartile. Cronbach’s alpha was 0.91 in our sample.

The dependent variable *other mental health problems* was assessed using the Brief Symptom Inventory (BSI-53), measuring the psychological symptom pattern of the respondents (Derogatis & Melisaratos, 1983). The introductory instruction was: “How much has the following symptoms problem distressed or bothered you during the past month?” It was followed by 53 items rated on a five-point scale of distress with possible answers ranging from “not at all” (0) to “extremely” (4). The BSI was scored and profiled in terms of nine subscales, i.e. primary symptom dimensions (Somatization, Obsessive Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation and Psychoticism) and the Global Severity Index (GSI) measuring the overall psychological distress level. In the main analyses, individual dimensions were assessed as binary variables created by dichotomizing the score into the subscale’s upper quartile or below. For the purpose of sensitivity analyses, the mean scores of the subscales were used. Cronbach’s alpha for the GSI was 0.97 in our sample.

The background characteristics *gender, age* and other basic *sociodemographic characteristics* were obtained by the questionnaire.

6.2.3. Statistical analyses

First, the background characteristics of the sample were described. In the next step, the associations of different R/S models (see Figure 1) with attachment anxiety were assessed using a binary logistic regression model adjusted for gender, age and educational status. Subsequently, the procedure was repeated for the associations of R/S models with nine BSI subscales and BSI GSI. Each independent variable was tested in a separate model. All analyses were performed using the statistical software package IBM SPSS version 21.

6.3. Results

6.3.1. Description of the population

The background characteristics of the sample are presented in Table 6.1. The sample is a representative sample of the Czech population aged 15 years and over (mean age 46.4, SD=17.4; 95% confidence interval 45.60-47.21; 48.7% men). Of the whole sample, 60 respondents reported some kind of conversion experience. The factors that contributed to it were mostly mixed. The highest prevalence showed a spiritual experience (75.0%), the example of other people (71.7%), and a difficult life situation (70.0%).

Spirituality and health: their associations and measurement problems

Table 6.1 Description of the study population, total and by stability of religiousness

	Total		Stable non-religious		Unstable non-religious		Converts		Stable religious	
	n	%	n	%	n	%	n	%	n	%
Gender										
Male	873	48.6	412	47.2	230	26.3	27	3.1	204	23.4
Female	922	51.4	329	35.7	293	31.8	33	3.6	267	29.0
Age										
15-29 years old	409	22.8	196	47.9	127	31.1	8	2.0	78	19.1
30-44 years old	448	25.0	206	46.0	137	30.6	14	3.1	91	20.3
45-59 years old	441	24.6	183	41.5	118	26.8	17	3.9	123	27.9
60-90 years old	497	27.7	156	31.4	141	28.4	21	4.2	179	36.0
Living arrangement										
With husband/ wife	917	51.1	362	39.5	250	27.3	35	3.8	270	29.4
With unmarried mate	350	19.5	158	45.1	125	35.7	6	1.7	61	17.4
Alone	353	19.7	144	40.8	93	26.3	13	3.7	103	29.2
With parents/ siblings	175	9.7	77	44.0	55	31.4	6	3.4	37	21.2
Marital status										
Single/ Divorced/ Widow(er)	729	40.6	302	116.0	228	89.0	23	11.9	176	83.1
Married/ Partner relationship	1066	59.4	439	91.4	295	57.7	37	5.2	295	45.7
Highest education achieved										
Elementary school	140	7.8	64	45.7	39	27.9	4	2.9	33	23.6
Secondary voca- tional school	441	24.6	173	39.2	118	26.8	20	4.5	130	29.5
Secondary school with graduation	852	47.5	360	42.3	258	30.3	21	2.5	213	25.0
College	362	20.2	144	39.8	108	29.8	15	4.1	95	26.2
Economic activity										
Employee	938	52.3	414	44.1	283	30.2	31	3.3	210	22.4
Self-employed	167	9.3	79	47.3	43	25.7	5	3.0	40	24.0
Household ^a / Unemployed	83	4.6	38	92.2	18	42.5	3	7.9	24	57.4
Student	178	9.9	80	44.9	59	33.1	2	1.1	37	20.8
Disabled/Old-age pensioner	429	23.9	130	67.1	120	48.5	19	14.4	160	60.0

Note: ^a including maternity leave ^b independently on church attendance

Table 6.1 (continued)

	Total		Stable non-religious		Unstable non-religious		Converts		Stable religious	
	n	%	n	%	n	%	n	%	N	%
Religiosity^b										
Believer, church member	170	9.5	0	0.0	0	0.0	32	18.8	138	81.2
Believer outside the church	361	20.1	0	0.0	0	0.0	28	7.8	333	92.2
Non-believer	1001	55.8	563	56.2	438	43.8	0	0.0	0	0.0
Convinced atheist	263	14.7	178	67.7	85	32.3	0	0.0	0	0.0
Total	1795	100	741	41.3	523	29.1	60	3.3	471	26.2

Note: ^a including maternity leave ^b independently on church attendance

6.3.2. Anxiety in close relationships

Table 6.2 shows the associations of various R/S models with anxiety in close relationships. Model 2A shows that compared to stable non-religious, unstable non-religious were more likely to report higher anxiety in close relationships with odds ratios (OR) 1.31 (95% confidence interval 1.02-1.69 $p < 0.05$). This holds also for converts, but only those who perceived God as distant (OR=2.59 (1.30-5.16), $p < 0.01$) (Model 3).

Table 6.2 Associations of different R/S models with anxiety in close relationships: results of binary logistic regression with the stable non-religious respondents being the reference category, adjusted for age, gender and education level leading to odds ratios with 95% confidence intervals.

Model		n (%)	Anxiety in close relationships OR (95% CI)
1	Non-religious	1264 (70.4)	1
	Religious	531 (29.6)	0.88 (0.69-1.12)
2A	Stable non-religious	741 (41.3)	1*
	Unstable non-religious	523 (29.1)	1.31 (1.02-1.69)*
	Converts	60 (3.3)	1.70 (0.97-2.97)
	Stable religious	471 (26.2)	0.92 (0.70-1.22)
2B	Non-religious	1264 (70.4)	1
	Religious, who perceive God as distant	374 (20.8)	0.94 (0.72-1.22)
	Religious, who perceive God as close	157 (8.7)	0.76 (0.50-1.14)
3	Stable non-religious	741 (41.3)	1*
	Unstable non-religious	523 (29.1)	1.31 (1.02-1.69)*
	Converts, who perceive God as distant	35 (1.9)	2.59 (1.30-5.16)**
	Converts, who perceive God as close	25 (1.4)	0.82 (0.30-2.22)
	Stable religious, who perceive God as distant	339 (18.9)	0.95 (0.70-1.28)
	Stable religious, who perceive God as close	132 (7.4)	0.86 (0.55-1.35)

Notes: *p<0.05, **p<0.01, ***p<0.001

^aTotal number of respondents in each category

6.3.3. Other mental health problems

Table 6.3 shows the results of associations of various R/S models with BSI. The pattern of results differed in various models depending on the way in which the respondents were categorised. While religious and non-religious respondents (Model 1) differed in only two BSI dimensions, similar to respondents in Model 2B, further division and combination of categories revealed significant differences among subgroups among religious as well as non-religious respondents.

Model 2A showed that compared to stable non-religious respondents, unstable non-religious were more likely to report worse MH, with BSI GSI OR=1.55 (1.19-2.02, $p<0.01$) and higher risks of elevated scores in seven of the nine specific BSI dimensions. Converts scored higher on BSI GSI (OR=2.70 (1.56-4.69), $p<0.001$) and all nine BSI dimensions. Stable religious scored higher on BSI GSI (OR=1.34 (1.01-1.76), $p<0.05$) and two BSI dimensions.

Model 3 revealed further differences within the religious group, showing that converts who perceived God as distant showed the worst MH. They scored higher on BSI GSI (OR=4.08 (2.03-8.22), $p<0.001$) as well as all BSI dimensions. In contrast, converts who perceived God as close differed in only three BSI dimensions, with no significant differences in the BSI GSI. Similarly, within the stable religious group, only the religious who perceived God as distant scored higher on BSI GSI (OR=1.36 (1.01-1.85), $p<0.05$) and two BSI dimensions, while the stable religious respondents who perceived God as close did not show any statistical difference from the stable non-religious group.

Table 6.3 Associations of different R/S models with selected BSI symptoms and the GSI: results of binary logistic regression with the stable non-religious respondents being the reference category, adjusted for age, gender and education level leading to odds ratios with 95% confidence intervals.

Model	n° (%)	Somatization	Obsessive sive	Compul- sive	Interpersonal sensitivity
1		1	1	1	1
Non-religious	1264 (70.4)				
Religious	531 (29.6)	1.29 (1.01-1.64)*	1.61 (1.25-2.07)***		1.08 (0.83-1.39)
2A		1**	1***		1**
Stable non-religious	741 (41.3)				
Unstable non-religious	523 (29.1)	1.42 (1.07-1.88)**	1.28 (0.94-1.73)		1.33 (1.00-1.78)*
Converts	60 (3.3)	2.51 (1.42-4.43)***	4.42 (2.54-7.68)***		2.68 (1.52-4.72)**
Stable religious	471 (26.2)	1.40 (1.05-1.87)*	1.55 (1.15-2.11)**		1.09 (0.80-1.48)
2B		1**	1**		1
Non-religious	1264 (70.4)				
Religious, who perceive God as distant	374 (20.8)	1.52 (1.17-1.99)**	1.67 (1.26-2.21)***		1.09 0.82-1.46)
Religious, who perceive God as close	157 (8.7)	0.82 (0.54-1.25)	1.47 0.98-2.19)		1.04 (0.68-1.58)
3		1***	1***		1**
Stable non-religious	741 (41.3)				
Unstable non-religious	523 (29.1)	1.42 (1.07-1.88)*	1.28 (0.94-1.73)		1.33 (1.00-1.78)*
Converts, who perceive God as distant	35 (1.9)	4.41 (2.14-9.11)***	6.33 (3.14-12.78)***		3.75 (1.86-7.56)***
Converts, who perceive God as close	25 (1.4)	1.00 (0.36-2.74)	2.60 (1.09-6.19)*		1.55 (0.61-4.00)
Stable religious, who perceive God as distant	339 (18.9)	1.61 (1.18-2.19)**			1.07 (0.76-1.51)
Stable religious, who perceive God as close	132 (7.4)	0.96 (0.60-1.53)	1.48 (0.93-2.36)		1.12 (0.70-1.81)

Notes: *p<0.05, **p<0.01, ***p<0.001

^aTotal number of respondents in each category

Table 6.3 (continued)

Model	Depression	Anxiety	Hostility	Phobic Anxiety
1 Non-religious	1	1	1	1
Religious	1.17 (0.93-1.47)	1.23 (0.98-1.55)	0.96 (0.74-1.24)	1.16 (0.91-1.49)
2A Stable non-religious	1**	1***	1*	1**
Unstable non-religious	1.29 (0.99-1.67)	1.63 (1.26-2.12)**	1.36 (1.03-1.79)*	1.27 (0.96-1.68)
Converts	2.89 (1.68-4.97)***	4.26 (2.48-7.33)***	1.87 (1.03-3.39)*	2.68 (1.54-4.68)**
Stable religious	1.16 (0.89-1.53)	1.32 (1.00-1.74)	1.01 (0.74-1.37)	1.16 (0.86-1.55)
2B Non-religious	1	1	1	1
Religious, who perceive God as distant	1.21 (0.93-1.56)	1.21 (0.94-1.58)	1.12 (0.84-1.50)	1.21 (0.92-1.60)
Religious, who perceive God as close	1.09 (0.75-1.58)	1.27 (0.88-1.84)	0.60 (0.37-0.99)*	1.05 (0.70-1.58)
3 Stable non-religious	1**	1***	1**	1*
Unstable non-religious	1.29 (0.99-1.67)	1.63 (1.26-2.12)**	1.36 (1.03-1.79)*	1.27 (0.96-1.68)
Converts, who perceive God as distant	4.52 (2.22-9.17)***	4.87 (2.43-9.78)***	3.17 (1.56-6.44)**	2.91 (1.44-5.91)***
Converts, who perceive God as close	1.52 (0.64-3.61)	3.55 (1.58-7.96)**	0.64 (0.19-2.18)	2.38 (1.02-5.53)*
Stable religious, who perceive God as distant	1.17 (0.86-1.58)	1.32 (0.97-1.79)	1.14 (0.82-1.59)	1.22 (0.89-1.69)
Stable religious, who perceive God as close	1.16 (0.76-1.78)	1.33 (0.87-2.05)	0.70 (0.40-1.21)	0.99 (0.62-1.59)

Notes: *p<0.05, **p<0.01, ***p<0.001

^aTotal number of respondents in each category

Table 6.3 (continued)

Model	Paranoid Ideation	Psychoticism	Global Severity Index
1	1	1	1
	Non-religious		
	Religious	1.04 (0.80-1.35)	1.19 (0.95-1.51)
2A	1**	1**	1***
	Stable non-religious		
	Unstable non-religious	1.49 (1.11-2.00)**	1.55 (1.19-2.02)**
	Converts	2.43 (1.36-4.36)**	2.70 (1.56-4.69)***
	Stable religious	1.12 (0.82-1.54)	1.34 (1.01-1.76)*
2B	1	1	1
	Non-religious		
	Religious, who perceive God as distant	1.10 (0.82-1.48)	1.25 (0.96-1.63)
	Religious, who perceive God as close	0.90 (0.58-1.40)	1.06 (0.73-1.56)
3	1**	1**	1***
	Stable non-religious		
	Unstable non-religious	1.49 (1.11-2.00)**	1.55 (1.19-2.02)**
	Converts, who perceive God as distant	3.91 (1.94-7.91)***	4.08 (2.03-8.22)***
	Converts, who perceive God as close	1.01 (0.34-3.01)	1.44 (0.59-3.52)
	Stable religious, who perceive God as distant	1.13 (0.80-1.61)	1.36 (1.01-1.85)*
	Stable religious, who perceive God as close	1.09 (0.66-1.79)	1.28 (0.83-1.96)

Notes: *p<0.05, **p<0.01, ***p<0.001

^aTotal number of respondents in each category

6.4. Discussion

The aim of this study was to contribute to our understanding of the heterogeneity of findings in associations of religiosity with MH. We found that different approaches to assessing religiosity, i.e. a different categorisation of respondents based on other related concepts, led to other findings. Unstable non-religious respondents and converts who perceived God as distant were more likely to experience anxiety in close relationships. Furthermore, we found higher risks of worse MH for unstable non-religious respondents, for converts who perceived God as distant and for stable religious respondents who perceived God as distant.

We found that the unstable religious, i.e. the non-believers who reported that their attitude could change in case of need and distress, were more likely to report a higher attachment anxiety compared with stable non-religious. Therefore, their religious instability could already be a symptom of worse MH, associated with the inclination to search for some external source of strength and support in times of need. This religious instability may subsequently manifest itself in a shift towards religion. This corresponds to findings of other authors who mention attachment insecurity as one of the factors in the conversion process (Granqvist et al., 2010). Moreover, these respondents showed higher risks of seven BSI symptoms and the BSI GSI score compared with the stable non-religious respondents. These findings are in line with the study of Zinnbauer and Pargament (1998), in which the convert group showed more pre-conversion perceived stress and a greater sense of personal inadequacy and limitation before the conversion. Our results could also be supported by studies which reported more adverse health outcomes among respondents who were inconsistent in their religiosity and spirituality (King et al., 2013), i.e. spiritual non-believers (Galen, 2009; King et al., 2006). This suggests that religious instability related to a more general instability in attachment may provide some explanation for the heterogeneity in the findings regarding S/R and mental health.

We also found that converts who perceived God as distant were more likely to experience anxiety in close relationships. These findings further support the idea of the association between one's attachment style and religious conversion (Halama et al., 2013). Moreover, these respondents showed approximately a four-times higher risk of worse MH than stable non-religious respondents. These findings contrast with those of other authors, who associated conversion e.g. with a decrease of depressive and hopelessness symptoms (Ng & Shek, 2001) and positive personality changes (Paloutzian et al., 1999). Nevertheless, as 70% of our respondents reported that a difficult life situation played an important role in their conversion, our results are consistent with the idea of conversion as a search for security in a difficult time (Granqvist et al., 2010). In addition, in secular countries a stronger impulse, e.g. a worse psychological condition, might be needed for conversion. The fact that this concerns only the converts who perceive God as distant suggests that the subgroup with better MH may represent respondents with a secure attachment style, while the other respondents have an insecure attachment style, as some other authors have also suggested (Granqvist, 2003). Alternatively, spiritual experience is often associated not only with the

perceived closeness of God, but also feelings of peace, happiness and meaning of life (Underwood, 2006). This may in turn lead to better MH.

6.4.1. Strengths and limitations

This study has several important strengths. The most important is that it explores various explanations of deviating findings on R/S and MH and points to possible sources of the heterogeneity. It is also the first study that uses a representative sample to assess the associations of various R/S models with MH in the secular environment of the Czech Republic. To the best of our knowledge, it is also the first study which categorises the respondents according to the stability of religious attitudes and therefore offers another point of view. A limitation of our study is its cross-sectional design which does not allow us to make conclusions on causality. Another limitation might be an information bias, as our data were based on the self-reports of respondents, which can be influenced by social desirability. This is hard to avoid given the subjective nature of the various issues.

6.4.2. Implications

Our findings show that that combining measures on religiousness with measures on closeness to God and the stability of religious attitudes could yield outcomes that lead to a different interpretation. Results of various studies on R/S without taking these factors into account should therefore be interpreted with caution.

We also found that both religious and non-religious respondents represent heterogeneous groups regarding these related characteristics and that a more comprehensive measurement is needed if research in this area is to have any practical implications e.g. for psychologists and psychiatrists. This implies that such a more comprehensive measurement should be included in future studies. Further research on R/S and health is needed to clarify the causality direction in this area.

Moreover, we found that religious respondents differ in their MH problems depending on their perceived closeness to God. Further research is needed to explore whether the secure attachment to God corresponds solely to the attachment style gained in childhood or through life (correspondence pathway), or whether it could also be gained through an experienced relationship with God (compensation pathway) (Granqvist et al., 2010). In case of the latter one's image of God could represent a potential target of psychotherapeutic/spiritual intervention.

6.5. Conclusion

Our findings suggest that the heterogeneity of findings in associations of R/S with MH could be due to measurement problems, i.e. not taking into account the heterogeneity of the groups of religious and non-religious people. A different categorisation of respondents regarding their religiosity could possibly lead to outcomes with different interpretations. A shift towards religiosity could be expected in a substantial part of the non-religious respondents in problematic times, which highlights the causality problematics in measuring R/S and MH in a secular country. Our results also show a link with the adult attachment style, which may help in the interpretation of the results. Further research in this area is needed with regard to the clinical applicability of these findings.

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Spirituality and health: their associations and measurement problems

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Hidden in emotions: a new approach to measuring implicit attitudes

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Submitted

Abstract

Background: Measuring implicit attitudes is difficult due to social desirability (SD). A new method, the Emotion Based Approach (EBA), can solve this by using emotions from a display of faces as response categories. We applied this on an EBA Spirituality tool (EBA-SPT) and an Actual Stress tool (EBA-AST). Our aim was to assess the structure, reliability and validity of the tools and to compare two EBA assessment approaches, i.e., an explicit one (only assessing final replies to items) and an implicit one (assessing also the selection process).

Methods: We obtained data on 522 Czech adults (age 30.3 ± 12.63 ; 27.0% men) via an online survey; in 46 we also assessed saliva cortisol. Data regarded the EBA-SPT and the EBA-AST and also the Daily Spiritual Experience Scale and the Brief Symptom Inventory as gold standards for congruent validity. We further examined the structure and reliability (internal consistency, test-retest) of the EBA tools and assessed their criterion validity using cortisol and the DOPEN Questionnaire Lie Score.

Results: We found an acceptable-good internal consistency reliability of the EBA tools, an acceptable divergent validity, and low (neutral expression) to good (joy) test-retest reliability for concrete emotions assessed by the tools. The implicit EBA approach yielded a stronger correlation between emotions and a weaker congruent validity, but a higher criterion validity, than an explicit approach and standard questionnaires.

Conclusion: Compared to standard questionnaires, EBA is a more reliable approach for measuring attitudes, with an implicit approach that reflects the selection process yielding the best results.

Keywords: implicit attitudes; emotions; measurement; spirituality; social desirability

7.1. Introduction

Measuring attitudes regarding deeply personal topics, issues and convictions, e.g. religiosity and spirituality (R/S), is a challenge in psychological and sociological research (Sedikides & Gebauer, 2010). Challenges particularly involve measurement errors, with social desirability bias being a major issue. This could explain why many studies fail to find significant associations between psychological variables and various biomarkers. For example, cortisol is a stress hormone that can be measured in saliva and used as a validity criterion for various associations with stress. However, in their review, Campbell and Ehlert (2012) found that significant correlations between a cortisol responses and perceived emotional stress variables were found in only 25% of the studies. Evidently, the measurement of psychological variables can be improved.

The challenge of social desirability bias (SDB), i.e. the tendency of individuals to present themselves in a more favorable light (King & Bruner, 2000), is particularly likely to occur in the measurement of R/S. Zerbe and Paulhus (1987) distinguishes two components of SDB: impression management and self-deception. Impression management represents the conscious presentation of false answers and to a certain degree could be addressed by ensuring the anonymity of respondents (Boothkewley, Edwards, & Rosenfeld, 1992). Self-deception might be more difficult to address, as the participants believe the false information they report (Zerbe & Paulhus, 1987) and might not even be aware of their deeper feelings (Shedler, Mayman, & Manis, 1993). In measuring R/S, social desirability is in particular of importance regarding images of God, with a likely discrepancy between one's rational idea of God and deeper emotional feelings (Pirutinsky, Siev, & Rosmarin, 2015). Innovative solutions are needed to assess these feelings.

A solution may be to handle the functioning of the brain as the source of difficulty in accessing one's own attitudes, especially their affective side, through standard questionnaires. Verbalizing one's attitudes activates mainly the cortical areas of the left hemisphere, which is generally associated with cognitive abilities and logical and verbal thinking (Kane & Kane, 1979; Langdon & Warrington, 2000). However, emotional experiences (often unconscious) are usually associated with the right hemisphere (Gainotti, 2006). Therefore, respondents might find it difficult to reach these types of experiences cognitively and to express them verbally, which could contribute to self-deception. Various implicit approaches could help to cope with this, e.g., the Implicit Attitude Test (Greenwald, McGhee, & Schwartz, 1998), and projective techniques which try to assess the construct of interest without asking directly for a verbal report (Fazio & Olson, 2003). These so-called enabling techniques could yield more reliable measurements of people's attitudes. Moreover, they can help lower the effect of different sociocultural expectations that may lead to suppression of certain emotions that might be considered unacceptable (Armonjones, 1985). Though definitely promising, most enabling techniques require a trained administrator to assess the outputs, which makes them inconvenient for large-scale research.

Building on the previous, the Self-Assessment Manikin (Bradley & Lang, 1994) provides a potential solution that could be used in large-scale applications. This non-verbal pictorial assessment technique measures the pleasure, arousal and dominance associated with a person's affective reaction to different stimuli. A further development of this idea could be the use of photographs of human faces, because a deeper level of a facial recognition is associated with activation of the right hemispheric cortical areas (Meng, Cherian, Singal, & Sinha, 2012; Sperry, 1982), which might not be the case for a picture analysis (Geskin & Behrmann, 2018). Therefore, an alternative to classical questionnaires that includes the above-mentioned findings could be the assessment of participants' responses to simple verbal stimuli (tool items) via choosing a corresponding photo of a basic facial expression from a display of emotions as a response category. Besides using this approach in R/S assessment, we also decided to explore the stress in one's current life, because it allows the use of cortisol assessment as a criterion validity.

Therefore, the aim of this study was to explore whether our new method, the Emotion Based Approach (EBA), specifically the EBA-Spirituality tool and the EBA-Actual Stress tool, represents a reliable alternative to classical questionnaires (Daily Spiritual Experience Scale, Brief Symptom Inventory). We assessed the structure (correlations between the emotions, descriptive statistics) and psychometric properties (internal consistency and test-retest reliability; congruent, divergent and criterion validity) of the EBA, and we examined whether the results differed for an explicit and implicit EBA approach.

7.2. Methods

7.2.1. Participants

We obtained data on a sample of 533 Czech respondents aged 15 years and over (April 2017-November 2017) using a snowball technique; 46 participants also agreed to give saliva for cortisol determination. Eleven respondents were excluded from the online survey because of the extremely short time filling in the survey (i.e. less than 15 minutes), which did not allow them to fill in the survey thoughtfully. This led to a final sample of 522 respondents (mean age 30.3, SD=12.63; 27.0% men), 157 of these also completed the retest study.

For the cortisol assessment, the inclusion criteria were attendance at a university and age within the range 19-28 years. The exclusion criteria were: recent abuse of illegal drugs (6 months), pregnancy or breast-feeding, endocrine problems, shift work and mouth redness due to infection or injury. The final subsample of 46 respondents had a mean age of 21.2, (SD=2.02 years) and 32.6% were male.

Participation in the survey was anonymous and voluntary. The study design was approved by the Ethics Committee of the Olomouc University Social Health Institute, Palacký University Olomouc (No. 2016/3).

7.2.2. Procedure and measures

7.2.2.1. *EBA (Emotion Based Approach) method*

The EBA method is an approach that assesses reactions to simple items through the choice of a corresponding facial expression from the display of 13 pictures with human faces standardly depicting various emotions (a neutral face and two degrees of expression of each of the basic emotions, a weak one and a strong one). The items can be designed according to different research areas. The main requirements are that the items are simple, and do not invoke specific emotions merely by their formulation. For scoring purposes, each of the basic emotions (joy, anger, fear, disgust, sadness, surprise, and a neutral emotion) represents a unique answering category. For each item, one point is added for a weak expression of emotion and two points for a strong expression. The score for each emotion is then aggregated over the tool and/or tool set of items. Next, we also registered the characteristics of the way of responding, leading to explicit and implicit responses c.q. approaches. An explicit EBA approach assesses only the final replies to items. We used an online tool; however, it could possibly be realized also via paper-pencil administration. An implicit approach also assesses the selection process in the sense of which other emotions a participant looked at (i.e. enlarged from the display) before choosing a final one; this requires an online tool, as described below.

7.2.2.2. *EBA development and procedure*

As a specific application of these principles, we developed and tested an EBA Spirituality Tool (EBA-SPT), i.e. a specific EBA application to measure R/S. It consists of two sets of questions: the first one focuses on non-religious (NR) spirituality and contains the following items: meaning of life; me and the world; my past; my future; my spiritual life; the aim of my life; forgiveness; activity for others. The second set of items focuses on the God-Image (GI) and contains the following items: God; prayer; God's will; God's closeness; I can hear God talking about me; meeting with God at the end of my life; alone with God; God in my life.

For the purpose of designing a tool for measuring actual stress levels in different areas of life, the EBA Actual Stress Tool (EBA-AST) was also created and used as an additional set of items. It contains the following items: how am I; today; people around me; my life; my work; my relationships; my needs; my health.

In the development of the EBA-SPT, we first tested a pilot version using qualitative interviews, to assess the suitability of various facial expressions. This regarded 28 in-depth interviews (lasting 60-180 minutes) in which participants responded to items of the EBA-SPT by choosing a corresponding facial expression on the first version of the display of emotions. In this pilot, we used 49 prototypical faces, each displaying a different emotion/combination of emotions, as published by Vanger (1998). Subsequently, respondents commented on their choices, which we registered and analyzed.

The tool was then revised based on the results of the interviews, leading to an online version of the EBA tool (first, we administered EBA-SPT). For every EBA item the pictures were displayed in random order in three rows and their position changed upon every page reload. The EBA tool recorded mouse movements over individual pictures. After hovering with the cursor over a picture for a period of time longer than 800ms the selected picture was enlarged and raised above the others, which was recorded as a “hover”. After clicking on the enlarged picture, it turned into selection and the face was displayed in a dialog window, which could be either submitted or dismissed. This event was recorded as a “display”. When submitted, it was recorded as a “selection” and the next item was displayed. For every item we collected the number of hover counts, display counts and selection counts per emotion, finally leading to two measures: selection counts (SC), representing an explicit EBA approach, and counts of hovers and of displays (hover-display count, HDC), representing an implicit EBA approach. The survey was hosted on virtual servers provided by Palacký University. The front-end was implemented as an interactive web page using standard Bootstrap layout. The system was secured by the Google reCaptcha system to avoid abuse of the system by bots.

As a next step, we administered the online EBA-SPT to 323 Czech adults collected using a snowball technique (December 2016-April 2017), 122 of whom also participated in a cortisol assessment (data not used in this study). Participants filled in the survey, which included the EBA-SPT and consequently used the generated code for entering their retest survey. For the cortisol assessment study, they entered the system with pre-distributed access codes. Evaluation of the pilot survey results showed weak associations of the EBA-SPT with the cortisol levels (data not shown); however, it brought questions regarding the usability of the first display of emotions, because the emotions were not graded by their intensity but displayed as combinations of upper and lower face parts with different facial expressions, which is not natural and potentially confounding. Therefore, we repeated the process using the Emotions Revealed Photo Set (Paul Ekman Group). In order to improve the use of cortisol as a criterion validity, we also included and analyzed the EBA-AST.

7.2.2.3. Test-retest analysis

A portion of the respondents was also offered a test-retest, which they were asked to complete one to two weeks after the first survey, assuming that participants would not remember their choices and that the responses would reflect their actual mood at that moment.

7.2.2.4. Criteria for validity

For congruent validity, we used the Brief Symptom Inventory (BSI-53) and Daily Spiritual Experience Scale (DSES) as gold standards. The Brief Symptom Inventory (BSI-53) measures the psychological symptom pattern of the respondents (Derogatis & Melisaratos, 1983). It consists of 53 items. The BSI was scored and profiled in terms of nine subscales,

Spirituality and health: their associations and measurement problems

i.e. eight primary symptom dimensions and the Global Severity Index (GSI) measuring the overall psychological distress level. Cronbach's alpha for the GSI was 0.97 in our sample (Kabat et al., 2018).

The Daily Spiritual Experience Scale (DSES) measures the frequency of ordinary experiences of connection with the transcendent in daily life (Underwood, 2006). An adapted, 15-item version (Malinakova et al., 2018) of the scale was used in this study. The scale was administered only to a part (321 of 522) of the respondents. Cronbach's alpha was 0.91 in our sample.

For criterion validity we used the DOPEN Questionnaire Lie Score and the measured salivary stress hormone cortisol as gold standards. As the criterion validity, we used the DOPEN Questionnaire Lie Score and measured cortisol levels. The DOPEN Questionnaire Lie Score (Ruisel & Muller, 1982) consists of 14 questions assessing one's tendencies to socially desirable responding. In this study we used 13 questions. Cronbach's alpha was 0.73 in our sample.

With regard to the measurement of cortisol levels, participants were instructed not to use an illegal drug or ingest a large amount of alcohol 48 hours prior to providing the sample and to acquire the first sample of cortisol immediately after getting up, by 8:00 AM at the latest. They were further instructed not to eat, drink, smoke, clean their teeth or use dental floss and to remove lipstick or lip balm. Next, participants took two saliva samples, the second sample 30 minutes after the first one, and then by noon, asked to complete the online survey. The two saliva samples were obtained using Salivettes with the blue cap (Sarstedt, Nümbrecht, Germany). Participants chewed on a synthetic swab for 1 minute. Afterwards the swabs were placed in the plastic tube of the Salivettes. Samples were either stored in the refrigerator and analyzed within 3 days, or stored at -20°C until they were analyzed. Biochemical analyses were performed at the Department of Clinical Biochemistry of the University Hospital in Olomouc using an ELISA kit (Salimetrics, State College, PA).

7.2.2.5. *Background and control questions*

We further obtained data on the background of respondents and asked control questions regarding the EBA-SPT, EBA-AST and cortisol assessments. Background characteristics regarded gender, age and other basic sociodemographic characteristics (marital status, highest education achieved, religiosity).

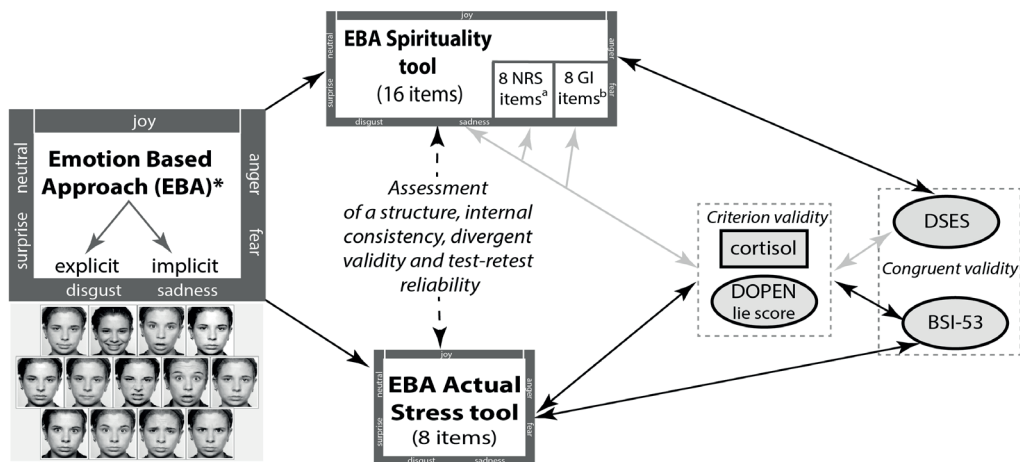
Control questions on reading emotions regard three questions on their interpretation of emotions, at the end of the EBA. For each question, a picture was shown with one basic emotion strongly expressed, and participants had to choose the right answer of three options describing a situation that the person might be experiencing. The participants who answered all three items correctly were considered as being able to recognize emotions, the rest as not being able to do so.

Control questions for cortisol assessment included the perceived level of actual stress, recent (48 hours) abuse of alcohol or an illegal drug, recent (6 months) dependence on any illegal drug, endocrine problems, use of steroids, phase of the menstrual cycle and recent (one month) use of contraception.

7.2.3. Statistical analyses

First, we described the background characteristics of the sample. Next, we assessed the EBA-SPT and EBA-AST based on the conceptual model, as shown in Figure 1. Each of the further steps was done in parallel for an explicit (SC) and an implicit (HDC) EBA approach.

Figure 7.1 Summary of the analytical process



Note: *explicit approach = assessment of a final choice; implicit approach = assessment of a final choice + assessment of the selection process. Every analysis was done separately for both implicit and explicit approach.
^aNRS = Non-religious spirituality; ^bGI = God Image

In the second step, we assessed the *structure of the EBA tools* using Spearman’s rank order correlation (r_s) between the scores of all basic emotions, as assessed by the EBA tools. Third, we tested the psychometric properties (reliability and validity) of the EBA tools. The *reliability of the EBA tools* and their sets of items was assessed using Cronbach’s alpha (α) based on Standardized Items and Mean Inter-Item Correlation values (MIIC). As the nature of the tool does not allow the standard item-by-item assessment, based on the previous analysis of the EBA structure, emotions were scored as follows: -1 point for a weak expression of joy, -2 points for a strong expression of joy; +1 point for a weak expression of any other emotion or a neutral face; +2 points for a strong expression of any other emotion. This resulted into one categorical variable for each of the items. The online tool did not allow this kind of adjustment of the HDC, therefore, only the SC approach was assessed. The test-retest analysis was assessed by Spearman’s correlation between assessments of EBA emotions in two time points.

We analyzed three types of validity: the congruent, the divergent, and the criterion validity. For the *congruent validity*, we used Spearman’s correlations to assess the associations

Spirituality and health: their associations and measurement problems

of the EBA-AST with the BSI-53 and of the EBA-SPT with the DSES. Consequently, we assessed the *divergent validity* between EBA-AST and EBA-SPT. Regarding *criterion validity*, we used as a first criterion of validity, associations with cortisol levels (baseline; 30 minutes after the first measurement, i.e. follow-up; and change, i.e. follow-up level minus baseline level). For the EBA tools, we separately assessed the positive emotion response category (joy) and the other emotions response category. We hypothesized that correlations of positive emotions with cortisol would be negative, and reverse. Before the cortisol analysis, we checked the role of potential confounders (the role of contraceptives and phase of the menstrual cycle) using a linear regression, showing none to confound. Therefore, we decided to proceed without further adjustment to them, just using Spearman's correlation to assess the association of cortisol levels, primarily with the BSI-53 and with the EBA-AST and consequently with the DSES and with the EBA-SPT.

As a second criterion of validity, we assessed associations of the EBA tools (both SC and HDC), the DSES and the BSI-53 with the DOPEN Questionnaire Lie Score using Spearman's correlation. We hypothesized that weak correlations with DOPEN scores would indicate less proneness to social desirability. All analyses were performed using the statistical software package IBM SPSS version 21.

7.3. Results

7.3.1. Description of the population

The background characteristics of the total sample and the test-retest and cortisol subsamples are presented in Table 7.1. Of the whole sample, 31.8% of respondents were unable to recognize emotions in the control questions.

Table 7.1 Description of the study population

	Total sample		Test-retest subsample		Cortisol subsample	
	n	%	n	%	n	%
Gender						
Male	141	27	42	26.8	15	32.6
Female	381	73	115	73.2	31	67.4
Age						
15-29 years old	321	61.5	89	56.7	46	100
30-44 years old	117	22.4	37	23.6	-	-
45-59 years old	76	14.6	28	17.8	-	-
60-90 years old	8	1.5	3	1.9	-	-
Marital status						
Single/ Divorced/Widow-widower	374	71.7	111	70.7	46	100
Married	148	28.4	46	29.3	-	-
Highest education achieved						
Elementary school	68	13	7	4.5	-	-
Secondary vocational school	18	3.4	5	3.2	-	-
Secondary school with graduation	237	45.4	77	49	41	89.1
College	199	38.1	68	43.4	5	10.9
Religiosity ^a						
Believer, member of the church	354	67.8	100	63.7	31	67.4
Believer outside the church	83	15.9	24	15.3	9	19.6
Non-believer	70	13.4	29	18.5	4	8.7
Convinced atheist	15	2.9	4	2.5	2	4.3
Total	522		157		46	

Note: ^aIndependently from church attendance

7.3.2. Structure of the EBA tools

The results of Spearman’s correlations of the scores for basic emotions of the EBA tools showed that all the scores for all emotions except joy were positively correlated for both explicit and implicit measurement of emotions. For the explicit EBA measure (i.e. SC), joy showed significant negative correlations ranging from -0.551 ($p < 0.01$; joy-anger, EBA-SPT) to -0.219 ($p < 0.01$; joy-fear, EBA-AST). The other correlations were rather weak, with the

Spirituality and health: their associations and measurement problems

exception of fear-surprise (0.347, $p < 0.01$; EBA-SPT). For the implicit EBA measure (i.e. HDC), joy showed weak negative or no significant correlations with other emotions. However, correlations were stronger among all the other emotions, ranging from 0.476 ($p < 0.01$; fear-surprise, EBA-SPT) to 0.089 ($p < 0.05$; fear-neutral, EBA-AST). Therefore, for some parts of validity analyses, joy was assessed as a unique response category while all the other emotions were merged together.

The results of the other descriptive analyses showed that the scores per emotion are positively skewed (see Table 7.2). Table 7.3 shows correlations between EBA-AST and EBA-SPT.

Table 7.2 Distribution of the scores per emotion: means, medians, standard deviations and further measures of variation

	Mean	Median	Std. Deviation	Skewness	Kurtosis	Minimum	Maximum
EBA Actual Stress Tool							
Selection counts							
anger	1.17	1.00	1.24	1.60	4.80	0.0	9.0
fear	0.39	0.00	0.83	2.27	5.02	0.0	5.0
sadness	1.41	1.00	1.56	1.06	0.79	0.0	8.0
disgust	0.63	0.00	1.09	2.08	4.99	0.0	7.0
surprise	0.41	0.00	0.78	2.04	3.92	0.0	4.0
joy	6.23	6.00	3.31	0.43	-0.20	0.0	16.0
neutral	0.52	0.00	.82	2.16	6.75	0.0	6.0
Hover and display counts							
anger	3.67	3.00	3.62	1.90	5.72	0.0	25.0
fear	1.71	1.00	2.20	1.67	3.19	0.0	14.0
sadness	4.03	3.00	3.98	1.75	4.73	0.0	25.0
disgust	2.48	2.00	3.07	1.95	4.56	0.0	17.0
surprise	2.09	1.00	2.57	1.84	4.36	0.0	16.0
joy	12.00	11.00	7.21	0.91	0.74	0.0	38.0
neutral	1.63	1.00	2.31	3.40	18.41	0.0	21.0
EBA Spirituality Tool							
Selection counts							
anger	1.08	1.00	1.23	1.40	2.05	0.0	6.0
fear	0.66	0.00	1.15	2.19	6.84	0.0	9.0
sadness	1.37	1.00	1.63	1.47	2.82	0.0	10.0
disgust	0.54	0.00	0.97	2.02	4.30	0.0	6.0
surprise	0.70	0.00	1.06	1.73	3.04	0.0	6.0
joy	6.37	6.00	3.37	0.17	-0.64	0.0	16.0
neutral	0.40	0.00	0.71	2.31	8.73	0.0	6.0
Hover and display counts							
anger	3.00	2.00	2.78	1.12	.94	0.0	14.0
fear	2.25	2.00	2.73	1.86	4.88	0.0	18.0
sadness	3.48	3.00	3.52	1.69	4.39	0.0	25.0
disgust	2.02	1.00	2.58	2.85	16.76	0.0	26.0
surprise	2.28	2.00	2.60	1.47	2.39	0.0	14.0
joy	10.55	10.00	6.25	0.84	1.12	0.0	38.0
neutral	1.20	1.00	1.68	3.23	21.45	0.0	18.0

Spirituality and health: their associations and measurement problems

Table 7.3 Associations of scores on the EBA Actual Stress Tool and the EBA Spirituality Tool (SC^a and HDC^b) performed on the complete sample: Spearman's rank order correlation coefficients

			EBA Actual Stress Tool				
			SC ^a		HDC ^b		
			Joy	Other ^c	Joy	Other	
EBA Actual Stress Tool	SC	Other	-.87**				
	HDC	Joy	.75**	-.69**			
		Other	-.49**	.52**	-.03		
EBA Spirituality Tool	SC	Joy	.56**	-.53**	.46**	-.28**	
		Other	-.52**	.60**	-.45**	.31**	
	HDC	Joy	.44**	-.46**	.57**	.05	
		Other	-.29**	.30**	.08	.67**	
	NRS subscale	SC	Joy	.57**	-.55**	.48**	-.31**
		Other	-.52**	.61**	-.46**	.32**	
GI subscale	HDC	Joy	.45**	-.47**	.57**	.01	
		Other	-.30**	.33**	.06	.66**	
	SC	Joy	.43**	-.40**	.34**	-.20**	
		Other	-.38**	.44**	-.32**	.22**	
HDC	Joy	.33**	-.34**	.42**	.06		
	Other	-.23**	.22**	.10*	.56**		

Notes: *p<0.05, **p<0.01, ***p<0.001

^aSelection counts; ^bHover and display counts; ^cOther emotions merged

Table 7.3 (continued)

EBA Tool	Spirituality	SC	Complete tool						EBA Spirituality Tool										
			SC			HDC			NRS subscale			GI subscale							
			Joy	Other	Joy	Other	Joy	Other	Joy	Other	Joy	Other	Joy	Other	Joy				
	Joy																		
	Other																		
	Joy	HDC	.83**																
	Other																		
	Joy																		
	Other																		
	Joy	SC	.87**																
	Other																		
	Joy																		
	Other																		
	Joy	HDC	.70**																
	Other																		
	Joy																		
	Other																		
	Joy	SC	.92**																
	Other																		
	Joy																		
	Other																		
	Joy	HDC	.78**																
	Other																		
	Joy																		
	Other																		

Notes: *p<0.05, **p<0.01, ***p<0.001

^aSelection counts; ^bHover and display counts; ^cOther emotions merged

7.3.3. Psychometric properties

7.3.3.1. Reliability

Results of reliability assessment using the SC are presented in Table 7.4. We found good internal consistency of the EBA-SPT, and an acceptable internal consistency of the EBA-AST.

In the assessment of test-retest reliability, we observed similar values (the largest difference was 0.154) of the scores for each emotion in the tools for both SC and HDC. The EBA-SPT showed somewhat higher test-retest correlations than the EBA-AST. Furthermore, we found good reliability for joy, but even very weak reliability for neutral expression in the EBA-AST.

Table 7.4 Reliability of the Emotion Based Approach tools: internal consistency and test-retest reliability measures

	Selection counts		Hover-display counts	
	Spirituality tool	Actual Stress tool	Spirituality tool	Actual Stress tool
Internal consistency reliability^a				
Cronbach's alpha	0.82	0.62		
MIIC ^b	0.22	0.17		
Test-retest reliability^c				
Anger	.48**	.31**	.47**	.37**
Fear	.45**	.26**	.50**	.21**
Disgust	.48**	.36**	.31**	.27**
Sadness	.59**	.36**	.44**	.29**
Surprise	.52**	.24**	.54**	.26**
Neutral	.35**	.09	.36**	.09
Joy	.83**	.65**	.74**	.49**

Notes: *p<0.05, **p<0.01, ***p<0.001

^aThe whole sample; ^bMean Inter-item correlation coefficient; ^cTest-retest subsample

7.3.3.2. Validity

In the further assessment of validity, we assessed the scores for basic emotions of the EBA tools both separately and, based on the results of the correlations between them, merged into an overall cluster, from which only joy was excluded.

Congruent and divergent validity

Table 7.5 shows the correlations of emotions of the EBA tool, presented both for SC and for HDC, with the BSI-53 and the DSES. Generally, correlations were stronger when the emotions were assessed by SC than by HDC.

Table 7.5 Correlations of the Emotion Based Approach (EBA) Actual Stress tool and the EBA Spirituality tool (non-religious + God-image items) with the Brief Symptom Inventory and the Daily Spiritual Experience Scale: a comparison of selection counts and hover-display counts

		Joy	All other emotions	Joy	All other emotions
		Actual Stress tool			
		Selection counts		Hover-display counts	
Brief Symptom Inventory	Somatisation	-.31**	.34**	-.29**	.11*
	Obsessive Compulsive	-.35**	.39**	-.34**	.16**
	Interpersonal sensitivity	-.46**	.48**	-.42**	.22**
	Depression	-.49**	.50**	-.46**	.19**
	Anxiety	-.41**	.45**	-.38**	.18**
	Hostility	-.37**	.44**	-.32**	.21**
	Phobic Anxiety	-.35**	.39**	-.37**	.13**
	Paranoid Ideation	-.43**	.44**	-.38**	.20**
	Psychoticism	-.49**	.51**	-.44**	.24**
	Global Severity Index	-.51**	.55**	-.48**	.23**
		Spirituality tool			
		Selection counts		Hover-display counts	
Daily Spiritual Experience Scale		.56**	-.50**	.47**	-.24**

Notes: *p<0.05, **p<0.01, ***p<0.001

The value of divergent validity for selection counts of EBA-AST with EBA-SPT is 0.82.

Criterion validity

We assessed criterion validity of the EBA-SPT and EBA-AST compared to standard questionnaires using the associations with cortisol levels and with the DOPEN Questionnaire Lie Score as criteria (Table 7.6). EBA-SPT had weak correlation with cortisol regarding joy. Both EBA had somewhat stronger significant correlations regarding the merged other emotions. These associations were stronger for change, i.e. level differences, than for state at either baseline or follow-up. In all cases, correlations were strongest for the HDC and level change approach regarding these merged other emotions, with most of these correlations being statistically significant. Moreover, for the HDC approach, correlations with social desirability scores were generally weaker and non-significant. More in detail for the EBA-SPT, associations with criteria were better for the NRS than for the GI subscale.

Spirituality and health: their associations and measurement problems

Results for the two standard questionnaires (DSES and BSI) were in reverse to those for the EBA HDC approaches, i.e. weak and non-significant for cortisol, and stronger and significant for social desirability. In summary, results regarding the two criteria were best for the HDC approach, and for the EBA-AST and the EBA-SPT NRS scale were better than for the two standard questionnaires.

Table 7.6 Results of Spearman's rank order correlation coefficients of scores of the EBA Actual Stress Tool and the EBA Spirituality Tool (SC^a and HDC^b), the Daily Spiritual Experience Scale (DSES) and the Brief Symptom Inventory (BSI-53) Global Severity Index, with cortisol levels and DOPEN Questionnaire Lie Score

			Cortisol ^a			Social desirability ^b
			Baseline	Follow-up	Level change ^c	
EBA Actual Stress Tool						
SC ^d	Joy		-.17	.18	.22	0.09*
	Other emotions merged		.21	-.12	-.21	-0.12*
HDC ^e	Joy		-.15	.10	.13	0.08
	Other emotions merged		.34*	-.31*	-.48**	-0.07
EBA Spirituality Tool						
SC	Joy		-.07	.31*	.26	0.12*
	Other emotions merged		.08	-.38*	-.37*	-0.16**
HDC	Joy		.02	.26	.18	0.15**
	Other emotions merged		.36*	-.41**	-.55**	-0.05
NRS subscale	Joy		-.20	.27	.34*	0.15**
	Other emotions merged		.23	-.27	-.38**	-0.15**
HDC	Joy		-.10	.18	.20	0.15**
	Other emotions merged		.40**	-.39**	-.60**	-0.08
GI subscale	Joy		.02	.22	.13	0.06
	Other emotions merged		-.04	-.28	-.19	-0.10
HDC	Joy		.05	.16	.06	0.11*
	Other emotions merged		.15	-.20	-.23	-0.03
DSES			-0.06	0.07	0.10	0.11*
BSI-53			0.21	0.08	-0.06	-0.18*

Notes: *p<0.05, **p<0.01, ***p<0.001

^aCortisol subsample; ^bThe whole sample; ^cFollow-up level – Baseline level; ^dSelection counts; ^eHover and display counts

7.4. Discussion

The aim of this article was to explore whether our new method, the Emotion Based Approach (EBA), based on a use of a display of photos of basic facial expressions, represents a reliable alternative to classical questionnaires with regards to assessment of attitudes. We found that the EBA tools have acceptable (EBA-AST) to good (EBA-SPT) internal consistency and that specific emotions of the tools differ in their test-retest reliability. An implicit EBA approach (HDC) yielded stronger correlations between the emotions as measured and a weaker congruent validity but a higher criterion validity, i.e. as hypothesized stronger correlations with cortisol change and weaker correlations with social desirability scores, than the explicit approach (SC) and standard questionnaires. The EBA thus seems to represent a better approach for measuring attitudes.

We found that the EBA tools had acceptable (EBA-AST) to good (EBA-SPT) internal consistency, but that separate emotions, i.e. response categories, varied in test-retest reliability, from good for joy to very weak for the neutral expression. Generally, research describes low values of reliability analyses for implicit attitude measures (Fazio & Olson, 2003). We can also suppose that the lower values of test-retest reliability for some emotions might reflect the real-life experience of participants, where negative emotions are rarely found as distinct feelings, but rather as their mixture (Harmon-Jones, Bastian, & Harmon-Jones, 2016). Therefore, when we consider the nature of the tool, the reliability of EBA-SPT is sufficient.

We further found that the implicit EBA approach (HDC) showed a weaker congruent validity (correlations with BSI-53 and DSES) but a higher criterion validity than the explicit approach (SC), except for joy. The standard questionnaires were practically not associated with cortisol levels but showed weak correlations with the Lie Score. An explanation could be that SC resembles standard instruments more than HDC and that these standard instruments are more susceptible to social desirability, more specifically to self-deception. Shedler et al. (1993) in their work on mental health (MH) measurement state that standard MH scales appear unable to distinguish between genuine MH and the facade or illusion of MH created by psychological defenses. Social desirability is involved in the interpretation of self-reported items (Holtgraves, 2017). If participants are not trained in recognizing emotions, both SC and HDC could leave space for respondents to interpret their choice in a socially desirable way, as was also shown in a part of our study. However, our results also suggest that social desirability can still be present if the emotion is easily recognizable (joy) or if participants are aware that their choice is being assessed (case of selection counts).

In our study, almost one-third of the participants failed to identify three basic emotions in the control set of questions. However, excluding these participants for the analyses did not improve any finding. The ability to label the emotion may thus not necessarily be associated with the non-conscious ability to read and express it. This idea is also supported by other authors (Gallese et al., 2007). We can therefore conclude that the inability to label the emotion correctly is not an objection to participate in this kind

of test, and perhaps, on the contrary, it might limit the response bias. However, further research is needed to show if this applies in general to people with seriously high emotional unawareness.

We also observed that the two EBA-SPT sets of items (i.e. NRS- and GI- items) differed in correlations with cortisol levels. Therefore, we can conclude that the theme and the wording of items seems to have an impact on the associations with other variables. This means that respondents do not simply project their actual mood into the test, but that they are able to tune to emotions related to different constructs. The question remains to what degree the actual mood interferes with the choices.

7.4.1. Strengths and limitations

This study has several important strengths. The most important is that it offers a new and easily administrable approach to measuring implicit attitudes. Second, it offers two concrete tools, the EBA Spirituality Tool for spirituality assessment and the EBA Actual Stress Tool for measuring the actual distress. Moreover, it gives instructions for creating other EBA tools, designed according to research purposes. Our study also presents two possible approaches, more explicit and implicit, of using EBA and compares the results of their use. Third, we present both congruent and criterion validity assessment of the new tools.

A limitation of our study is the relatively low number of respondents in the cortisol assessment study. A second limitation is that the whole survey was administered in home conditions, which means we could not control possible disturbing elements.

7.4.2. Implications

This study offers a new method, the EBA, which is suitable for use both in qualitative and quantitative research. We suggest that an assessment of the selection process (HDC) may represent a better way of measurement than the mere selection of a face, and so that an online tool is the most suitable way of administration. However, our results indicate that even the paper-pencil administration might lead to satisfactory results.

Future research should assess whether including a male face for male participants (or including a choice) makes a distinction concerning their choices and should also compare the results gained by paper-pencil administration with those of obtained as SC through the online tool. Furthermore, based on our results and the nature of specific emotions, the exclusion of a neutral face and/or surprised could be considered. It would also help to assess associations of the EBA scores with other physiological measures in controlled experimental conditions.

7.5. Conclusion

We found that that the more implicit approach, i.e. using the display of basic emotions instead of a classical verbal choice, represents a more reliable approach for measuring attitudes than standard questionnaires. Moreover, assessing also the selection process (HDC) seems to offer even better insight into participants' deeper feelings. Our EBA method therefore represents a useful approach that helps to lower the effects of social desirability.

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General discussion

The general aim of this thesis was to assess the relationships between R/S and different aspects of health using various pathways of the possible influence of R/S on health. Understanding these underlying mechanisms may improve our understanding of the concept of R/S and its meaning for health. A further aim was to explore possible sources of the discrepancies between the findings of various research studies in the area of R/S and health, with a special focus on measurement problems. This approach leads to a focus on measurement problems in the behavioural sciences in general. Finally, this thesis offers two tools for measuring spirituality, an adapted version of a classical spirituality scale and a new tool for measuring implicit attitudes in the area of R/S, which could also be adapted for measuring other attitudes.

This final chapter summarises (8.1) and discusses (8.2) the main findings of this study and discusses its strengths and limitations (8.3). Finally, it discusses implications for practice and future research (8.4).

8.5. Main findings

The main findings are summarized per research question.

Research question 1 (*Chapter 3*):

What are the psychometric properties of the shortened version of the Spiritual Well-Being Scale in Czech adolescents?

The Spiritual Well-Being Scale (SWBS) is one of the most extensively studied measures of subjective and spiritual well-being. We assessed the psychometric characteristics of a shortened 10-item version of the scale in Czech adolescents; we found that the three negatively formulated items of the scale created a separate factor and lowered Cronbach's alpha and the Mean Inter-Item Correlation values. After adjustment, i.e. the exclusion of these negatively-worded items of the scale, our study supports the original two-factorial model of the SWBS with satisfactory internal consistency.

Research question 2 (Chapter 4):

Does an association exist between spirituality and religious attendance (both separately and jointly) and leisure-time choices, specifically screen-based activities and organised leisure time activities, among adolescents in a highly secular environment?

We found that religious attendance and spirituality separately were associated with a lower prevalence of excessive television use. The same held for excessive playing of computer games, where in addition, religious attendance reinforced the protective effect of spirituality. Regarding excessive Internet use, respondents who were either only attending or only spiritual were more likely to use the Internet excessively. However, the combination of attending religious activities and being spiritual was protective with respect to excessive Internet use. We further found that attending respondents, as well as spiritual respondents, were more likely to be involved in at least one activity and tended to have a greater variety of organised leisure-time activities. Participants were also more likely to regularly read books and to play a musical instrument. Spirituality was also associated with higher chances of engaging in sufficient physical activity.

Research question 3 (Chapter 5):

Is there an association of spirituality and religious attendance with adolescent health-risk behaviour in a highly secular environment? Does spirituality modify the association of religious attendance, or does religious attendance mediate that of spirituality?

We found that religious attendance and spirituality were associated with a lower risk of weekly smoking and that spirituality was also associated with a lower risk of weekly drinking. The multiplicative interaction of religious attendance and spirituality was associated with less risky behaviour for four of the five explored health-risk behaviours. Religious attendance was not a significant mediator for the association of spirituality with health-risk behaviour.

Research question 4 (Chapter 6):

Is there an association of religiosity measured more specifically (i.e. as perceived closeness of God and as the stability of religious attitudes) with mental health (i.e. attachment insecurity and other mental health problems) in a secular environment?

We found that various approaches to assessing religiosity, i.e. a different categorisation of respondents based on other related concepts, led to different findings. Unstable non-religious respondents and converts who perceive God as distant were more likely to experience anxiety in close relationships. Furthermore, we found higher risks of worse mental health for unstable non-religious respondents, for converts who perceive God as distant and for stable religious respondents who perceive God as distant.

Research question 5 (Chapter 7):

Could a new method, Emotion Based Approach (EBA) represent a reliable alternative to classical questionnaires with regards to assessment of attitudes? What are the characteristics (structure, psychometric properties) of the two EBA tools that are presented (EBA Spirituality

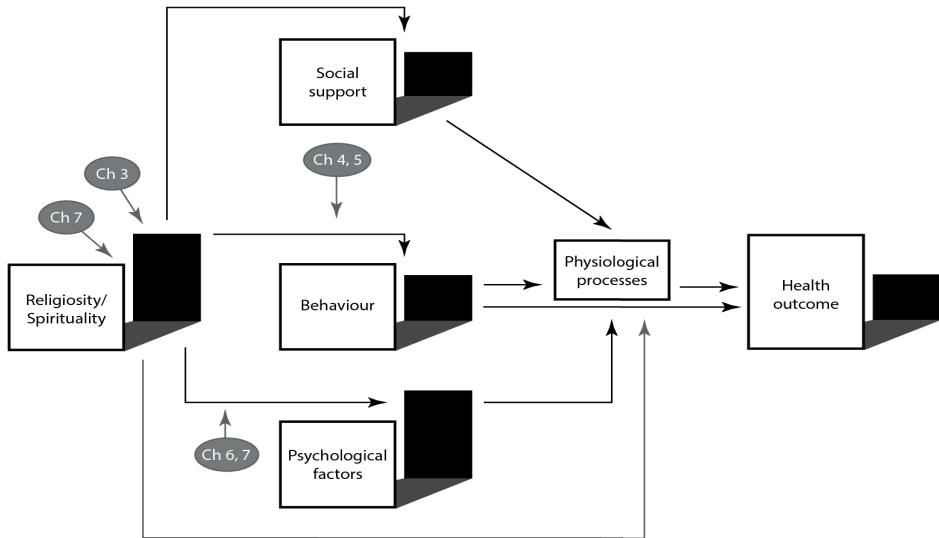
tool and EBA Actual Stress tool)? Do these vary for implicit (i.e., assessment with recording of the selection process) and explicit (i.e., assessment of only the final responses to items) EBA approaches?

We found that the EBA tools have an acceptable (EBA Actual Stress Tool) to good (EBA Spirituality Tool) internal consistency and an acceptable divergent validity and that concrete emotions that the tools use as response categories differ in their test-retest reliability from low reliability for neutral expression to good reliability for joy. The implicit EBA showed a stronger correlation between emotions and a weaker congruent validity, but a higher criterion validity, i.e. as hypothesized stronger correlations with cortisol change and weaker correlations with social desirability scores, than the explicit approach and standard questionnaires. Therefore, using a display of basic emotions represents a more reliable approach for measuring attitudes, with the implicit approach yielding the best results.

8.2. Discussion of the main findings

In this chapter, the main findings will be discussed in relation to the general aim of the thesis and specific partial aims, as outlined in Chapter 1. First, results will be categorised alongside the main pathways that are suggested to connect R/S with health, as proposed in Figure 8.1. In a second step, we will focus more specifically on potential reasons of deviating findings in associations of R/S with health. Therefore, this time results will be categorised alongside the potential sources of distortion of research findings in this area.

Figure 8.1 Research findings of this thesis in relation to a model of R/S and health



Note: Shadows indicate that due to measurement problems (especially social desirability bias) we do not observe the variables directly, but only use participants' self-reported view.

8.2.1. Religiosity and spirituality in relation to health outcomes

We explored pathways of R/S to health as shown in Figure 8.1, in particular the behavioural and psychological pathways, taking the third, social, pathway as a given.

8.2.1.1. Behavioural pathway

We found that both religiosity and spirituality were associated with more active adolescent leisure time choices. However, only the combination of religious attendance and spirituality was protective with respect to excessive Internet use and adolescent health-risk behaviours. Spirituality in the absence of religious attendance was in some cases associated with even more risky behaviour. Thus, our results support the findings of other authors, who associate R/S with healthier adolescent behaviour in general (Kub & Solari-Twadell, 2013). They contradict the assumptions of the authors who propose that this applies only to environments in which the religious conviction is supported by a social setting (Holmes & Kim-Spoon, 2016; Stark et al., 1982), as this is not the case of the Czech Republic.

Spirituality and health: their associations and measurement problems

Our findings therefore suggest that R/S might be associated with adolescent behaviour independently of the sociocultural environment or that other factors have a stronger influence than this environment.

Factors other than the sociocultural environment could thus explain the protective role of R/S on adolescent behaviour, as we observed. Holmes and Kim-Spoon (2016) propose a series of other factors, based on two theories. The first is the social control theory (Hirschi & Stark, 1969; Smith, 2003), which poses that religious children experience more adult monitoring of their behaviour due to interconnected relationships in religious communities. The second theory is the divine interaction theory (Ellison, 1991), which poses that a perceived relationship with the divine might at the same time serve as a perceived oversight of one's behaviour independent of other relationships. However, we can also consider the positive encouragement of healthier behaviour. E.g., a perceived relationship to God might not be experienced only as a source of control, as hypothesised in these two theories, but may also be experienced as a source of safety and support (Kirkpatrick, 1992). This could provide a positive motivation to lead a life according to religious moral standards, i.e., living them out of a motivation to be a good person (Donahue & Benson, 1995). Another positive motivation for a desirable behaviour may add to this, i.e. the adolescents' tendency to worship and follow idols (Lin & Lin, 2007). This could also be applied to religious leaders and religious figures (God, Jesus, saints, Allah, Buddha etc.). Our findings provide some support for all these explanations, as discussed below.

First, with respect to the social control theory, we found that some adolescent behaviours (e.g. excessive television and computer use, leisure-time choices) were associated with R/S even when these constructs were assessed separately, but the most for religiosity. Therefore, social control may play a stronger role in these behaviours, which is confirmed by research showing that religious parents of adolescents are more likely to directly monitor their behaviour than non-religious parents (Mahoney, 2010). Parental monitoring might be even stronger in behaviours that are more observable, such as use of a family television, and could therefore be more controlled.

Second, with respect to the divine interaction theory, for health-risk behaviour we observed that R/S had only limited impact when assessed separately and that it was mainly the combination of R/S that played a protective role. This supports the divine interaction theory (Ellison, 1991), as it may be interpreted that adolescents internalise the norms for desirable behaviour, feel "observed by God" and may act according to these norms even in situations lacking direct adult control. At the same time, we can also consider the positive encouragement of healthier behaviour, i.e. behaviour based on a positive relationship to God flowing from a secure attachment to God (Granqvist, Mikulincer, & Shaver, 2010). Nevertheless, our findings could also be explained in the light of adolescent idolization. Adolescents might be inspired to have a healthier lifestyle in line with the values and lives of their religious community leaders or other religious figures.

Third, with respect to positive adolescent motivation, we found that spirituality in the absence of religious attendance was in some cases associated with even more risky

behaviour. These findings imply that the merely “being spiritual without being religious” and vice versa might not be sufficient to protect against risk behaviours. This resonates with the findings of various authors, who point out that it is internalised religiosity in particular that plays a protective role in behaviours (Pule, Mashegoane, & Makhubela, 2018), which corresponds to the divine interaction theory (Ellison, 1991) but also to explanations linked to the attachment to God and adolescent idolization. However, forcing adolescents to attend church does not seem to lead to desirable outputs and might, on the contrary, promote some kind of rebellion against the rules and authorities, consequently manifesting itself in an even higher occurrence of risk behaviour.

Thus, our findings suggest that the association of adolescent R/S and their behaviour is unlikely to be explained by one single theory. More probably, we can expect that several theories could be applied at the same time, with some of them, however, better explaining certain types of behaviour.

8.2.1.2. Psychological pathway

We did not find a protective role of R/S on mental health, but we found that certain R/S experiences and attitudes (e.g. anger towards God, perceived distance of God, lack of meaning and positive feelings towards one’s own life) were associated with poorer mental health (Chapter 6) as well as unfavourable physiological responses (cortisol level; Chapter 7). This seems to contradict the findings of the majority of previous studies, which report a protective role of R/S in mental health (Koenig, 2012). However, authors who focused on negatively experienced R/S, i.e., so-called religious struggles or negative religious coping, have often reported negative associations with health as well (Exline, Yali, & Sanderson, 2000), similar to our studies. An explanation for these negative associations could be that the stress due to questioning the foundations of one’s faith directly involves one’s own well-being negatively. However, it may also reflect, given the cross-sectional nature of most studies, that people with certain psychological predispositions are more likely to experience these types of struggles (Ano & Pargament, 2013). This is in line also with our findings in Chapter 6 and with the findings of other authors (Pargament, 2009; Pirutinsky et al., 2011). These authors distinguish between primary spiritual struggles, i.e. a spiritual struggle leading to distress, and secondary spiritual struggles, i.e. distress leading to a spiritual struggle (e.g. questioning God’s love when facing a serious illness), and complex spiritual struggles containing both types. Therefore, it is important to assess these signs of negative religious coping in the context of overall mental health and to properly assess the various potential explanations. This probably requires more longitudinal research, too.

We further found that non-religious spirituality, i.e. a focus on the meaning of life and on one’s own attitude to life as well as to other people, had a strong correlation with cortisol level, i.e. with a marker of perceived stress (Chapter 7). This is in line with previous findings of a higher R/S being associated with a lower level of cortisol in both clinical (Ironson et al., 2002) and non-clinical (Anyfantakis et al., 2013; Tartaro et al., 2005) samples. A lower cortisol level could be a direct consequence of practicing spiritual exercises, as studies report

a decrease of cortisol level following e.g. 8 weeks of a short daily meditation practise (Basso et al., 2019). Thus, these findings may also support our fourth pathway, as shown in Figure 8.1., directly linking R/S with physiological processes. However, we do not have enough information to distinguish whether these changes are mediated by psychological processes, e.g. a better coping with stressful situations.

8.2.2. The potential sources of deviating findings in the associations of R/S with health

Three potential sources, i.e. the sociocultural environment, different types of R/S and measurement problems, might explain the discrepancies in research findings regarding the association of R/S with health.

8.2.2.1. Sociocultural environment

The potential impact of the sociocultural environment in research on R/S involves especially the prevalence of R/S in various countries, i.e. whether religion dominates a country. The Czech Republic is an example of a secular society with very low percentages of religious people. The first part of this subchapter will briefly summarise and discuss the situation in the country. In the second part, we will discuss our other findings, related to research on R/S in secular countries in general.

The prevalence of R/S and the dynamics of change of religious views in the Czech Republic

We found a low prevalence of R/S in both the adolescent and adult national representative samples, confirming previous research by the Pew Research Center (2014) reporting that 76.4% of the Czech population do not affiliate themselves with any organised religion. Among Czech adolescents, 7.1% of the respondents reported weekly religious attendance and 9.1% were spiritual, i.e. scored in the highest quartile of the spirituality scale. The prevalence of religiosity in the adult sample was slightly higher, as 9.5% respondents called themselves a believer, member of a church, and 20.1% called themselves a believer outside the church. These figures are similar to those found by Vane and Stipkova (2013), who reported slightly higher percentages of religious respondents. The differences might either reflect the different scoring options used in this study or the trend of a decreasing prevalence of religiosity in the country, which was also observed by other authors (Pew Research Center, 2017; Hamplova & Nespor, 2009).

However, we also found that of all adult respondents, 29.1% were unstable non-religious, i.e. were non-believers who reported that their attitude could change in case of need and distress. Of all respondents, 3.3% were converts, with most of them (70%) reporting that a difficult life situation contributed to their conversion. These findings suggest that a shift towards religiosity could be expected in a substantial portion of non-religious respondents in problematic times, which implies dynamics that differ from those in predominantly religious countries.

R/S research in the Czech Republic that might be applicable to other secular countries

The Czech Republic is a very secular country, similar to e.g. North Korea, Estonia, Japan, Hong Kong and China. Unfortunately, we do not have comparable data from these countries, but we can presume that some of our findings, discussed below, could be applied also to other countries with a low religious affiliation.

In the psychometric evaluation of the Spiritual Well-Being Scale (Chapter 3) we found that a statement involving one's relationship to God (implicitly assuming the existence of God) reinforced problems with measurement that were already present, i.e. the problems with negatively-worded questions. An explanation could be that in prevalently secular countries a certain fraction of respondents might hold such strong anti-religious attitudes that it even complicates for them the thoughtful responding to a questionnaire on R/S. If they are not comfortable with the whole concept of R/S, they might feel resistance towards responding on spirituality items and might try to answer quickly. Thus, they might more easily overlook e.g. the inverse direction of the wording of an item. This might be true even for religious countries, but with a lower prevalence of non-religious respondents, these problems might not be so visible.

The sociocultural environment in secular countries may also interfere with the associations of R/S and health. For example, in Chapter 6 we observed an association of R/S with worse mental health among some religious participants, as already discussed in 8.2.1. Regarding the role of the sociocultural environment, we can conclude that these findings confirm the reports of other studies which show a lower life-satisfaction of religious participants in secular countries (Hayward & Elliott, 2014). Explanations of these findings relate to the role of the sociocultural context (Diener et al., 2011; Lun & Bond, 2013; Okulicz-Kozaryn, 2010) and the role of government regulations (Hayward & Elliott, 2014). However, in addition to these, our results offer another potential explanation, i.e. that the dynamics in the Czech Republic, and possibly also in other countries with a low religious affiliation, might differ from those in a more religious environment. The relatively large share of participants who indicated that they would turn to religion in a difficult life situation implies that when analysed by cross-sectional studies, this potential shift in religious affiliation might not be recognised. This might then potentially contribute to finding negative associations of R/S with health. Therefore, among participants in secular countries we could expect a different ratio of primary to secondary spiritual struggles, with a higher prevalence of secondary spiritual struggles resulting from a difficult life situation than in more religious countries. This could then affect the association of R/S with mental health in such countries.

8.2.2.2. Different types of religiosity/spirituality

A second cause for our discrepant findings regarding the associations of R/S and health might regard the kind of R/S that participants are living and practicing, i.e. not only their belonging to a specific religion, but also the way they live within a framework of a specific religion or spirituality. This includes differences in cognitive, emotional and behavioural dimensions of

Spirituality and health: their associations and measurement problems

living R/S. Consequently, participants may differ in the level of internalization of R/S values (Ryan et al., 1993), in the type of R/S they are living with regards to consequences for their life, i.e., “healthy or unhealthy R/S” (Vaughan, 1991), their image of God (Jackson et al., 2018) and in the type of religious coping they use (Pargament et al., 1998). In Chapters 4, 7 and especially 6, we found that the group of religious respondents was quite heterogeneous and that the subgroups differed not only regarding their R/S attitudes, but also regarding their health behaviour and health. Therefore, the question might not be “Is R/S related to a better health?”, but “What type of R/S might be related to a better health and what type to a worse health?”. Items assessing the type of spirituality or spiritual coping should therefore be included in R/S analyses as potential confounders.

8.2.2.3. *Measurement problems*

A third factor that could contribute to the discrepant research findings on the associations of R/S and health regards problems in the measurement of R/S. One source of problems might concern the negatively-worded items, as described in Chapter 3. This applies to a broader research area than only R/S. However, we also found that different approaches to assess R/S yield findings which can be interpreted differently. More specifically, the research findings in Chapters 3-6 mostly reflect problems due to different definitions and understanding of R/S. These types of problems are summarised in a review of Koenig (2008) and in other publications (Hill & Pargament, 2003) showing that a different understanding of these concepts could indeed lead to contradictory findings. Burris, Sauer, and Carlson (2011), for example, reported religiosity to be associated with less adolescent alcohol use, while spirituality with more. Consequently, these authors argue that both R and S are associated with the search for the sacred, but that people might use different means to achieve this, and in the absence of religious commitment they could actually even use alcohol, tobacco, hallucinogens or sexual intercourse as means to discover meaning, purpose and connectedness with the self, others or the transcendent (Burris et al., 2011).

However, the findings reported in Chapter 7 suggest that a more implicit approach could be a better measure of hidden attitudes. This may be interpreted as pointing to the weaknesses of self-reported verbal measures in general, especially regarding social desirability bias. This seems to influence the measurement of R/S, as suggested also by Gittelman et al. (2015). Therefore, a more implicit approach in measuring R/S could improve the validity of measurement of these constructs and could also help distinguish different types of spirituality (the way R/S is lived and experienced), as mentioned above. We will address this issue further in the next paragraph.

8.2.3. **Addressing social desirability bias**

In Chapter 7 we assessed a new method for measuring implicit attitudes, the Emotion Based Approach (EBA). We found that compared to standard questionnaires, using a display of basic emotions yields higher correlations with cortisol levels, i.e. the validity criterion.

Moreover, assessment of the selection process, and not only of the final response choice, i.e. the implicit approach, seemed to lead to even better results, also in the associations with a second validity criterion, the DOPEN Questionnaire Lie Score. Thus, it seems that more implicit approaches might get closer to participants' real experiences and are not as loaded with social desirability bias. Using a display of faces with basic emotions may touch both dimensions of the social desirability bias, i.e. self-deception and impression management. Self-deception seems to be addressed by a non-verbal method assessment of responses, which also allows deeper feelings to be assessed, i.e. feelings beyond the cognitive reach of the respondent. Impression management seems to be addressed by use of an anonymous online survey and by monitoring the selection process to sort out cases in which the participants would even deliberately want to give incorrect answers (e.g. finally choosing joy as a response option even when they feel otherwise). Therefore, using this kind of implicit approach might be a promising way to assess attitudes regarding more personal topics.

8.3. Strengths and limitations

8.3.1. Quality of the sample

A big strength of this thesis is its use of large representative samples of both adolescents and adults. Adolescent data include the HBSC study, which is a cross-sectional WHO collaborative study that focuses on health and health-related behaviour in 11-, 13-, and 15-year-old children (Roberts et al., 2009) in 48 countries all-over the world. This means that our data are comparable to those of other countries. In addition, we analysed data from a unique national representative sample of the Czech adult population with nearly no missing values. This means that this data can also be generalised to the Czech population. Altogether, these data represent a contribution to our knowledge of R/S dynamics in a non-religious environment, as the Czech Republic is a typical example of a secular society

A limitation of our data is the overall low prevalence of R/S respondents in the Czech representative samples, which decreased the power of our studies, in particular regarding moderation. A second limitation is that the online sample used in Chapter 7 was smaller and not representative. However, the sample size and quality were more than sufficient for the analyses that we performed.

8.3.2. Quality of information

This thesis has several important strengths regarding the quality of the information it brings. First, we mostly used validated, internationally recognised instruments that have already been applied in various settings. This holds both for adolescent and adult samples. Second, it offers two tools for measuring R/S, an adapted version of a classical spirituality scale and a new tool for measuring implicit attitudes in the area of R/S. Third, it evaluates data which

Spirituality and health: their associations and measurement problems

are based not only on self-reported measures of respondents, but also on cortisol levels, i.e. a more objective measure of a perceived stress, and it includes a scale for controlling social desirability bias. Fourth, by providing a new approach which could be adapted to other research questions, this study helps to address social desirability bias in quantitative measurement.

A limitation of this study is the missing values in the data on R/S in the HBSC survey, which we partly dealt with through multiple imputation and exclusion of some respondents. Another limitation in Chapters 4-6 might be information bias, as the data was based on the self-reports of respondents, which can be influenced by social desirability. This concerns especially the area of R/S (Sedikides & Gebauer, 2010) and psychological health (Shedler et al., 1993). However, all studies that use classical surveys in this area have this problem, so our data are comparable with the others. Moreover, we did not simply assess one dimension of R/S but used a combination of different R/S variables. Therefore, assessment of more dimensions increased the validity of the measurement. Furthermore, the study has two potential limitations, as reported in Chapter 7. First, we could not assess the full DOPEN Questionnaire Lie Score, but only 13 of its 14 items. A second limitation is that the online survey was administered in home conditions, which means we could not control possible disruptive elements. This reflects routine practice in most research, however.

8.3.3. Causality and confounding

A limitation of this thesis is the cross-sectional design of the studies. This type of studies analyses data obtained at a specific point in time; therefore, it does not allow us to make more decisive conclusions on causality. Our findings should preferably be confirmed by studies with a longitudinal or experimental design.

8.4. Implications

8.4.1. Implications for practice and policy

Our findings have several implications for practice and policy. First, we found that religious attendance and spirituality were associated with more active leisure-time choices and lower health-risk behaviour. This may imply that supporting healthy spiritual development of adolescents lowers the risk of undesirable behaviours. This could be done through family and school education as well as through different activities in leisure-times centres. Suitable activities might help to facilitate the process of finding one's own identity and to support the sense of responsibility for one's own life.

Our findings also showed that religious attendance without strong spirituality may not be protective or can even increase the likelihood of health-risk behaviour. Parents as well as churches could therefore be better informed of adolescent psychological development and possible negative consequences of pressure on adolescents in the area of R/S. At the

same time, supporting the internalisation of the spiritual values might represent the most effective strategy.

We further found that respondents who showed signs of religious and spiritual struggles and negative religious coping were at higher risk of also having mental health problems. These findings highlight the need for cooperation between pastoral carers and professionals in the area of mental health. All these workers should be aware of the two-fold nature of the issues; they should be adequately trained to recognise the warning signs, and if possible should develop professionally established cooperation.

Our findings of the associations of cortisol level with R/S imply that supporting healthy R/S and possibly concrete R/S practises (e.g. meditation) may help to manage stress. Where adequate, it could therefore provide another strategy to improve the health of clinical patients and to maintain the health of people who are living in stressful conditions.

8.4.2. Implications for future research

This study may also have several implications for future research. The first implication concerns difficulties in the use of spirituality scales in a secular environment, where special attention should be paid to negatively worded religious items. Based our results, we suggest that, if possible, the use of these items should be avoided. If they are used, an additional response option “does not apply to me”, should be considered on top of the current response options of the scale.

We found a heterogeneity within groups of religious respondents, with various categorisations leading to different findings. This implies that R/S respondents can differ in various aspects of R/S, such as the degree of the internalisation of their values, type of religious coping they use, their image of God, stability of their religious attitudes and other aspects. Thus, research on R/S should take into account these aspects. Moreover, it should include both religiosity and spirituality and consider their possible interaction. Findings on R/S with the use of just a single item, typically a question on one’s affiliation to a church, frequency of religious attendance or the importance of faith, should be interpreted with much caution, as this covers only one of multiple R/S dimensions.

Furthermore, we found that a high percentage of Czech non-religious respondents might turn to religion in difficult life situations. This shows that research in secular countries should take into account this potential shift to prevent confounded findings.

Finally, we found that that a more implicit approach measurement could yield a more valid assessment of attitudes than classic questionnaires. Future research could therefore focus on the further development and validation of these approaches. More concretely, other tools based on the Emotion Based Approach principle could be developed and tested with use of a wider range of potential biomarkers.

8.5. Conclusion

This study focused on the associations of R/S with health, on the role of various pathways and on explanations for some discrepant findings. R/S was associated with healthier behaviour; however, for some behaviours only the combination of both R and S was protective. Moreover, certain negative R/S experiences and attitudes were associated with a more adverse effect on mental health. We also learnt that the sociocultural context, type of R/S and especially measurement problems could contribute to the heterogeneity of findings on the associations of R/S with health.

Thus, this thesis supports the findings of other authors on the pathways of associations of R/S with health and offers additional insights into these mechanisms. It also offers some methodological considerations for research on R/S. It shows that R/S is a complex research topic requiring proper assessment i.e. not using only a single-item. Research on R/S should take into account more internal dimensions of R/S as well as potential confounding variables (sociocultural context, type of R/S, social desirability bias).

Finally, this thesis offers two tools for a better measurement of spirituality. The first one is an adapted version of a classical spirituality scale and the second is a new approach for measuring implicit attitudes in the area of R/S. Using this approach could help to decrease the effect of social desirability bias in survey studies on attitudes.

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Summary

Religiosity and spirituality (R/S) are connected with many areas of human life, including health. A majority of studies report positive associations of R/S with physical and mental health, suggesting three main pathways of the influence of R/S on health. These include behavioural, psychological and social pathways. However, a minority of studies has reported mixed or negative associations of R/S with health, which highlights the need for a better understanding of the underlying mechanisms. Possible explanations of the heterogeneous findings could be sociocultural differences, the type of spirituality that is being analysed and measurement problems. Therefore, the aim of this thesis was to assess the associations of R/S with different areas of health, focusing on various pathways to health as well as on sources for discrepant findings including approaches to the measurement of R/S.

Chapter 1 gives the theoretical background of the issues of R/S and health. It focuses on religiosity and spirituality, their prevalence in the Czech Republic compared to other countries, their definitions and measurement, the pathways from these concepts to health, and finally their associations with health. Furthermore, it describes some potential reasons for the discrepancies in research findings in this area, with special attention to measurement problematics. These are not only restricted to the area of R/S, but also valid for behavioural sciences in a more general sense.

Chapter 2 describes the three samples used in this study: two national representative samples (an adolescent and an adult one) and one online adult sample. Furthermore, it provides an overview of the variables used in this study and the statistical analyses used.

Chapter 3 describes the results of a psychometric evaluation of a shortened 10-item version of the Spiritual Well-Being Scale (SWBS), one of the most extensively studied measures of subjective and spiritual well-being. When assessing the SWBS in a Czech national representative sample, we found that the three negatively formulated items of the scale created a separate factor and lowered Cronbach's alpha and Mean Inter-Item Correlation values. After adjustment, i.e. the exclusion of these negatively-worded items of the scale, the results supported the original two-factorial model of the SWBS with satisfactory internal consistency.

Chapter 4 assesses the associations of R/S with adolescent leisure-time choices. We found that religious attendance and spirituality separately were associated with a lower prevalence of excessive television use and also with excessive playing of computer games, where in addition, religious attendance reinforced the protective effect of spirituality. Respondents who were either only attending or only spiritual were more likely to use the Internet excessively than respondents being neither. However, the combination of attending religious activities and being spiritual was protective with respect to excessive Internet use.

We further found that attending respondents, as well as spiritual respondents, were more likely to be involved in at least one activity and tended to have a greater variety of organised leisure-time activities. These respondents were also more likely to regularly read books and to play a musical instrument. Spirituality was also associated with a higher chance of having sufficient physical activity.

Chapter 5 focuses on the associations of R/S with adolescent health-risk behaviour. We found that religious attendance and spirituality were associated with a lower risk of weekly smoking and spirituality also with a lower risk of weekly drinking. The interaction of religious attendance and spirituality was associated with a lower risk of weekly smoking, weekly drinking and cannabis and drug use. However, religious attendance did not mediate the association of spirituality with health-risk behaviour. Moreover, spirituality in the absence of religious attendance was in some cases associated with even more risky behaviour.

Chapter 6 describes the associations of R/S with mental health. We found that in the secular environment of the Czech Republic, a shift towards religion could be expected in a solid portion of non-religious respondents in difficult times. Therefore, it is possible that the stability of religious attitudes in secular countries might have a different dynamics than in more religious countries. Moreover, we found that various approaches to assessing religiosity, i.e. the different categorisation of respondents based on other, but related, concepts, led to different results. Generally, unstable non-religious respondents and converts who perceive God as distant were more likely to experience anxiety in close relationships. Furthermore, we found higher risks of worse mental health for unstable non-religious respondents, for converts who perceive God as distant and for stable religious respondents who perceive God as distant.

Chapter 7 addresses measurement problems associated with social desirability through offering a new and easily administrable way of measuring implicit attitudes, the Emotion Based Approach (EBA). This approach uses the choice of a concrete emotion from a display of basic facial expressions instead of a classical verbal response, and on the top of a final choice (an explicit EBA approach) it can assess also the selection process (an implicit EBA approach). We assessed two tools, the Spirituality EBA tool for spirituality assessment and the Actual Stress EBA tool for measuring the actual distress. We found an acceptable (EBA Actual Stress Tool) to good (EBA Spirituality Tool) internal consistency reliability of the tools and an acceptable divergent validity. However, we found differences between the two approaches in the test-retest reliability regarding concrete emotions. An implicit EBA approach showed weaker correlations with standard questionnaires and a higher criterion validity, i.e. more of the hypothesized correlations with cortisol level and with the DOPEN Questionnaire Lie Score (a measure of the social desirability bias), than an explicit approach and standard questionnaires. Our EBA method therefore represents an approach that can help to solve measurement problems caused by social desirability.

Chapter 8 summarises and discusses the main findings of the previous chapters. When relating our findings to the main pathways that are suggested to connect R/S with health, we found that R/S was associated with healthier behaviour; however, for some

Spirituality and health: their associations and measurement problems

behaviours only the combination of both R and S was protective. We also found that certain negative R/S experiences and attitudes were associated with a more adverse effect on mental health. Regarding potential reasons for the heterogeneity of findings on the associations of R/S with health, we confirmed that the sociocultural context, the type of R/S, and especially the measurement problems can contribute to discrepancies as described in the literature.

These findings on the associations of R/S and health imply that the development of healthy spirituality that is integrated into one's life could support a healthy lifestyle and thus better general health. Moreover, workers in the field of R/S and mental health professionals should be trained regarding these areas and their overlap, so that they can offer professional support to those in need. In future research the potential sources of distortion, i.e. measurement problems, sociocultural context and the type of R/S, should be adequately controlled by taking them into account in the analyses. Finally, we suggest that social desirability bias deserves more attention in research in the area of R/S as well as in the whole area of behavioural sciences. This could be done e.g. by using a display of basic emotions instead of classical verbal questions.

Thus, this thesis supports the findings of other authors on the mechanisms leading to associations of R/S with health and offers additional insights into these mechanisms. Further it provides methods for further research on R/S.

Samenvatting

Religiositeit en spiritualiteit (R / S) raken aan vele gebieden van het menselijk leven, inclusief gezondheid. In de meeste studies worden positieve verbanden van R / S met fysieke en mentale gezondheid gerapporteerd, wat wijst op drie belangrijke routes van de invloed van R / S op de gezondheid. Deze betreffen gedragsmatige, psychologische en sociale routes. Een minderheid van de studies rapporteert echter gemengde of negatieve verbanden van R / S met gezondheid, wat laat zien dat we de onderliggende mechanismen beter moeten begrijpen. Mogelijke verklaringen voor de heterogene bevindingen kunnen sociaal-culturele verschillen zijn, het type spiritualiteit dat wordt geanalyseerd en meetproblemen. Daarom was het doel van dit proefschrift om de verbanden na te gaan van R / S met verschillende gezondheidsdomeinen, met nadruk op verschillende routes naar gezondheid en op oorzaken van discrepante bevindingen, waaronder ook verschillen in benadering wat betreft het meten van R / S.

In Hoofdstuk 1 wordt de theoretische achtergrond besproken van de vraagstukken rond R / S en gezondheid. Het hoofdstuk richt zich op religiositeit en spiritualiteit, hun prevalentie in de Tsjechische Republiek in vergelijking met andere landen, hun definities en wijze van meting, de routes van deze concepten naar gezondheid, en tenslotte hun verband met gezondheid. Verder worden in dit hoofdstuk enkele mogelijke redenen beschreven voor de verschillen in onderzoeksresultaten op dit gebied, met speciale aandacht voor meetproblemen. Deze zijn niet alleen beperkt tot het gebied van de R / S, maar betreffen ook de gedragswetenschappen in een meer algemene zin.

In Hoofdstuk 2 worden de drie steekproeven die in dit onderzoek zijn gebruikt beschreven: twee nationale representatieve steekproeven (één onder adolescenten en één onder volwassenen) en een online studie onder volwassenen. Voorts biedt het hoofdstuk een overzicht van de variabelen die in dit onderzoek zijn gemeten en de statistische analyse methoden die zijn gebruikt.

In Hoofdstuk 3 worden de resultaten van een psychometrische evaluatie van een verkorte 10-item-versie van de Spiritual Well-Being Scale (SWBS) beschreven, een van de meest uitgebreid bestudeerde maten voor subjectief en spiritueel welzijn. Bij de beoordeling van de SWBS in een Tsjechisch nationaal representatieve steekproef, ontdekten we dat de drie negatief geformuleerde items van de schaal een afzonderlijke factor creëerden en de waarden van de Cronbach's alfa en Mean Inter-Item Correlation verlaagden. Na correctie, d.w.z. na uitsluiting van deze negatief geformuleerde items van de schaal, ondersteunden de resultaten het oorspronkelijke twee-factoren model van de SWBS met voldoende interne consistentie.

Hoofdstuk 4 gaat over de verbanden tussen R / S en vrije tijdkeuze voor adolescenten. We vonden dat kerkgang en spiritualiteit afzonderlijk samenhangen met minder overmatig televisie kijken en ook met minder excessief gamen, waarbij bovendien kerkgang het beschermende effect van spiritualiteit versterkte. Respondenten die alleen naar de kerk gingen of alleen spiritueel waren, maakten vaker excessief gebruik van internet dan respondenten waarbij geen van beide het geval was. De combinatie van kerkgang en spiritueel zijn was echter beschermend wat betreft overmatig internetgebruik. We vonden verder dat zowel respondenten die naar de kerk gingen als spirituele respondenten eerder betrokken waren bij tenminste één georganiseerde vrijetijdsactiviteit en vaker een grotere verscheidenheid aan georganiseerde vrijetijdsactiviteiten hadden. Deze respondenten lazen ook vaker regelmatig boeken en bespeelden vaker een muziekinstrument. Spiritualiteit hing ook samen met een hogere kans op voldoende lichaamsbeweging.

Hoofdstuk 5 richt zich op de verbanden tussen R / S en het gezondheidsrisicogedrag van adolescenten. We vonden dat kerkgang en spiritualiteit gepaard gingen met een lager risico op wekelijks roken en daarnaast spiritualiteit alleen ook met een lager risico op wekelijks drinken. De interactie van kerkgang en spiritualiteit hing samen met een lager risico op wekelijks roken, wekelijks drinken, en cannabis en drugsgebruik. Kerkgang medieerde echter niet het verband tussen spiritualiteit en gezondheidsrisicogedrag. Bovendien hing spiritualiteit in afwezigheid van kerkgang in sommige gevallen samen met nog meer risicovol gedrag.

In Hoofdstuk 6 worden de verbanden van R / S met geestelijke gezondheid beschreven. We vonden dat in de seculiere omgeving van de Tsjechische Republiek een verschuiving naar religie te verwachten valt in moeilijke tijden bij een deel van de niet-religieuze respondenten. Daarom is het mogelijk dat de stabiliteit van religieuze attitudes in seculiere landen een andere dynamiek heeft dan in meer religieuze landen. Bovendien vonden we dat verschillende benaderingen voor het beoordelen van religiositeit, d.w.z. verschillende categorisering van respondenten op basis van andere, wel gerelateerde, concepten, tot verschillende resultaten leidden. Over het algemeen hebben onstabiele niet-religieuze respondenten en bekeerlingen die God als veraf zien, meer kans om angst te ervaren in hechte relaties. Bovendien vonden we een hoger risico voor een slechtere psychische gezondheid bij onstabiel niet-religieuze respondenten, voor bekeerlingen die God als veraf ervoeren en voor stabiele religieuze respondenten die God als veraf ervoeren.

In Hoofdstuk 7 wordt ingegaan op problemen bij het meten van attitudes vanwege sociale wenselijkheid door een nieuwe en gemakkelijke manier aan te bieden voor het meten van impliciete attitudes, de Emotion Based Approach (EBA). Deze benadering maakt gebruik van de keuze voor een concrete emotie uit een weergave van elementaire gezichtsuitdrukkingen in plaats van een klassieke verbale respons, en kan naast de uiteindelijke keuze (de expliciete EBA-benadering) ook het selectieproces beoordelen (de impliciete EBA-benadering). We hebben twee tools beoordeeld, de EBA-tool voor spiritualiteit en de EBA-tool Actual Stress voor het meten van de werkelijke stress. We vonden een acceptabele (EBA Actual Stress Tool) tot goede (EBA Spirituality Tool) interne

consistentie van de tools en een acceptabele divergente validiteit. We vonden echter verschillen tussen de twee benaderingen qua test-hertest betrouwbaarheid wat betreft concrete emoties. Een impliciete EBA-benadering liet zwakkere correlaties zien met standaardvragenlijsten en een hogere criteriumvaliditeit, d.w.z. bevestiging van meer van de veronderstelde correlaties met cortisolniveau en met de DOPEN-vragenlijst leugenscore (een maatstaf voor de voorkeur voor sociale wenselijkheid), dan een expliciete benadering en standaardvragenlijsten. Onze EBA-methode leert daarmee een aanpak die kan helpen bij het oplossen van meetproblemen vanwege sociale wenselijkheid.

In Hoofdstuk 8 worden de belangrijkste bevindingen van de vorige hoofdstukken samengevat en besproken. Relateren van onze bevindingen aan de belangrijkste voorgestelde routes tussen R / S en gezondheid, laat zien dat R / S geassocieerd was met gezonder gedrag. Echter, voor sommige gedragingen was alleen de combinatie van R met S beschermend. We vonden ook dat bepaalde negatieve R / S-ervaringen en -attitudes verband hielden met een meer nadelig effect op de geestelijke gezondheid. Wat betreft mogelijke redenen voor de heterogeniteit van de bevindingen over de verbanden van R / S met gezondheid, vonden we dat de socioculturele context, het type R / S en vooral meetproblemen kunnen bijdragen aan de discrepanties die in de literatuur worden beschreven.

Deze bevindingen wat betreft de verbanden van R / S en gezondheid impliceren dat de ontwikkeling van een gezonde spiritualiteit die is geïntegreerd in iemands leven een gezonde levensstijl en dus een betere algemene gezondheid zou kunnen ondersteunen. Bovendien moeten werkers op het terrein van R / S en professionals in de geestelijke gezondheidszorg worden geschoold wat dit betreft, zodat zij professionele hulp kunnen bieden aan mensen in nood. In toekomstig onderzoek moeten de potentiële bronnen van verstoring, d.w.z. meetproblemen, sociaal-culturele context en het type R / S, adequaat worden gecontroleerd door ze in analyses mee te nemen. Ten slotte moet sociale wenselijkheid meer aandacht krijgen in het onderzoek op het gebied van R / S en in het de gehele gedragswetenschappen. Dit zou kunnen door een representatie van basisemoties te gebruiken in plaats van de klassieke schriftelijke vragen.

Dit proefschrift ondersteunt de bevindingen van andere auteurs over de mechanismen die leiden tot een samenhang van R / S en gezondheid en biedt aanvullend inzicht in deze mechanismen. Verder biedt het methoden voor verder onderzoek naar R / S.

Souhrn

Religiozita i spiritualita (R/S) jsou spojeny s mnoha oblastmi lidského života, včetně zdraví. Většina studií uvádí pozitivní vztah mezi R/S a fyzickým i mentálním zdravím a navrhuje tři hlavní dráhy, kterými by R/S mohla zdraví ovlivňovat. Ty zahrnují dráhu behaviorální, psychologickou a sociální. Menšina studií nicméně nalezla mezi R/S a zdravím smíšené či negativní vztahy, což zdůrazňuje potřebu lepšího porozumění hlubších mechanismů, které se v této oblasti uplatňují. Mezi možná vysvětlení různorodých zjištění může patřit sociokulturní kontext, druh studované spirituality a problémy s měřením. Cílem této práce je proto zkoumat vztahy mezi R/S a různými oblastmi zdraví, se zaměřením na jednotlivé dráhy, a na možné zdroje různorodosti výsledků v této oblasti, včetně přístupů k měření R/S.

Kapitola 1 poskytuje teoretické zázemí k otázkám R/S a zdraví. Zaměřuje se na religiozitu a spiritualitu, jejich prevalenci v České republice v porovnání s ostatními zeměmi, jejich definici a měření, dráhy, skrze které R/S ovlivňují zdraví, a nakonec na vztah mezi R/S a zdravím. Dále popisuje některé z možných důvodů nejednotnosti výzkumných výsledků v této oblasti. Speciálně se přitom zaměřuje na problematiku měření. Tyto důvody se neomezují jen na oblast R/S, ale jsou platné i pro behaviorální vědy v obecnějším smyslu.

Kapitola 2 popisuje 3 vzorky použité v této studii: dva národní reprezentativní vzorky (adolescenti a dospělá populace) a online vzorek dospělé populace. Dále poskytuje přehled proměnných, které byly použity v této práci, a využití statistické metody.

Kapitola 3 popisuje výsledky psychometrické analýzy zkrácené desetipoložkové verze Škály spirituální pohody (SWBS), jednoho z nejpoužívanějších nástrojů pro měření subjektivní a spirituální pohody. Při zkoumání vlastností SWBS na českém reprezentativním vzorku jsme zjistili, že tři negativně formulované položky škály vytvářely samostatný faktor a snižovaly hodnoty Cronbachovy aplfy a průměrných korelací mezi položkami. Po úpravě, tj. odstranění těchto tří negativně formulovaných položek škály, podporují výsledky s uspokojivou vnitřní konzistencí původní dvoufaktorový model SWBS.

Kapitola 4 zkoumá vztah mezi R/S a způsoby trávení volného času adolescentů. Zjistili jsme, že návštěva bohoslužeb i spiritualita byly spojeny s nižší prevalencí nadměrného sledování televize a nadměrného hraní počítačových her, kde navíc návštěva bohoslužeb posilovala protektivní účinek spirituality. Respondenti, kteří pouze navštěvovali bohoslužby anebo byli pouze spirituální, s větší pravděpodobností nadměrně užívali internet, kombinace návštěv bohoslužeb a spirituality však byla v tomto případě protektivní. Dále jsme zjistili, že účastníci, kteří navštěvovali bohoslužby, i spirituální účastníci byli s větší pravděpodobností zapojeni v nejméně jedné volnočasové aktivitě a měli sklon k větší variabilitě organizovaných volnočasových aktivit. U těchto respondentů byly také vyšší šance, že budou pravidelně číst knížky a hrát na hudební nástroj. Spiritualita byla také spojena s větší tendencí k pravidelné fyzické aktivitě.

Kapitola 5 se zaměřuje na vztah mezi R/S a rizikovým chováním adolescentů. Zjistili jsme, že návštěva bohoslužeb a spiritualita byly spojeny s nižším rizikem týdenního kouření

a spiritualita také nižším rizikem týdenní konzumace alkoholu. Interakce návštěvy bohoslužeb a spirituality byla spojena s nižším rizikem týdenního kouření a týdenního užívání alkoholu a nižším rizikem užívání marihuany a drog. Návštěva bohoslužeb nicméně nebyla mediátorem vztahu mezi spiritualitou a rizikovým chováním. Pokud respondenti nenavštěvovali bohoslužby, byla spiritualita v některých případech dokonce spojena s rizikovějším chováním.

Kapitola 6 popisuje vztahy mezi R/S a mentálním zdravím. Zjistili jsme, že v sekulárním prostředí České republiky lze v těžkých obdobích očekávat u velké proporce českých respondentů obrát k náboženství. Je proto možné, že stabilita religiózních postojů v České republice může mít odlišnou dynamiku než ve více religiózních zemích. Dále jsme zjistili, že různé přístupy ke zkoumání religiozity, tj. různá kategorizace respondentů založená na příbuzných, ale přesto odlišných konceptech, vedla k odlišným výsledkům. Nestabilně nereligiózní respondenti a konvertité, kteří vnímali Boha jako vzdáleného, měli větší riziko prožívání úzkosti v blízkých vztazích. Navíc jsme našli vyšší riziko horšího mentálního zdraví u nestabilně nereligiózních respondentů, konvertitů, kteří vnímali Boha jako vzdáleného, a také u stabilně religiózních respondentů, kteří vnímali Boha jako vzdáleného.

Kapitola 7 adresuje problémy spojené se sociální žádoucností skrze nabídku nového snadno administrovatelného způsobu měření implicitních postojů, Přístupu zaměřeného na emoce (Emotion Based Approach, EBA). Tento přístup využívá namísto klasické slovní odpovědi výběru konkrétní emoce ze zobrazených základních výrazů tváře. Kromě výsledné volby (explicitní EBA přístup) může zkoumat také proces výběru (implicitní EBA přístup). Zkoumali jsme dva nástroje, EBA–Spiritualita nástroj pro měření spirituality a EBA–Aktuální stres nástroj pro měření aktuálního distresu. Nalezli jsme přijatelné (EBA–Aktuální stress) až dobré (EBA–Spiritualita) hodnoty reliability (vnitřní konzistence) těchto nástrojů a přijatelnou hodnotu divergentní validitu, ale rozdíl mezi dvěma přístupy v test-retest reliabilitě u konkrétních emocí. Implicitní EBA přístup vykazoval slabší korelace se standardními dotazníky a vyšší kriteriální validitu, tj. silnější předpokládané korelace s hladinou kortizolu i se Lži skóre dotazníku DOPEN (ukazatel sociální žádoucnosti) než explicitní přístup a standardní dotazníky. Naše EBA metoda tedy reprezentuje přístup, který může pomoci řešit problémy s měřením způsobené sociální žádoucností.

Kapitola 8 shrnuje a diskutuje hlavní zjištění předchozích kapitol. Po propojení našich výsledků s hlavními navrženými drahami, které by mohly spojovat R/S se zdravím, jsme zjistili, že R/S byla spojena se zdravějším chováním. Pro některé druhy chování byla nicméně protektivní pouze kombinace R a S. Zjistili jsme také, že některé negativní R/S zkušenosti a postoje byly spojeny s horším dopadem na mentální zdraví. V oblasti potenciálních zdrojů různorodosti výsledků ve vztahu R/S a zdraví jsme potvrdili, že k rozporům popsáním v literatuře může přispívat sociokulturní prostředí, typ R/S a zejména problémy s měřením.

Tato zjištění o vztahu R/S a zdraví naznačují, že rozvoj zdravé spirituality, která je integrována do života, může podpořit zdravější životní styl a tak i lepší celkové zdraví. Pracovníci v oblasti R/S a profesionálové v oblasti mentálního zdraví by měli být náležitě proškoleni o obou těchto oblastech i jejich překryvu, aby mohli lidem v nouzi nabídnout profesionální pomoc. V dalším výzkumu by měly být adekvátně kontrolovány potenciální

Spirituality and health: their associations and measurement problems

zdroje zkreslení, tj. problémy s měřením, sociokulturní kontext a typ R/S. Ty by měly být při analýzách brány v úvahu. Závěrem navrhuje, že sociální žádoucnost si zasluhuje více pozornosti ve výzkumu v oblasti R/S, ale i celé oblasti behaviorálních věd. Toho může být dosaženo např. použitím zobrazení základních emocí namísto klasických slovních odpovědí.

Tato práce tedy podporuje výsledky jiných autorů ohledně mechanismů, které mohou vést ke vztahu R/S a zdraví, a nabízí do těchto mechanismů další vhledy. Dále poskytuje metody pro další výzkum v oblasti R/S.

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About the author



Klára Maliňáková was born on 4th April 1983 in Ivančice, Czech Republic. She studied Molecular Biology and Genetics at the Faculty of Sciences, Masaryk University, Brno, and graduated in 2008. After that she studied Teacher Training in Biology, Masaryk University, Brno, Faculty of Sciences, which she finished in 2010. From 2008 she also worked as a pedagogue of leisure time activities and as a coordinator of volunteers in the Salesian Centre Brno-Zabovresky, where she stayed till 2014. The programs in the centre were aimed at the overall development of a person and at the prevention of health-risk behaviours through offering multiple leisure time activities.

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Olomouc University Social Health Institute

Olomouc University Social Health Institute (OUSHI) was founded in 2011 and is hosted by Sts Cyril and Methodius Faculty of Theology of the Palacký University in Olomouc, Czech Republic. OUSHI provides general support for research and education in the area of social aspects of health. It focuses on research of psychological, social and spiritual determinants of health, epidemiology and public health.

OUSHI is collaborating with the Department of Community and Occupational Health, University Medical Center Groningen, University of Groningen, the Netherlands.

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