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## THEORETICAL REPORTS

### Attitudes and Beliefs about Adult Sexual Contact with Children

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The present paper reviews current findings on common beliefs and knowledge about sexual contact with children held by a broad spectrum of members of our society including adults who have had sexual contact with children. We examine the general understanding that adults have about sexual contact with children as well as their beliefs about children's responses and behaviours. A number of studies are reviewed which both directly and indirectly suggest that many individuals and groups within society have limited knowledge about child sexual abuse and hold offense-supportive misconceptions about adult sexual contact with children. We discuss the implications that these beliefs may have on actual behaviours as well as on disclosure, prosecution, treatment and prevention of adult sexual contact with children.

**Key words:** beliefs, sexual contact, attitudes

#### Introduction

Almost two decades ago, researchers and clinicians began to examine the role of cognitive factors in the development and maintenance of adult sexual interest and contact with children in a more systematic way (e.g., Cohen, Seghorn & Calmas et. al., 1969; Abel, Becker & Cunningham, 1984; Stermac & Segal, 1989). At the time, research on the role of cognitions among child molesters and others was an under-studied area and one of emerging relevance to both theory construction and clinical intervention. Since the publication of several early studies in this area in the United States and Canada (e.g., Abel et. al., 1984; Stermac & Segal, 1989) and following the 1980's generally, the role of cognition and specifically beliefs about adult sexual contact with children has received more attention both in research and clinical practice (e.g., Ward, 2000). A number of researchers and clinicians alike have examined the role of various attitudes and beliefs in potentially contributing to both adult sexual contact with children as well as general knowledge about sexuality and sexual abuse among both offender and non-offender groups. As the role of attitudes in predicting some types of behaviours is well established (Tenniford, 2006), the relationship between attitudes and knowledge about adult sexual contact with children and such behaviours is an area that needs further investigation.

The purpose of the present paper is to review and present current findings on common beliefs and knowledge about sexual contact with children held by both adults who have had sexual contact with children as well as a broad spectrum of members of our society. This review includes a comprehensive review of published literature that remains

predominantly, but not exclusively, North American. We discuss the implications that these beliefs may have on actual behaviours as well as on disclosure, prosecution, treatment and prevention of adult sexual contact with children.

### *Attitudes and Knowledge about Sexual Contact with Children among Offenders*

Clinicians working with sex offenders against children have long noted the permissive beliefs and other offense-supportive views expressed by child molesters when discussing their behaviours (Mohr, Turner & Ball, 1962). It was only in the last two decades, however, that researchers turned their attention to investigating these cognitions and attitudes more systematically.

One of the earliest theories of the role of cognitions in sexual contact with children was proposed by Abel and colleagues in 1984 in the U.S. (Abel, Becker, & Cunningham-Rathner, 1984). Based on the principles of social learning theory, Abel suggested that sexual offending resulted from a developmental inability in learning how to suppress inappropriate sexual desires. Offense-supportive beliefs served the purpose of helping child molesters deal with the conflict between their attraction to children and societal norms. Abel's analysis of post-offense statements of men who had committed a sexual offense revealed seven common sexually permissive attitudes including: lack of physical resistance from a child means they are a willing sexual partner, being sexual with a child educates them about sex, children do not tell others about the sexual abuse because they like it, mere fondling of children will not really harm them, children ask about sex because they want to be shown it, having sex with a child brings the adult and child closer together, and society will learn to accept child-adult sexual relationship in the future. These distortions were identified and assessed post offense initially as they were hypothesized to arise at this time. Abel and colleagues proposed that these views functioned to protect the offender from their unacceptable thoughts and behaviours.

Abel's theory received considerable support in defining the role of offense-supportive beliefs in sexual offending. It remained the most influential conceptualization in this area for over a decade until the emergence of Ward and Keenan's (1999) implicit theory of cognitive distortions. Ward and Keenan (1999) proposed that offense-supportive beliefs among sex offenders did not develop after an offense but were implicit in nature, developing early and from adversity in childhood. These researchers categorized beliefs into five implicit theories which worked together to guide the processing of social information in an offense-congruent way. These theories include: children as sexual beings (i.e., children enjoy sexual relations), the nature of harm (i.e., only physically aggressive acts are harmful and/or sex is unlikely to harm even young children), dangerous world (i.e., the world is comprised of individuals likely to exploit and reject others), entitlement (i.e., individual needs are of paramount importance and can be fulfilled whenever and with whomever they chose) and lastly uncontrollability (i.e., human beings are out of control and unable to exert any influence on their emotions or urges).

Significant overlap is noted between the content of the distortions in both Abel's and Ward's theories, however, differences with respect to their origin and function are hypothesized. Abel argues that offense-supportive beliefs arise post-offense while Ward suggests they are of a more etiological nature. While the origin of these beliefs is still

unresolved, the general consensus among researchers and clinicians is that these distortions increase the chances of sexual abuse occurring or recurring and play a key role in the etiology and maintenance of sexual offending (Andrews & Bonta, 1994; Fisher, Beech & Browne et. al., 1999; Marshall, Fernades, Marshall & Serran, 2006; Gannon, Ward & Collie, 2007).

More recent research from North America and Europe offers an explanation as to how offense-supportive cognitions may play both an etiological and post-hoc role in offending, by examining subgroup classifications of convicted child sexual abusers. While extensive subtyping of child sexual abuse has been developed over the past decades (Cohen, et. al., 1969; Groth, Hobson, & Thomas, 1982; Bickley & Beech, 2003; Yates & Kingston, 2006), examination of two main subgroupings of child molesters, namely that of extrafamilial and intrafamilial offenders, permits a cogent analysis of how offense-supportive beliefs may be developed and maintained differently.

Extrafamilial child molesters are individuals who seek out sexual contact with children outside their families and demonstrate pervasive, core beliefs that children are sexual beings. These individuals believe that children are able to engage in and consent to sexual activity and that this activity does not cause significant harm (Johnson, Hudson & Ward, 1997; Bickley & Beech, 2003; Yates & Kingston, 2006). In contrast, intrafamilial or incest offenders, appear to have distorted beliefs which arise post offense. Their statements tend to reflect distortions related to reducing the fear of getting caught, diminish responsibility for their offending, and to seek permission from their victims to continue the abuse (Hartley, 2008). In contrast to an extrafamilial offender's belief that children are sexual beings, intrafamilial offenders use offense-supportive beliefs to reduce the discomfort associated with their desire to seek out sexual contact with a child (Cohen, et. al., 1969). This group of offenders also demonstrates lower levels of pre-treatment distortions when compared to extrafamilial offenders, and similar to that found in the general population (Hayashino, Wurtle, & Klebe et. al., 1995).

While most sexual offender treatment programs target cognitive distortions as an important treatment component (Andrews & Bonta, 1994; Marshall, et. al., 2006), some research suggests that these distortions are viewed as a homogeneous set of beliefs, common across all child molesters (Bickley & Beech, 2003; Yates & Kingston, 2006). When examining offense-supportive beliefs within a more heterogeneous framework, significant differences emerge which may have important treatment implications. It is proposed that extrafamilial offenders could benefit uniquely from treatments which target their core belief that children are sexual beings. Intrafamilial offenders would not benefit from this approach as their offense-supportive beliefs reflect post-offense justifications for their offending behaviour (Hartley, 2008).

### **Attitudes and Knowledge about Sexual Contact with Children among Non-offenders**

The significance of investigating and understanding the role of cognition and attitudes about adult sexual contact with children is underscored in findings among non-offender groups as well as offenders. While few studies have focused exclusively on non-offender

community groups, general social attitudes towards adult sexual contact with children emerge from studies with a broader focus.

Stermac and Segal (1989) in Canada were among the first researchers to examine beliefs about adult sexual contact with children among various community and professional groups in addition to sexual offenders. The researchers presented twelve descriptive scenarios of sexual contact between an adult male and a female child varying by degree of sexual contact with the child as well as the child's response. Groups of laypersons, mental health clinicians, criminal lawyers, police officers, as well as sexual offenders against women and children were asked to read each scenario and respond to a set of questions which probed perceptions and beliefs surrounding the specific aspects of sexual contact, victim complicity, potential outcome and adult responsibility.

Of particular interest in the findings were the results of non-offender groups who indicated that, under certain conditions, individuals perceived benefits to the child in their engagement with an adult. In scenarios where the child response was smiling as opposed to having a passive or negative response, all non-offender groups attributed some benefit to the child as a result of the sexual contact. Perceived benefit was also higher in situations in which the adult contact included only touching. In vignettes that included intrusive sexual contact yet the child was described as smiling, perceived benefit to the child was lower, but still higher than that found in scenarios in which the child responded passively or negatively.

These results highlight that perceptions of adult sexual contact with children may be linked to the specific details of the contact and are not uniform across all instances of sexual abuse among the socio-cultural groups studied. These views may impact how sexual contact with children is defined and holds important implications for the assessment, treatment and consequences of sexual contact for both the victims and perpetrators of child sexual assault.

### *Beliefs about Children's Responses and Behaviours*

Research on child abuse has examined knowledge and understanding of children's responses to adult sexual contact among various community groups. North American studies suggest that up to 72% of the general public believe that children who have been sexually abused will demonstrate overt and negative changes in their general behavioural functioning (Calvert & Munsie-Benson, 1991; Schneider, 1994; Shackel et. al., 2008) and display bizarre sexualized behaviours (Quas, Thompson & Clarke, 2005). Many individuals also believe that most child abuse victims will show fear of their perpetrator (Manning & Cheers, 1995), resist, cry out or try to escape their abuser (Morison & Grene, 1992) or no longer show love if the perpetrator is a parent (Kovera, Borgida, Gresham, Swim & Gray, 1993).

These studies highlight that the general public believes that most child abuse victims will respond negatively and overtly to adult sexual contact. Paradoxically, research also shows that some community members believe that sexual contact with an adult is not necessarily harmful and may actually benefit a child, preventing them from having sexual hang-ups in the future (Hayashino et. al., 1995). This may also explain why some respondents in Stermac and Segal's (1989) study identified benefits to the child in sce-

narios in which the child was described to be smiling, as smiling is understood to be an atypical response suggestive of lack of distress.

These findings indicate that there is lack of understanding and confusion among the public studied as to what defines and constitutes sexual abuse. Research suggests that many individuals expect children to respond negatively to sexual abuse. When a child's post offense response is of a more ambiguous or contradictory nature, some individuals will question the perceived degree of harm.

Pervasive misunderstandings about the behaviour of sexually abused children have also been documented among individuals engaged with legal settings, including judges and jurors. One study demonstrated that individuals believed that child abuse victims will display clear behavioural indicators of sexual abuse and demonstrate fear of the perpetrator (Shackel et. al., 2008). Furthermore, they endorsed the belief that disclosure and retraction of reports of sexual abuse are uncommon and indicative of a fabricated allegation (Shackel et. al., 2008). This has significant implications for the perceptions of child sexual abuse in general and the prosecution of child sexual abuse cases. In instances where the alleged victim has an atypical response, members of the community and judiciary may view the sexual assault as being less serious in nature, a belief that may impact both sentencing and treatment options (Franiuk, Seefeldt, & Vandello, 2008).

In contrast to the beliefs of individuals in legal settings, child abuse experts studied in Britain unanimously agree that children's responses to sexual contact with adults vary (Freel, 2003). Experts indicate that a sexually abused child will not always display signs of distress, respond with resistance, or stop showing love or affection towards the abuser, especially if the offender is a parent (Morrison & Greene, 1992). Despite this knowledge, mental health professionals may still be subject to influence from children's responses and behaviours which may affect their assessments of harm (Stermac & Segal, 1989). This belief has important implications for the treatment of victims as the more a child's response to an alleged assault deviates from what is viewed as "normal" the less significant the abuse will seem to others. Misconceptions about the dynamics of child sexual abuse lead to more permissive attitudes and run the risk of downplaying the seriousness of adult sexual contact with children (Shackel et. al., 2008).

### *Beliefs about Children's Responsibility*

Misconceptions about children's responsibility in sexual contacts with adults are also noted. Although international research has shown that many individuals perceive adults as being responsible for sexual contact with children (Tennifjord, 2006; Ruben & Thelen, 1996), 42% of respondents in a study by Ruben and Thelen (1996) were unclear where the blame should lie and blamed the alleged victim to some extent. Hayashino et. al., (1995) found that at least one quarter of the laypersons comprising their control group believed that a child who does not resist an adult's sexual advances really desired to have sex with the adult, and that if a child was acting in a way that could be interpreted as flirtatious, he or she also was seen as wanting to have sex.

These misconceptions and beliefs are similar to those found in the post-offense statements of child molesters who endorse beliefs surrounding the sexual nature of children (Ward & Keenan, 1999). Believing that children are capable of initiating and consenting



to sexual activity is identified as one of the core beliefs of at least one child molester subgroup, i.e., extrafamilial offenders. This group endorses beliefs that sexual contact with children will not cause any harm (Bickley & Beech, 2003). As these beliefs are thought to be etiological in this subgroup of offenders and also important in the maintenance of sexual offending, the presence of this belief in nonclinical populations is troubling. While there is no research directly examining the relationship between this belief and offending in community groups, concern about the extent to which these sexual interests translate into actual sexual behaviours is raised.

### *General Adult Sexual Interest in Children*

The studies reviewed above suggest that limited knowledge and understanding of adult sexual contact with children exists. As well, these studies raise the question of whether these beliefs are associated with permissive attitudes and acceptability of adult sexual interest in children. Some research supports this claim and historical accounts of adult sexual interest in children note the presence of this interest in many societies (Green, 2002).

In the Siwa Valley in North Africa, for example, all men and boys engage in sexual activity and those who do not are singled out as peculiar. Unmarried Aranda aborigines in Central Australia commonly take a young boy of ten or twelve to live with until they marry, and research documents several examples of heterosexual intercourse in public between adults and prepubertal children in Polynesia (as cited in Green, 2002). While this research does not suggest that sexual contact between adults and children should be accepted in Western societies, it does point out that sexual interest in children has existed across diverse populations of individuals in varying cultures across time.

One of the earliest studies to suggest that male's sexual response to children is also relatively common in the Western world was conducted by Briere (1989) and has since been replicated by others (e.g., Smiljanich, 1996). Within college samples, approximately 22% of undergraduate males admitted some sexual attraction to children and 4% to 9% reported fantasies about sexual contact with a child (Smiljanich, 1996; Briere, 1989). How this interest translates into the likelihood of actual sexual contact is not well understood. However, research shows that when asked about the potential likelihood of engaging in sex with a child if assured the contact would not be detected or punished, anywhere from 7 to 19% of non-clinical populations indicate some likelihood of this occurring (Hayashino et. al., 1995; Byers et. al., 1998).

This finding is further strengthened by physiological arousal studies which indicate that men from the general population have some degree of sexual response to photographs of very young nude female children (Farrall, 1992; Freund, McKnight, Langevin, & Cibiri, 1972; Langevin, Hucker, Ben-Aron, Purins & Hook, 1985). This percentage has been shown to be as high as 25% in "normal" volunteers (Hall, Hirschman, & Oliver, 1995), and replicated across cultures, with 28 of 48 soldiers in a Czech study demonstrating a physiological response to female children aged 4 to 10 years (Freund & Costell, 1970).

Freel (2003) sought to address the lack of empirical data on adult sexual interest in children in Britain and investigated the prevalence of these beliefs in child care settings.

The results showed that 15% of male child care workers reported being sexually attracted to children. However, this figure dropped to 4% when asked about the hypothetical likelihood of actually having sexual contact with a child, suggesting the presence of inhibitors preventing most men from actually committing child sexual abuse. Exactly what these inhibitors consist of is an important area for future research.

These findings suggest that adult sexual interest in children is documented to some extent in the general population. While the exact meaning of these findings is not clear, the lack of research in this area may be a factor contributing to some of the misconceptions about adult/child sexual contact.

## **Understanding Attitudes and Beliefs about Adult Sexual Contact with Children**

The identified lack of knowledge about adult sexual contact with children in general suggests that there may be widespread misconceptions which govern how the general public, largely in North America, views and responds to alleged incidents of child sexual abuse. These misunderstandings have given rise to myths and socio-cultural practices that are permissive of sexually abusive behaviours. While there is limited research which examines the impact of permissive attitudes towards adult sexual contact with children, a wealth of studies address these attitudes in regards to sexual violence against women.

In this work, widespread misjudgments and biases are termed “rape myths” which serve to trivialize sexual assault by disparaging victims and excusing the perpetrators (Franiuk, et. al., 2008). Victims are often accused of lying, are blamed for the assault, and are subject to character and lifestyle investigation. In contrast, perpetrators are often exonerated as a result of these misjudgments, minimizing the significance of their behaviour and sexual assault in general (Franiuk, et. al., 2008; Bohner & Schmelcher, 2006; Burt, 1980; Brownmiller, 1975). Rape myths have become so widespread that they actually function as social norms. This is particularly alarming as (these studies suggest that individuals who endorse high levels of rape myths are also more likely to actually commit a sexual assault (Bohner et al., 2006; Bohner et. al., 1998; Eyssel, et. al., 2006; Malamuth, 1981). This relationship is strengthened by the perceived offense supportive beliefs of others, and studies manipulating this variable have found that feedback about high levels of rape myth acceptance in one’s peer group leads to higher levels of self-reported rape proclivity (Bohner, et. al., 2006).

As research suggests that sexual violence against women and children are interrelated forms of sexual exploitation sharing common social roots (Briere, 1989), findings from the adult sexual assault and rape myths literature may be relevant also to sexual contact with children. Applied to child sexual abuse, this means that up to 19% of laypersons could be described as being accepting of child abuse myths. When taken in conjunction with what is known about rape myth acceptance and rape proclivity, this suggests that approximately 19% of the population may be at risk for committing a sexual offense, a rate that is probably minimized due to the influence of social desirability. It is hypothesized that the 19% reported by Hayashino et. al., (1995) may actually be much higher if beliefs could be assessed independently of social desirability factors. As re-

search suggests offense-supportive beliefs exert a significant influence on the likelihood of committing a sexual offense, it is clear that more attention is needed in this area.

These findings are particularly surprising given the stigma surrounding child molesters within our society. While it is generally believed that sexual contact with children is met with disapproval, the reviewed studies suggest that permissive attitudes towards sexual contact with children are not uncommon and may represent sexual interests arising from normal male socialization.

## Conclusion

The present paper reviews a number of studies which both directly and indirectly suggest that many individuals and groups within society have limited knowledge about child sexual abuse and hold offense-supportive misconceptions about adult sexual contact with children. These beliefs are not limited to sexual offenders but are also found in professional groups (Shackel et. al., 2008), child care workers (Freel, 2003), undergraduate samples (Smiljanich, 1996; Briere, 1989) and laypersons within the community (Hayashino et. al., 1995). For many these beliefs are the result of misinformation about the realities of child sexual abuse, however, the consequence is a general societal belief in a stereotypical child sexual abuse victim and perpetrator. This stereotype functions like a social norm, downplaying the significance of sexual assault and abuse and acting as a causal factor in the etiology of sexual violence (Bohner et. al., 2006). Future studies examining the relationship between child sexual abuse myth acceptance and the likelihood of engaging in sex with a child, is needed to strengthen the empirical evidence for the direct relationship between these variables. The more these beliefs and attitudes are acknowledged in research and in practice, the more society will recognize the role of perpetuating factors such as child abuse myths and work towards eradicating them.

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## REPORTS OF EMPIRICAL STUDIES

### Negative and Positive Stakes in Plural Voting: An Experimental Study

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The paper reports the results of a study examining people's attitude towards plural voting (a system where voters with higher stakes in the decision are given multiple votes) in comparison to the traditional "one person-one vote" principle. The participants (N=102) were asked to evaluate various voting procedures that pre-assigned votes to different voter groups depending on the stakes of these groups in hypothetical scenarios regarding municipal-level decisions about construction work. Participants evaluated plural voting procedures more favorably when more information was available about the stakes of those involved in the voting process. Respondents' preferences were independent of whether the stakes in question were positive or negative. The results show that, at least under experimental conditions, plural voting is acceptable to people, and in specific situations plural voting may be preferred to egalitarian voting.

**Key Words:** plural voting, stakes, social justice

### Introduction

An important issue in political philosophy and democratic theory is the so-called "boundary problem" or the "affected interests problem" (Arrhenius, 2005; Goodin, 2007; Whelan, 1983). The boundary problem deals with the question of who should be included in the democratic process and who should be excluded. If one country decides to build a nuclear plant near its border, should the citizens of the neighboring country have a say in any decisions regarding the construction? Should the local residents of the intended construction site have more influence on the decision than other citizens and taxpayers, who act through the elected government? What if the construction of the power plant is vitally important for the functioning of the whole country? And what if construction is more important for the functioning of some geographically distant, but industrially developed regions than for the geographically proximate, but less developed region?

It is apparent from this example that the boundary problem is very closely related to the concept of voter stakes, namely, the question of how much vested interest each voter, or voter group, has in the outcome of a particular decision. Several authors have pointed out the necessity for modern democracy to consider the issue of voter stakes when deciding the issue on who has voting rights, and have argued that from a normative point of view plural voting (a system where voters with higher stakes in the decision are given multiple

votes) would best ensure that the interests of voters are considered in a just and proportionate manner (Brighouse & Fleurbaey, 2006; Harwood, 1998; Heyd & Segal, 2006; Hortalá-Vallve, 2007). These authors have mostly offered their arguments from a normative point of view that is, trying to define a voting system that would be the most appropriate from the perspective of democratic theory. Other authors have criticized these proposals from a similarly normative point of view (Fudge & Quinn, 2001; Petren, 2006). In the rest of the paper, by plural voting we understand a voting system where people can have several votes when they meet certain qualifications or under certain conditions. We refer to the traditional one person-one vote principle as “egalitarian voting.”

However, the general public is not certain to accept the normatively most appropriate system of political decision-making, because public perception of the procedures suggested may be influenced by various psychological factors, such as political decision-making heuristics—simplified decision rules based on superficial features of alternatives, rather than rational analysis of their expected utility for the decision-maker (Kuklinski & Quirk, 2000). Such factors may sometimes override the rational arguments in favor of certain procedures or decision alternatives. What has been left out of the above-mentioned discussions is the perception of the boundary problem and the proposed plural voting systems by ordinary voters, who might be the ones asked to implement these systems, or to observe their implementation by fellow voters. Considering that acceptance by the majority is a logical pre-condition for any democratic decision-making procedure, this oversight of voters’ perception calls for corresponding psychological research.

There are at least two reasons why perception and acceptance of democratic procedures is a worthy topic of study in psychology. First, the perception and assessment of fairness of the decision-making procedures used by authorities, institutions, and different other groups is a significant determinant of the perceived legitimacy of these decisions, as well as peoples’ willingness to get involved in the democratic process (Gonzalez & Tyler, 2008; Tyler, 2001, 2006). If decision-making procedures are perceived as unfair and not properly representing the interests of those affected, the result may be dissatisfaction and dissent among the disenfranchised members of the population and their disengagement from the democratic process and the broader group in question (Tyler, Boeckmann, Smith, & Huo, 1997). Second, laboratory experiments have shown that stakes in decision outcomes systematically influence peoples’ behavior in bargaining games and social dilemmas (Croson & Konow, 2009; De Cremer, 2007; Konow, 2005; Sutter, 2002), and that the importance of fair decision-making procedures increases with higher stakes in the decision outcomes for those affected by the decision (Brockner, DeWitt, Grover, & Reed, 1990).

In the light of these findings it is quite surprising that, to our knowledge, there are no published studies examining the attitudes of the general public to plural voting systems in general and the possibilities of applying such systems in various real-life contexts. Such research is necessary not only to test the feasibility and the perceived legitimacy of non-traditional voting procedures but also to understand people’s perception of justice and fairness in political decision-making contexts better. The first aim of this study was to investigate how individuals evaluate plural voting systems in comparison with traditional, egalitarian voting systems.

Previous research has shown that the way social dilemmas are presented invokes specific fairness concerns in people, which in turn may affect their voting behavior and support for particular voting schemes (Gamliel & Peer, 2006; Sonnemans, Schram, & Offerman, 1998). In particular, Gamliel and Peer (2006) found that presentation of dilemmas as gain scenarios vs. loss scenarios can significantly influence people's responses to such scenarios—non-egalitarian principles (such as merit or need) were judged as more just when the dilemma was presented in a positive framing manner (allocation of good outcomes or withholding of bad outcomes). In other words, people were less willing to accept non-egalitarian allocation principles when they involved a risk of loss to those affected. In addition, research has shown that presentations of economic dilemmas in terms of gains vs. losses systematically influences individuals' judgments of the fairness of different alternatives, and consequently alters their attitudes towards various policy measures (Bullock & Fernald, 2005; Kinsey, Grasmick, & Smith, 1991; Verboon & Van Dijke, 2007). These findings are in line with the effects of framing and the general tendency towards loss aversion reported in the decision-making literature (Tversky & Kahneman, 1981). However, the particular manifestations of loss aversion depend on the specific context in which the decision should be made, and on the presentation of the problem (Levin, Gaeth, Schreiber, & Lauriola, 2002; Levin, Schneider, & Gaeth, 1998; Tanner, Medin, & Iliev, 2008). Consequently, we wanted to study whether the type of situation to which plural voting is to be applied (i.e., one in which voters are either set to gain something from a particular situation or to lose the same amount due to the same situation) would affect the evaluation of particular voting schemes.

In the study reported here we investigated how information about the stakes of different voter groups would influence the evaluation of voting schemes that assign different influence to these groups. The voting schemes were constructed based on two principles: the "all affected" principle that excluded voter groups with no stakes or low stakes in the decision, and a principle of proportionality that assigned votes to the groups based on their stakes. In addition, we wanted to test whether the type of stake—that is, whether it is expressed as potential gains or potential losses—would influence evaluation of voting schemes. In line with findings from previous loss-aversion studies (Tversky & Kahneman, 1981), we hypothesized that support for plural voting schemes should be higher when the stakes are negative (i.e., when the plural voting schemes give stake-holders a better chance of avoiding negative outcomes than egalitarian voting schemes), than in a situation where the stakes are positive, or where no information about the stakes is provided.

## **Method**

Participants in this study were 102 psychology and education students from the University of Latvia. The median age of the participants was 19 years. In all, 78% of the participants were female, 22% were male. Each participant was asked to complete a questionnaire about a fictitious scenario in which city residents were asked to express their opinion about a new construction project in a local referendum. The situation was modeled after the current practice in Latvia, where a "public discussion" of each new project must take place, in which neighborhood residents can express their opinion for or against



a particular project. The participants were asked to imagine that the municipality had to decide between several possible voting schemes. Five different voting schemes were presented, where the number of votes assigned to each voter was manipulated depending on how much the particular voter group would be affected by the construction (i.e., according to their stake in the issue). The scenario and the five voting schemes can be seen in the Appendix.

In addition, three different versions of the same questionnaire were presented in a between-participants design (meaning that each participant completed only one version of the questionnaire). In the gain condition the stakes were expressed as gains (i.e., the properties of some of the voters would appreciate in value after the construction). In the loss condition, the stakes were expressed in terms of losses (the properties of the voter groups would depreciate after the construction). In the control condition no information was given regarding change of property values, and the stakes were expressed simply in terms of geographical proximity of the voter group's residence to the construction site.

The participants were asked to rank the five voting schemes according to their personal views of fairness, wisdom, and the greater good of society. Ranking was chosen instead of rating to increase the respondents' engagement with the task and avoid the problem of non-differentiation, as suggested in the attitude-measurement literature (Krosnick, 1999, pp. 49-50).

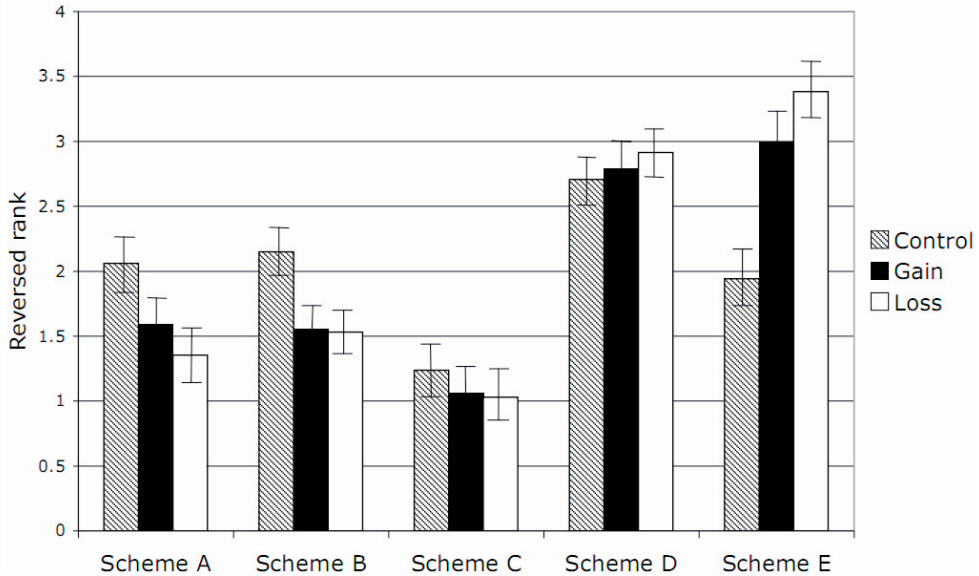
## Results

Two questions were of interest when analyzing the results of this experiment. First, which voting schemes did the participants evaluate as the most appropriate for the situation described? And second, was the evaluation of voting schemes dependent upon the information about the stakes provided in the particular questionnaire version? To answer the first question we compared the mean ranks of the five voting schemes (depicted in Figure 1).

Statistical analysis (Friedman test) showed that there were significant differences between the rankings of the five schemes, Chi-Square (4) = 89.83,  $p < .05$ . Pairwise comparisons (Wilcoxon signed ranks test) revealed that voting scheme C (the most restrictive scheme) was the least popular, followed by voting schemes A (traditionally egalitarian),  $z = 2.61$ ,  $p < .05$ , and B (moderately restrictive),  $z = 3.65$ ,  $p < .05$ , which did not differ significantly from each other  $z = 0.37$ ,  $p = .71$ . Scheme D (combination of exclusion and proportionality principle) and E (fully proportional scheme), which did not differ significantly from each other ( $z = 0.17$ ,  $p = .87$ ), were the most popular ones ( $z = 4.25$ ,  $p < .05$  for the smallest difference—i.e., between rankings of Scheme B and Scheme E). These results clearly show that participants preferred voting schemes that positively differentiated between groups with different stakes, assigning more voting power to groups with higher stakes.

To answer the second question we conducted one-way analyses of variance, comparing responses of respondents who completed the three different questionnaire types, separately for each voting scheme. We found significant differences for two voting schemes: scheme B,  $F(2, 101) = 4.04$ ,  $p < .05$  and scheme E,  $F(2, 101) = 10.2$ ,  $p < .001$ .

Pairwise comparisons (LSD test) revealed that in both cases the statistically significant differences appeared between the control condition on the one hand, and gain and loss conditions on the other. In other words, the evaluations of the voting schemes did not differ between the groups of participants who received information about the potential gain or loss to apartment owners in the scenario, but both groups evaluated scheme B lower than the control group, and scheme E higher than the control group did. It appears that it did not matter whether the stakes of the apartment owners were positive or negative, but it mattered that financial information about the stakes was provided at all.



**Figure 1. Mean evaluation of the five voting schemes in control, gain, and loss conditions (reversed ranks; higher number indicates more favorable evaluation). Error bars depict standard errors of the means**

We also tested for gender differences in our results. First, we calculated point-biserial correlations between gender and the ranking of each voting scheme. None of the correlations were significant, indicating that there were no gender differences in ranking of the schemes. To test for interaction between gender and type of stakes, we ran a 2 (gender) by 3 (information about stakes) ANOVA for the ranking of each voting scheme. None of the effects involving gender were significant in any of the analyses.

## Discussion

In general, the results of our studies show that people consider plural voting systems appropriate under certain conditions when the stakes of the voter groups are clearly known. The results of the experiment suggest that people prefer plural voting systems that do not exclude any voter groups to voting schemes that exclude groups with no stakes or low stakes in the issue being voted about. Perhaps this reflects the general fairness concern—people may be averse to potential limitation of other people's rights. It appears that for the participants it was more important to give everyone a chance to participate in the decision making process, even if particular groups did not have explicit

stakes in the issue being voted about. In contrast, people prefer to ensure that the stakes are reflected in the voting power by providing additional votes to the high-stake groups. This indicates that under certain conditions plural voting systems can be not only acceptable, but also preferable. The results are in line with previous findings showing the importance of feeling included in the decision-making process as a significant precondition for positive relationships and cooperation within groups (De Cremer, 2002). At the very least, our results suggest that normative models of plural voting do not conflict with people's intuitions about social justice. Plural voting seems to be a viable solution to the boundary problem not only from a normative, but also from a psychological point of view.

One considerable limitation to the present study is the question of external validity. The participants evaluated an abstract situation where they were not directly involved. Although the situation was chosen in a way that it should have been familiar to the participants (the data were collected during the height of the construction boom in 2006), it did not affect the participants personally, and they were not given a chance to use any of the described voting schemes themselves. So, the question remains open whether the participants would have evaluated the voting schemes similarly if they had been asked to choose a scheme to solve some real problem through voting. In future studies, for example, student participants could be asked to evaluate the same schemes applied to the elections of student self-governance bodies under the pretext that the chosen scheme would in fact be used in the election. Similarly, such schemes could be offered in other small-scale public decision-making contexts, for example, in organizations. At the same time, the present study approximates the first stage of a two-step voting procedure that would be necessary if a system of plural voting were to be implemented. In a two-step procedure, in stage one everyone votes on assignment of votes to various stakeholder groups, and in stage two the actual vote on the issue in question takes place (cf. Heyd & Segal, 2006). Stage one essentially means choosing the fairest system of plural voting for a particular context, and in this respect our study helps to understand what kind of plural voting schemes might be more acceptable to the voters, and which schemes should, or should not, be offered for deciding between in such a first stage of a two-step procedure.

Our results did not confirm the prediction that there would be a difference between the votes of participants to whom the scenario was presented with negative stakes (loss condition) and of those who evaluated the situation with positive stakes (gain condition). Instead, the mere fact that some information—either positive or negative—was provided about the voter groups' stakes increased the popularity of the plural voting schemes. A possible explanation of this finding may be found in the notion of response compatibility (Tversky, Sattath, & Slovic, 1988). This notion implies that people tend to prefer a graded response (here graded votes) the more the input is graded (here in terms of information about the monetary value of the outcomes). This interpretation implies that if plural voting schemes were to be introduced in real-life contexts, one would need to pay a special attention to how the information about the stakes of the involved parties is presented. Clearly outlining the differences between stakeholder groups on a comparable scale would be essential for increasing the public support for plural voting systems. But another explanation could be that with respondents relying on automatic information

processing arguments might appear more persuasive simply because they include more information about the situation in question (Langer, Blank, & Chanowitz, 1978). When more information is provided about the stakes of those affected, it may be perceived as a justification for granting those more affected more votes even without examining the contents of the information. More research is required to understand this finding.

One slightly puzzling result was the difference between the evaluations of Scheme D and Scheme E by the control group. It is not immediately apparent why there was a difference between evaluations of the two proportional schemes in the control group, but not the positive and negative stakes group. Our explanation is that in the control group the information provided focused the attention of participants on the geographical distance to the construction site. In this context, Scheme E might seem less acceptable by giving a vote to residents who live far away from the construction site. However, when information about apartment prices was provided geographical distance became secondary; thus both plural voting schemes were evaluated similarly in the gain and loss conditions.

Further research should concentrate on examining the acceptance of plural voting with behavioral, rather than attitudinal, measures. Such research could include both laboratory and field studies. In the laboratory, voting in group decision-making contexts could be studied by asking participants to divide certain resources among themselves. Stakes could be manipulated by assigning participants to various contribution levels to the public good, thus varying their level of entitlement to the resources being divided. Such studies should focus on both stages of the plural voting process. Of more interest is the process of allocation of votes for various stakeholders, which should include some deliberation and bargaining. But the process of plural voting itself is also interesting, especially in terms of voters' satisfaction with the outcomes of such voting. As mentioned above, another promising line of research would be field studies involving actual voting in various local, non-political contexts (such as schools, social organizations, or commercial organizations). Yet another promising area of study would be cross-cultural comparison of attitudes towards plural voting. One might expect that the strength of democratic traditions in a country, as well as overall level of political participation and trust in government could play a role in voters' support for novel, non-traditional voting schemes. Because democratic procedures are being constantly developed and improved by social philosophers and political scientists, psychologists should keep up with this process by providing empirical data on how novel democratic procedures are perceived and interpreted by the public.

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## Author Note

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## Appendix

### Scenarios used for the experiment

#### **Control condition:**

Imagine that a new industrial park is about to be built in a city neighborhood. The law requires that the city residents have an opportunity to express their opinion about any new building projects. Several voting schemes have been proposed to ensure that those people most affected by the construction have their say on the matter. Below you will

see a number of voting schemes, with various assignments of votes to different population groups. In each voting scheme, numbers in the cells correspond to the number of votes given to each voter in the respective group. The number 1 means that each voter in the group has one vote on the issue, 0 means that the respective group is not included in the vote on the issue, i.e. its members have no vote, 2 means that each member of the respective group has two votes on the issue and 3 means that each voter in the respective group has 3 votes.

In the light of your personal views of fairness, wisdom, and the greater good of society, please, rank-order the following voting schemes starting from the most appropriate for this case to the least appropriate.

	Scheme A	Scheme B	Scheme C	Scheme D	Scheme E
Residents living in the block(s) adjacent to the construction site.	1	1	1	2	3
Residents living in the administrative district where construction is planned, but not in adjacent blocks.	1	1	0	1	2
Residents of all other city districts.	1	0	0	0	1
<b>Rank:</b>					

**Loss condition:**

Imagine that a new industrial park is about to be built in a city neighborhood. The construction will reduce the market value of apartments in that neighborhood significantly because of increased traffic, noise, and possible pollution. The law requires that the city residents have an opportunity to express their opinion about any new building projects. Several voting schemes have been proposed to ensure that those people most affected by the construction have their say on the matter. Below you will see a number of voting schemes, with various assignments of votes to different population groups. In each voting scheme, numbers in the cells correspond to the number of votes given to each voter in the respective group. Number “1” means that each voter in the group has one vote on the issue. “0” means that the respective group is not included in the vote on the issue, i.e. its members have no votes. “2” means that each member of the respective group has two votes on the issue; “3” means that each voter in the respective group has 3 votes.

In light of your personal views of fairness, wisdom, and the greater good of society, please rank-order the following voting schemes starting from the most appropriate for this case to the least appropriate.

	Plan A	Plan B	Plan C	Plan D	Plan E
A resident living in the block adjacent to the construction site whose apartment will depreciate by EUR 20,000 as a consequence of the construction	1	1	1	2	3
A resident living in the administrative district where construction is planned, whose apartment will depreciate by EUR 2,000 as a consequence of the construction	1	1	0	1	2
A city resident whose apartment’s value will not change	1	0	0	0	1
<b>Rank:</b>					

**Gain condition:**

Imagine that a new industrial park is about to be built in a city neighborhood. The construction will increase the market value of apartments in that neighborhood significantly because of improved infrastructure, increased interest of real estate dealers and influx of

high-profile businesses. The law requires that the city residents have an opportunity to express their opinion about any new building projects. Several voting schemes have been proposed to ensure that those people most affected by the construction have their say on the matter. Below you will see a number of voting schemes, with various assignments of votes to different population groups. In each voting scheme, numbers in the cells correspond to the number of votes given to each voter in the respective group. Number “1” means that each voter in the group has one vote on the issue. “0” means that the respective group is not included in the vote on the issue, i.e. its members have no votes. “2” means that each member of the respective group has two votes on the issue; “3” means that each voter in the respective group has 3 votes.

In light of your personal views of fairness, wisdom, and the greater good of society, please rank-order the following voting schemes starting from the most appropriate for this case to the least appropriate.

	Plan A	Plan B	Plan C	Plan D	Plan E
A resident living in the block adjacent to the construction site whose apartment will appreciate by EUR 20.000 as a consequence of the construction	1	1	1	2	3
A resident living in the administrative district where construction is planned, whose apartment will appreciate by EUR 2.000 as a consequence of the construction	1	1	0	1	2
A city resident whose apartment's value will not change	1	0	0	0	1
<b>Rank:</b>					



# The Limitations in Using the Step Test and the 220-Age Formula to Examine Physical Activity in Relation to Vulnerability to Depression

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The aim of this paper is to bring to the attention of future researchers the limitations of using the step task and the standard 220-age formula in studies of physical activity and cognitive vulnerability. The present study examined whether physical activity proximally affects negative thinking in individuals with a past depressive history and whether an acute intervention of physical activity (i.e., a step task) would inhibit distorted and negative thinking styles that are typical of formerly depressed individuals who undergo a negative mood prime. The participants, 37 formerly depressed and 19 never-depressed, were randomized to a negative mood prime condition or to a step task prior to receiving a negative mood prime in a repeated measures design. This is the first study to use such indices in a mood priming paradigm. The practicality of using the step task as an acute intervention for this study is discussed in this paper.

**Key words:** step test, depression, physical activity

## Introduction

In an attempt to understand why some people become depressed while others do not, cognitive theorists have proposed that maladaptive or dysfunctional attitudes are more accessible to individuals when a stressor is experienced. These dysfunctional attitudes represent underlying assumptions of oneself, such as, “I’m unlovable” and such endorsement increases vulnerability to depression. Research has shown individuals with a history of depression can access maladaptive thoughts more easily than never-depressed individuals because this thinking style lay dormant until activated by a stressor. For example, numerous studies have shown elevated dysfunctional thinking style and information processing differences of previously depressed individuals compared to never-depressed individuals only after a mood induction; otherwise, their thinking styles remain similar (Gemar, Segal, Sagrati, & Kennedy, 2001; Gilboa & Gotlib, 1997; Ingram, Bernet, & McLaughlin, 1994; Ingram & Ritter, 2000; McCabe, Gotlib, & Martin, 2000; Miranda & Persons, 1988; Miranda, Persons, & Byers, 1990; Segal, Gemar, & Williams, 1999; Teasdale & Dent, 1987). Using a negative mood prime to investigate the cognitive

vulnerability of depression is considered a sufficient stressor to activate the latent or hidden maladaptive thinking style of formerly depressed individuals (Martin, 1990).

A plethora of research documents the effectiveness of exercise in the treatment of clinical depression (Blumenthal, Williams, Needles, & Wallace, 1982; Blumenthal et al., 1999; Dimeo, Bauer, Varahram, Proest, & Halter, 2001; Dunn, Trivedi, Kampert, Clark, & Chambliss, 2005; Dunn, Trivedi, & O'Neal, 2001) and in the reduction of depressive relapse (Blumenthal et al., 1999). Research has shown that regular physical activity can protect against the development of depression (Camacho, Roberts, Lazarus, Kaplan, & Cohen, 1991; Paffenbarger, Lee & Leung, 1994) and that physical inactivity is a risk factor for depression (Farmer, Locke, Moscicki, Dannenberg, Larson, & Radloff, 1988). In fact, research has consistently shown physical activity to target symptoms that are most characteristic of initiating and maintaining depression, such as negative thinking, hopelessness, criticalness, stress, sadness, anger, tension, energy level, and sleep disturbance (for review see Arent, Landers, & etnier, 2000; Dunn et al., 2001; Salmon, 2001; Yeung 1996). Notably, exercise that is of short duration, even a single session, can produce similar antidepressant and anxiolytic effect as that of more chronic exercise forms (Hansen, Stevens, & Coast, 2001; Rehor, Dunnagan, Stewart, & Cooley, 2001; Williamson, Dewey, & Steinberg, 2001). Given that these positive effects can be attained in both chronic and acute bouts of exercise, the current study focused on an acute short-duration moderate-intensity physical activity to study the possible effects on cognitive and affective responses of individuals vulnerable to depression. The convenience of executing short versus longer bouts of exercises may be considerably important for individuals experiencing depressive symptoms who often have limited energy and motivation.

### *Hypothesis*

It is hypothesized that formerly depressed individuals' participation in an acute physical activity task will inhibit the activation of maladaptive thinking style typically seen in depressed individuals. It is expected that formerly depressed individuals who engage in an acute physical activity task prior to a negative mood induction will show less lowering of mood and less distorted and negative thinking style following the mood induction compared to when they engage in a mood induction task without prior exercise. In this way, physical activity will circumvent the negative and distorted thinking style and serve as being prophylactic.

## **Method**

### *Participants*

Participants were recruited through advertisements posted in local newspapers in the greater Toronto area or from referrals from recent studies conducted in the Neurochemical Imaging in Mood Disorders Lab at the Centre for Addiction and Mental Health (CAMH). In total, 56 individuals, between the ages of 18 to 60, who were in relatively good health with no medical or physical problems, not currently taking medications or cigarette smoking, and who were not engaged in regular exercise, sport, or recreational activity, or that they have sedentary employment, participated in the study. The Structured Clinical Interview for DSM-IV (American Psychiatric Association, 1994), Axis, I

Disorders (SCID-I, Version 2.0, First, Gibbon, Spitzer, & Williams, 1996) was used to determine group inclusion and all participants were required to score  $< 8$  on the 17-item Hamilton Rating Scale for Depression (HRSD: Hamilton, 1960) and  $< 12$  on the Beck Depression Inventory (BDI-II: Beck, Steer, & Brown, 1996), which represents minimum to mild depressive symptomology (Frank et al., 1991). All participants were able to provide informed consent and complete assessment instruments unassisted.

### *Formerly Depressed Group*

The formerly depressed (FD) group consisted of 37 individuals ( $n = 22$  women;  $n = 15$  men), mostly women (59.5%) with an average age of  $31.3 \pm 1.3$  SE. The majority of FD individuals (65 %) were diagnosed as having a history of major depression disorder and experienced  $0.4 \pm 0.04$  SE depressive episodes per year that began at an average age of  $20.0 \pm 1.4$  SE years. On average, participants reported having a previous depressive episode  $28.1 \pm 4.7$  SE months prior to study participation that endured for approximately  $10.8 \pm 2.2$  SE months. Participants reported having a past treatment of antidepressants (48.4 %), psychotherapy (13.6 %), or both (67 %). Of those who sought psychotherapy, more than half of individuals with a depressive history completed Cognitive Behaviour Therapy (CBT) or general psychotherapy, respectively. At the time of assessment and testing, no participant was receiving any psychological or antidepressant treatment.

### *Never-Depressed Comparison Group*

A total of 19 participants ( $n = 11$  women;  $n = 8$  men; 57.9 % women) represented the ND group. With an average age of  $29 \pm 2$  SE years, all individuals reported having no current or past psychiatric problems.

All participants were matched by age and gender. No significant differences between FD and ND groups were found for age, gender, employment status, education level, ethnicity, socio-economic status, or pre-experimental affective and cognitive scores (all  $p > 0.05$ ). Generally, groups were ethnically diverse: 55.9% Caucasian; 18.8% African-Canadian; 16.1% United Kingdom; 26.6% European; 13.4% Eastern European; 13.2% Middle Eastern; 21.3% Hispanic; 2.7% Asian; 15.9% Southern Asian and 2.7% reported having a mixed ethnicity. In both experimental groups, participants had an education higher than high school (2.7 and 5.3 %, FD and ND groups, respectively) with most having frequented postsecondary school either partially (16.2 and 47.4 %) or to graduation (64.9 and 42.1 %). While some individuals in the ND group (5.3 %) were in the process of completing graduate studies, 13.5 % of individuals in the FD group had already attained a degree.

The majority of individuals in both groups were employed full-time (81.1 and 78.9 %, respectively) and earning more than \$20,000.00 to nearly \$40,000.00 a year (29.7 and 21.1 %, respectively). Compared to ND individuals, more FD individuals were unemployed (5.3 and 10.8 %). Conversely, far more students participated in the ND group (15.8 %) compared to the FD group (5.4 %). In addition, the majority of the sample (57.1 %) was never-married (FD = 54.1 %; ND = 63.2 %) followed by married (10 %) (FD = 16.2 %; ND = 21.1 %), common-law (3%) (FD=5.4%; ND=0%) or long- term relationships (2%) (FD=2.7%; ND=5.3%). A small portion of the sample (each 4%) were separated or divorced (FD=54.1%; ND=63.2%) and only one FD individual was wid-

owed (2.7%). No significant differences in marital status occurred between groups. Most participants had a religious affiliation that was primarily Christian (16.2 and 15.8 %, FD and ND respectively) or Roman Catholic (29.7 and 63.2 %) followed by Judaism (10.8 and 5.3 %) and Islam (5.4 and 5.3 %). With the exception of one ND person who followed Anglican beliefs, only the remaining FD participants equally reported having an Orthodox, Hinduism, or Anglican affiliation (all 2.7 %).

## Materials

The *Beck Depression Inventory-II* (BDI-II; Beck et al., 1996) is one of the most frequently used 21-item self-report questionnaire to assess the presence and severity of depressive symptoms by tapping the somatic-affective and cognitive dimensions of depression. Based on their previous week, participants make their responses on each question which include four self-evaluate statements that range in value from 0 to 3. Total scores on the BDI-II range from 0 to 63, with higher scores indicating more severe depressive symptoms.

The *Dysfunctional Attitude Scale* (DAS; Weisman & Beck, 1978) is a 40-item questionnaire that measures negative beliefs and underlying assumptions typically held by depressed individuals. Participants indicate their attitude or degree of belief to questions, such as, "I cannot be happy unless most people I know admire me" by being in agreement ("totally agree", "agree very much", "agree slightly"), disagreement ("totally disagree", "disagree very much", "disagree slightly"), or with neutrality. Total scores range from 54 to 280, with higher scores indicating a greater dysfunctional or distorted belief system that is consisted with typical negative thinking styles of depressed versus ND individuals (Hamilton & Abramson, 1983).

The *Automatic Thoughts Questionnaire* (ATQ; Hollon & Kendall, 1980; Ingram & Wisnicki, 1988) has been commonly employed in depression and cognition research (Ingram, Kendall, Siegle, Guarino, McLaughlin, 1995; Ingram, Slater, Atkinson, & Scott, 1990). Since monitoring the presence or absence of positive and negative thoughts has been deemed important in understanding psychopathology (Kendall, 1984; Kendall & Hollon, 1981; Schwartz, & Garamoni, 1989), the 60-item version of the ATQ, a combination of both negative (Hollon & Kendall, 1980) and positive (Ingram & Wisnicki, 1988) forms, were used in the present study to determine the frequency of negative and lack of positive self-statements or automatic thoughts. Based on the past week, participants rate the occurrence of self-relevant thoughts (e.g., "I'm a failure") on a 5-point Likert scale (1, "not at all," to 5, "all the time"). The ATQ has been shown to have strong psychometric properties (Ingram et al., 1995), adequate convergent and discriminate validity, and is sensitive to cognitive changes (Ingram et al., 1990).

The *Profile of Mood States* (POMS-SF; Schacham, 1983) is a reliable instrument of psychological distress in healthy and psychiatric populations and has been abbreviated from the original POMS questionnaire (McNair, Lorr, & Droppleman, 1981). Described as being equally reliable and valid to the original POMS questionnaire (Curran, Andrykowski & Studts, 1995), it uses slightly more than half (i.e., 37/65) of the original questionnaire items. Participants respond to how they are currently feeling with ratings from 0 = not at all, 1 = a little, 2 = moderately, 3 = quite a bit and 4 = extremely. The mood

inventory provides subscores of anger, tension, confusion, depression, fatigue, vigor, and total mood disturbance score.

The *Visual Analogue Scales* (VAS) is widely used in mood priming and cognitive studies (e.g., Gemar et al., 2001; Segal et al., 2001; Teasdale & Dent, 1987; Teasdale & Fogarty, 1979; Williams, Connolly, & Segal, 2001). Seven visual analogue scales, including both negative and positive affect, were used to measure participants' current mood throughout the testing session, and particularly before and after the negative mood induction.

*Heart Rate.* Throughout the testing sessions, heart rate was continuously monitored using the Polar Vantage XL Heart Rate Monitor (Creative Health Products, Plymouth, MI). Heart rate responses were recorded, on average, every five minutes, except every two minutes during the 10-minute physical activity task. Researchers have deemed its importance in monitoring emotional arousal with heart rate ratings (e.g., Emery, Hsiao, Hills, & Frid, 2003) and the readings from the Polar Vantage XL monitor have been shown to be highly correlated with ECG readings during exercise and physical tasks (Godsen, Carroll, & Stone, 1991; Goodie, Larkin, & Schauss, 2000).

The *Physical Activity Readiness Questionnaire* (PAR-Q), is a standard questionnaire, approved by the Canadian Society for Exercise Physiology, Health Canada, to screen for an individual's ability to partake in physical activity with minimal risk of injury prior to commencing physical activity (American College of Sports Medicine, 1991; 1995; 1996; Arraiz, Wigle, & Mao, 1992; Thomas, Reading, & Shephard, 1992).

## *Procedure*

### *Experimental Conditions*

All eligible participants were randomly assigned to two different orders of conditions: (1) Acute physical activity task prior to receiving a negative mood induction (MI+PA); and (2) Negative mood induction only (MI). All participants participated in both conditions, which were scheduled exactly one week apart (see Figure 1).

### *Mood Induction*

Listening to music, along with autobiographical memories (Brewer, Doughtie, & Lubin, 1980), and explicit instruction to participants to obtain the desired emotional response (Slyker & McNally, 1991) have been identified as effective factors in producing a negative mood prime in adults and have been used by cognitive vulnerability researchers (e.g., Gemar et al., 2001; Segal et al., 1999; Williams et al., 2001). Therefore, participants were requested to "get into" a sad mood while listening to sad music and were prompted to recall pre-selected sad memories. Participants had recorded a descriptive autobiographical memory that, when recalled, elicited sad feelings. The piece of music selected for the mood induction, Prokofiev's "Russia Under the Mongolian Yoke" from the film Alexander Nevsky was recorded at half-speed and heard through the use of a headset for seven minutes. All participants were debriefed at the end of each testing session to ensure that their mood had returned to baseline level.

### Acute Physical Activity Task

The acute physical activity task involved a step task that is in accordance with standard guidelines of the American College of Sports Medicine. It is a standard measure of general physical activity that has been used in several studies to assess the exercise-mental health link (Heyward, 2006). Physical activities such as walking, general gardening and step climbing with body weight alone produce a similar metabolic cost or energy expenditure. They are considered a light to moderate level of activity with an approximate metabolic equivalent value (i.e., MET value) of 5 (Heyward, 2006). To minimize possible injury or harm, all participants performed the physical activity task prior to testing day and after having passing a medical evaluation by a physician. Participants were instructed to repeatedly step up and down on the stair apparatus while wearing a heart rate monitor. Heart rate was taken every two minutes of the 10-minute physical activity task to ensure sufficient exertion. After each heart rate recording participants were instructed to either increase, decrease or maintain the same stepping speed. This decision was based on their pre-calculated heart rate target zone which is based on a standardized formula of 220 minus person's age multiplied by 65 and 85 % to determine the acceptable lower and higher range of physical exertion. For the purposes of this study, a moderate level of exercise, which is achieved in this range, was considered sufficient to study the possible effects of acute physical activity, cognition and mood. Any participant who exceeded the upper exertion level early on in the physical activity task was asked to step only on one stair versus two stairs to prevent over-exertion.

Participants were supervised by a research coordinator who was also a qualified fitness instructor to ensure proper identification of participants who showed any signs of physical distress or discomfort. To minimize the possible occurrence of external distractors, participants performed the physical activity task in a private testing room with only the research coordinator present.

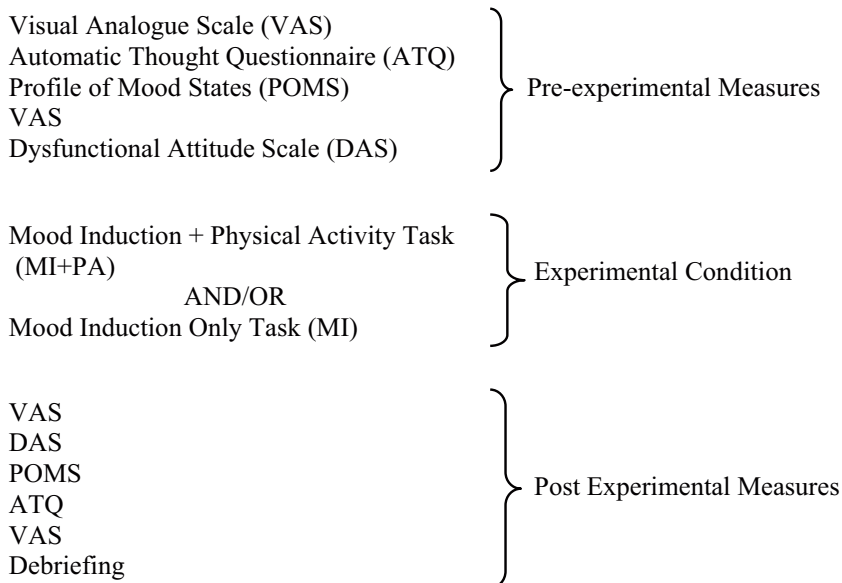
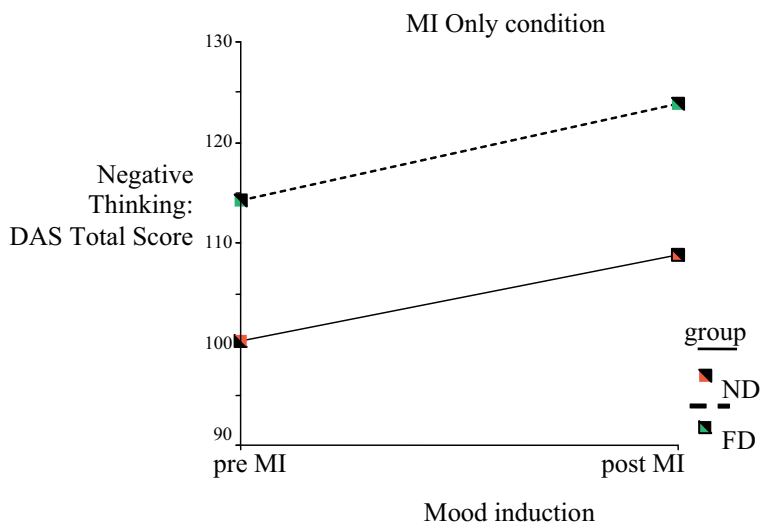


Figure 1. Experimental Study Phase

## Results

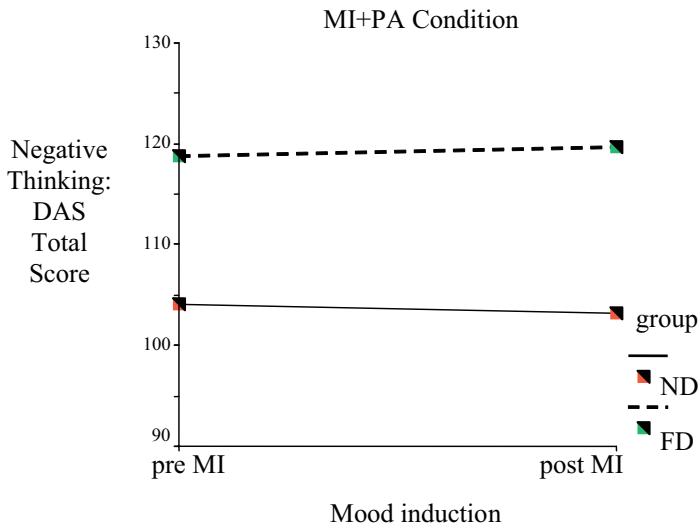
### *Negative and Positive Thinking Style of Groups across Experimental Conditions*

To determine whether a greater change in negative and positive ATQ and DAS scores occurred between groups, data was analyzed to isolate effects of physical activity and before and after the negative mood prime. The current analysis (ANOVA) tests effects of PA versus no PA, and pre and post MI between groups directly. Typically, FD participants reported having more negative thinking than their ND counterparts ( $50.2 \pm 1.5$  and  $36.7 \pm 2.0$  SE, respectively). Generally, results lend partial support to the study's hypotheses. Overall, the FD group (DAS:  $119.1 \pm 2.7$  SE; ATQ:  $50.2 \pm 1.5$  SE) had significantly more negativistic thinking than the ND group (DAS:  $104.1 \pm 3.7$  SE;  $36.7 \pm 2.0$  SE). Despite these differences, results showed no differential effect of PA. That is, changes in DAS and ATQ scores were not specific to testing conditions as groups significantly differed in their negativistic thinking regardless of whether the PA task was included or not. That is, negative thinking was higher for FD participants compared to the ND participants in both the MI only condition and MI+PA condition (see Figures 2 and 3). No significant three-way (Group X PA X MI) or two-way (Group X PA; Group x MI) interactions were observed. Consistent with negative ATQ scores, no significant main or interactive effects were found for positive ATQ scores. This suggests that both groups similarly rated their positive thoughts throughout the research, ( $98.5 \pm 2.1$  and  $100.9 \pm 2.9$  SE, respectively).



Note. FD=Formerly Depressed, ND=Never-Depressed, MI=Mood Induction, DAS=Dysfunctional Attitude Scale

**Figure 2. Overall Dysfunctional Thinking Style (DAS) of FD and ND Groups Before and After a Mood Prime with the exclusion of Physical Activity**



Note. FD=Formerly Depressed, ND=Never-Depressed, MI+ PA= Mood Induction and Physical Activity Condition, MI=Mood Induction, DAS=Dysfunctional Attitude Scale.

**Figure 3. Overall Dysfunctional Thinking Style (DAS) of FD and ND Groups Before and After a Mood Prime with the Inclusion of Physical Activity**

### *Negative and Positive Affect of Groups across Experimental Condition*

As predicted, more negative affect was reported by individuals with a history of depression, especially after completing the negative mood prime. Nearly double in depression scores, FD group scored dramatically higher than the ND group (POMS:  $3.6 \pm 0.4$ ; VAS:  $46.3 \pm 2.8$  SE versus POMS:  $1.2 \pm 0.5$  SE; VAS:  $33.0 \pm 3.97$  SE, respectively). Interestingly, a pre to post MI main effect was found with nearly triple the degree of POMS depressed feelings reported by participants prior to engaging in the mood prime ( $1.4 \pm 0.5$  SE) compared to afterward ( $3.4 \pm 0.5$  SE) and this occurred irrespective of experimental condition. A very interesting finding was that VAS mood scores were more than two times lower prior as opposed to post MI ( $20.1 \pm 3.5$  to  $59.2 \pm 3.5$  SE), irrespective of group and experimental condition. Of notable interest was the finding that FD individuals scored nearly double in depressive scores compared to their ND peers in the MI+PA condition.

The pattern of increased negative affect for FD individuals and post MI was demonstrated with feelings of anxiety (POMS:  $2.9 \pm 0.3$  versus  $1.6 \pm 0.4$  SE and VAS:  $38.4 \pm 2.9$  SE versus  $29.2 \pm 4.2$  SE) and anger. Average anger ratings were double for FD participants ( $1.46 \pm 0.23$ ) compared to individuals without ( $0.7 \pm 0.3$  SE) and nearly doubled post MI ( $12.9 \pm 2.7$  to  $25.5 \pm 2.7$  SE). Significant increases in feelings of anger were observed in pre-to-post MI in both experimental conditions.

Not surprisingly, positive affect was also significantly reduced post MI and less likely reported by FD individuals. Individuals previously depressed reported feeling less happy than their ND peers ( $101.3 \pm 4.5$  versus  $110.4 \pm 6.3$  SE) and this was most evident post MI (from  $125.6 \pm 5.5$  to  $86.1 \pm 5.5$  SE). Interestingly, lower happiness scores were more likely found when PA was excluded from the experimental condition ( $109.1$



$\pm 5.5$  SE) than if it was included ( $102.6 \pm 5.5$  SE). FD participants were also far less optimistic ( $103.2 \pm 2.9$  SE) than the ND group ( $119.5 \pm 4.2$  SE) and significantly lower post MI (from  $125.5 \pm 3.6$  to  $97.1 \pm 3.6$  SE). FD consistently scored lower in optimism irrespective of experimental condition. Similar results were also found for other factors, including feeling energetic, vigorous, and relaxed, and ability to concentrate, that may substantially contribute to psychological well-being. Therefore, a main effect of group and/or mood prime on cognition and affect was typically found throughout the study and not limited to experimental conditions.

### *Heart Rate Response of Groups across Experimental conditions*

To ascertain whether FD participants would show a greater attenuation in Heart Rate (HR) than the ND group post MI in the MI only condition compared to the MI+PA condition, two analyses were conducted. First, GLM procedures ( $\alpha = 0.05$ ), between time 1 and time 2 measurements were conducted. Time period data was pooled once no significant differences of these measurements were found. Second, a repeated measures t-test was used to detect any differences in HR: (a) between groups (FD versus ND), (b) between experimental weeks (Time 1 versus Time 2), (c) in order of test administration (MI versus

Results revealed significant differences with HR response over time within each group at initial assessment with FD individuals experiencing significantly lower heart rates than ND individuals ( $75.5 \pm 1.6$  versus  $81.3 \pm 2.2$  SE, respectively). Heart rate decreased after the MI in both groups, with greater (non-significant) decreases for FD individuals. HR response from pre to post MI decreased from 95.4 to 83.5 bpm for FD individuals in comparison from 93.3 to 87.5 bpm for ND individuals. Heart rate values post PA were very similar for FD and ND individuals alike, (120.6 versus 114.1 bpm, respectively).

In relation to the TIME X ORDER interaction the average HR response was significantly elevated in the MI only condition at time 1,  $77.6 \pm 2.0$  SE bpm and time 2,  $86.4 \pm 2.0$  SE bpm. In the MI+PA condition, the average HR response at time 1 was  $90.43 \pm 2.0$  SE bpm and time 2 was  $83.7 \pm 2.0$  SE bpm. During the MI+PA condition, significant changes in HR occurred over time within each group. Additionally, a significant within TIME x GROUP interaction occurred. These results suggest that HR response significantly changed over time for each group, but that no significant differences were observed between groups when testing between-subjects effects. No other significant differences in scores were observed among groups or experimental weeks.

## **Discussion**

The results of the study partially support the hypothesis that acute physical activity has an inhibitory or buffering effect on thinking style and affective response solely for individuals with a history of depression. Consistent with study hypotheses, a negative thinking style was reported more often by individuals with a history of depression than those without, and this was most prominent after the MI in both experimental conditions. Importantly, these thoughts were not affected differentially by the experimental condition. That is, negativistic thinking was reduced in both groups regardless of the inclusion of

a physical activity task. Likewise, physical activity did not profoundly influence groups' self-reported positive automatic thoughts as expected. Significant changes in negative affect were also observed throughout the testing sessions with participants, particularly those with a history of depression, feeling the worst after engaging in the MI. In fact, reported feelings of depression, anger and anxiety more than doubled from pre-to-post MI in either condition.

Exercising at a higher-than-anticipated-intensity may be a likely reason for the findings and questions the validity of the physical output comparison of stair-climbing to normative exercises represented in the literature. More specifically, the step-task has been commonly used in studies as a natural and effective exercise to elevate heart rate in a short duration. In terms of metabolic expenditure, it has been described in the literature as analogous to walking and gardening (see Heyward, 2006). Although it was easily modified to adhere to participants' heart rate target zone, it is likely that despite these modifications, participants were engaged in higher intensity exercise.

The use of the industry standard of 220-age formula to determine and monitor physical exertion may be inexact (Robergs & Landwehr, 2002; Tanaka, Monahan, & Seals, 2001) and a contributing reason for participants exercising at a higher intensity. This is likely because its calculation of maximum heart rate is not dependent on gender or fitness level but by using age alone (Tanaka et. al 2001). In consideration of this, it is possible that participants' heart rate response was inaccurately represented and that they were exercising in a higher target heart rate zone rather than the moderate-intensity level proposed for this study.

Exercising at an unaccustomed high intensity has been associated with producing negative affect (Petruzzello, Jones, & Tate, 1997; Raglin & Wilson, 1996; Steptoe & Cox, 1988; Yeung, 1996), such as anger and stress, due to an increase in sympathetic arousal. It is also possible that the sudden or over-stimulation of the central nervous system because of the acuteness and intensity of the stair-climbing task may not have permitted the release of neurotransmitters typically associated with positive affect. This may explain why there was a significant decrease in feeling optimistic and an increase in negative feelings for participants after engaging in physical activity. Therefore, research on the physical output comparison of stair-climbing to normative exercises may not be accurately represented. For this reason, it may be advantageous for future researchers to use more appropriate exercise modalities and measures such as the BORG Rating of Perceived Exertion Scale (Borg, 1982), to better monitor participants' perceived exertion.

It is unlikely that the study's relatively small sample size would have negatively affected the results as the sample size was deemed sufficiently powerful (.87), by Cohen's (1992) criteria, to detect a medium effect size for a repeated experimental design. A more relevant drawback of the study is that exercising in a laboratory is not identical to exercising in a naturalistic environment and this can limit generalizability of results. Apart from the challenges faced by having research in a laboratory setting, such as its artificiality (e.g., participant demands and hypothesis guessing), it was considered a viable and ethical way to conduct this type of study. Easier access to this specific population and ability to minimize risk of injury or harm to participants was more adequately achieved in a hospital setting. A laboratory setting was also considered more appropri-

ate to minimize extraneous factors and to study factors that do not necessarily occur naturally. In such cases, selecting an alternative exercise apparatus that is more desirable to participants may be better suited in studies studying the exercise-mental health link. Elsewhere, for example, participants have rated exercising on the treadmill more favourable than stair climbing (Cox, Thomas, & Davis, 2001). Therefore, it may be worthwhile for researchers to consider the limitations and suggestions of the present study to facilitate more informed decisions of study measures. Importantly, conclusions are drawn based on a mood priming study that was first to investigate whether individuals vulnerable to depression may use a simple intervention such as a brief physical activity task to reduce their risk of relapse. Particular consideration of the current study's methodology may be beneficial for future study in this area.

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# Adolescent Behaviour Problems and Family Environment: The Mediating Role of Self-Efficacy

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The goal of this study was to examine associations between adolescent externalizing and internalizing behaviour problems, self-efficacy, and perceived family environment. A sample of 554 pupils from secondary schools in Latvia, 12-14 years of age, completed questionnaires regarding self-efficacy (Children's Perceived Self-Efficacy Scale, SPSE; Bandura, 2006), behaviour problems (Youth self-report, YSR; Achenbach, 2001) and family environment (Family Environment Scale, FES; Moos & Moos, 2002). The results indicate that family cohesion is positively associated with three aspects of self-efficacy: academic self-efficacy, social self-efficacy and self-regulative efficacy, and negatively with adolescents' behaviour problem ratings. The associations are reversed for family conflict. The relationships between perceived family environment characteristics and adolescents' behaviour problems are partially mediated by adolescents' self-efficacy in that a stronger sense of self-efficacy predicts fewer internalizing and externalizing behaviour problems.

**Key words:** Behaviour problems, family environment, self-efficacy.

## Introduction

Adolescence is a period of human development that is associated with multiple changes in the behavioral, cognitive, emotional and ideological realms. These changes occurring simultaneously often coexist with vigorous self-seeking, emotional instability, persistent questions about "Who am I? Where I am going?", new challenges and explorations, as well as conflicts, and misunderstandings within the family.

The developmental outcomes of adolescence, a period of increased risk for emotional and behavioural problems, can greatly influence further personality maturation and functioning (Youngblade & Theokas, 2006). Results of longitudinal research suggest that the long-term consequences of child and adolescent problem behaviour (especially externalizing problems) often encompass a wide spectrum of social maladaptation in adult life, including addiction, impaired family relationships, and criminal activity (Henderson, et al., 2006; Bongers, et.al, 2008). Consequently, The factors which contribute to healthy adolescent development or influence it negatively remain in need of further exploration. The present study examines the effect of family psychological environment and adolescents' self-efficacy on internalizing and externalizing behaviour.

Analyzing and exploring emotional and behavioural problems from the perspective of developmental systems theory and contextual psychology, emotional and behavioural problems as well as all other behaviours are considered to be the result of dynamic, bidirectional ecological interaction between a person and multiple levels of his or her environment (Lerner & Galambos, 1998; Cicchetti & Aber, 1998; Delsing, Oud & De Bruyn,

2005; Bronfenbrenner & Morris, 2006). In the past two decades, significant empirical research has been done to develop comprehensive models of the role of multiple contextual domains (relations among individual characteristics, social relationships, and larger effects of communities and institutions) on adolescent behaviour and well-being, including both risk and protective factors (Compas, Hinden & Gerhardt, 1995; Ary, et al., 1999; Parke, 2004; Costa, et al., 2005). Jessor (1993) has proposed a theoretical framework to explain and explore the development of problem behaviour in adolescence. The model includes three major systems of explanatory variables: the perceived-environment system (social controls, models, and support), the personality system (values, expectations, beliefs, attitudes toward self and society), and the behavioural system (both problem behaviours and conventional behaviours). Each system is composed of variables that serve either as risk or protective factors for the development of problem behaviour (Jessor, 1993; Costa, et al., 2005).

Jessor's (1993) model of the development of problem behaviour constitutes the theoretical framework of this research for examining of the association between adolescents' emotional and behavioural problems within the context of their perceived family environment and their sense of self-efficacy as an important aspect of the personality system.

### **Family environment and adolescent developmental outcomes**

The family is a primary socialization context and is therefore considered to be a very important factor influencing child development (White & Matawie, 2004). The both theoretical literature and empirical findings suggest that the family context plays a significant role in the adolescent's ability to successfully negotiate important developmental tasks. A positive family climate and nonconflictual family processes provide an emotionally supportive environment that helps the adolescent to feel secure enough to explore different values and beliefs, and to adjust to changes in the self, and to new environmental opportunities and demands (Pratt et al., 2003; Gutman & Eccles, 2007). Family environment is a widely used construct which makes it possible to conceptualize and study family systems and relationships. It includes such family relationship characteristics as expressiveness, cohesion, and level of conflict, and two essential characteristics of family system maintenance: organization and control (Moos, 1990). Within this construct, expressiveness refers to whether family members feeling free to express and discuss their feelings and emotions openly, cohesion is the extent to which family members are committed to the family unit, and conflict is assessed on the basis of frequency of to how often family interactions are angry and aggressive interactions. The two dimensions of system maintenance, organization and control, measure the degree of importance of clear organization and structure in planning family activities and responsibilities, as well as the extent to which set rules and procedures are used to run family life.

Adolescence is characterized by transformations in family relationships as parents' and adolescents' expectations about each other change (Lerner & Galambos, 1998). Families that are cohesive (i.e., open, communicative, and flexible) can accommodate better to the changing needs of family members during this time. Thus, it is suggested that adolescents from more cohesive families should be less inclined to resort to aggres-



sive and delinquent behaviours than adolescents in families that have trouble negotiating these issues (Richmond & Stocker, 2006).

Previous studies examining the role of family environment in adolescent development indicate that family environment influences adolescent's psychological adjustment and problem solving strategies (Aydin, & Oztutuncu, 2001; Jarvis, & Lohman, 2000), sense of well-being (DuBois, et al., 1992), as well as self-confidence and ability to set clear goals concerning their personal and professional future (Strage, 1998). Adolescents' internalizing and externalizing behaviour problems are related to their perception of their family environment (Lau & Kwok, 2000; Henderson, et al., 2006; Gutman & Eccles, 2007). Family cohesion and supportive relationships between family members facilitate adolescent psychological adaptation and decrease the probability of depression (Strage, 1998; Lau, & Kwok, 2000; Aydin, & Oztutuncu, 2001; Jewell, & Stark, 2003; Herman, Ostrander, & Tucker, 2007), and reduce the negative influence of stressful events on adolescent's well-being (DuBois, et al., 1992; Jarvis, & Lohman, 2000). These empirical findings suggest that a cohesive and supportive family environment serves as a secure base for adolescents' to develop effective coping strategies and the ability to manage the challenges they face.

Research regarding level of family conflict suggests that a higher level of parental conflict causes adolescents' insecurity and psychological distress, and negatively influences self-confidence (Dunkle, Fondacaro, & Pathak, 1998). A conflictual family environment is associated with aggressive behaviour and with conduct disorder (Jenkins, et al., 2005; George, Herman, & Ostrander, 2006), as well as with adolescents' avoidant coping (Jarvis, & Lohman, 2000) and depression (Herman, Ostrander, & Tucker, 2007).

Families with high cohesion and expressiveness, high levels of organization and low or medium levels of parental control generally tend to be associated with positive outcomes for adolescent development. In contrast, families that are high in conflict and control and low in cohesion and expressiveness are generally associated with more negative outcomes (Hamid, Leung, & Dong Yue, 2003).

### **Self-efficacy and adolescent developmental outcomes**

Contemporary research in the domain of emotions and behaviour has examined the effect of a person's cognitions of self-efficacy as a basis for motivation, psychological well-being and personal achievement in various aspects of life. Originally formulated by Bandura (1997), self-efficacy concerns people's beliefs in their ability to achieve given attainments. Perceived efficacy plays a key role in human functioning, because it affects behaviour not only directly but also by its impact on other determinants such as goals and aspirations, outcome expectations, affective proclivities, and perception of impediments and opportunities in the social environment. Bandura (1997) proposed that self-efficacy is central to emotional well-being. Empirical research indicates that self-efficacy is negatively associated with adolescents' concurrent depressive symptoms (Stewart, et al, 2004) and externalizing problem behaviour. Meta-analyses across different spheres of functioning confirm the major role of perceived self-efficacy in human self-development, adaptation, and change (Boyer, et al., 2000, as mentioned in Bandura, 2006).

Research in the field of social cognitive psychology assumes that personal efficacy serves a regulatory function in all major transitions in life, and is especially important during adolescence (Schunk, & Meece, 2006). Therefore, the self-efficacy construct has become an important target in developmental and clinical psychology research and intervention. Given that self-efficacy has proven to be an important contributor to success in a variety of domains, researchers theorize that it is likely to be critical in mastering successfully the various task demands, risks, and challenges in the passage through adolescence to adulthood (Zimmerman, & Cleary, 2006). Bandura also proposed that youngsters who enter adolescence beset by a disabling sense of inefficacy transfer their vulnerability to stress and dysfunction to new environmental demands, are less able to enlist familial guidance and support, and are more likely to be exposed to peer pressures conducive to various hazardous and transgressive activities (Bandura, 1997). In contrast, youngsters who have a high sense of self-efficacy are better equipped to cope with the transitional stressors of adolescence, to pursue activities that build competencies, to voice their opinions and aspirations effectively with parents and adults, and to resist peer pressures to engage in risky or antisocial conduct (Bandura, 1997).

### The present study

Examination of the existing literature suggests that there are definite associations between family environment, the quality of relationships within the family, perceived self-efficacy and adolescent externalizing and internalizing problem behaviours. However, despite previous research supporting the importance of family functioning and self-concept (including efficacy beliefs) in adolescent problem behaviour, these factors have rarely been studied together (Henderson, et al. 2006).

There is a high level of agreement about the importance of positive family environment for the development of a child's positive self-concept, self-confidence and self-efficacy in various domains of life. Also the empirical studies mentioned above underline the positive associations between self concept characteristics and adolescent behaviour. This allows suggesting that the impact of positive characteristics of family environment, such as family cohesion and low conflict level, will be both direct and indirect, mediated by perceived self-efficacy. The proposed theoretical model is presented in Figure 1.

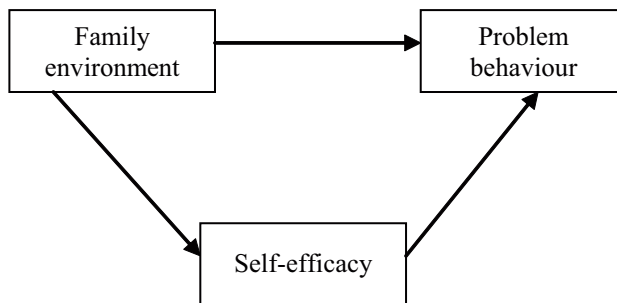


Figure 1. Theoretical model

The goal of the present study was to explore the associations between perceived family environment, adolescents' self-efficacy and internalizing and externalizing

behaviour problem ratings for 12-14 years old adolescents in a Latvian sample. The question was raised, which of the perceived family environment and self-efficacy domains are the most predictive of internalizing and externalizing behaviour problems for the adolescents in the sample.

This study also proposes to add to the existing literature by explore the possible mediating role of adolescents' self-efficacy in the proposed relationship between perceived family environment and adolescents' problem behaviour.

## Method

### *Participants*

The study sample included 554 adolescents (252 males, 302 females) attending 7th grade of Latvian secondary schools. The mean age of the participants was 13.2 years, ranging from 12 to 14 years in age. All of the pupils were attending Latvian-language based schools, and the vast majority of the adolescents were of Latvian ethnicity, from families who speak Latvian at home. The study sample was chosen so as to include representatives from both urban and rural areas, and from various socioeconomic status families. Study participants were from 12 schools in small towns and rural areas, and from 8 schools in the capital city of Riga. The adolescents were asked to rate their perception of the family's financial situation and the results were as follows: 14% of participants characterized the level of family income as high, 57% as fairly high, 21% as average and 8% as low. In regard to the parents' level of education, 56% reported that at least one of their parents had either partially or fully completed university education; 44% reported that neither parent had university education, but that both parents had completed either secondary school or vocational school.

### *Measures*

*Behaviour Problems.* To assess adolescents' externalizing and internalizing behaviour problems the Youth Self Report (YSR; Achenbach, 1991) was used. This self-report questionnaire was designed for use with adolescents between the ages of 11 and 18. The problem scoring part contains 112 items that measure symptoms in eight subscales concerned with anxiety/depression, withdrawal/depression, somatic complaints, social problems, thought problems, attention problems, aggressive behaviour, and rule breaking behaviour, respectively (Achenbach, 1991). The first three symptom subscales are referred to as "internalizing," whereas the subscales: aggressive behaviour and rule breaking behaviour, are referred to as "externalizing". Respondents rate each item on a 3-point scale (0 = not true, 1 = somewhat or sometimes true, and 2 = very true or often true) and scores for individual items are summed.

The YSR has been translated into Latvian with forward back translation (Sebre, & Laizane, 2006). In the present study, five of the YSR subscales: withdrawal/depression, anxiety/depression, social problems, aggressive behaviour, and rule breaking behaviour) were used. The scales of the Latvian version show high internal consistency levels ranging from 0.73 (for withdrawal/depression) to 0.83 (for aggressive behaviour). The Total Problems score was obtained by summing all items, with higher scores indicating endorsement of greater behavioral and emotional problems (Cronbach's alpha 0.94).

*Self-efficacy.* To provide a measure of self-efficacy the Children's Perceived Self-Efficacy Scale (CPSE; Bandura, 2006) was used. The CPSE was developed on the basis of the theoretical framework of social learning theory and Bandura's paradigm of self-efficacy. The CPSE is a self-report measure consisting of 34 statements that assess three perceived self-efficacy domains: academic self-efficacy, social self-efficacy and self-regulative efficacy. Academic self-efficacy items concern the individual's beliefs in his/her capability to manage his or her own learning, to master academic subjects, and to fulfill personal, parental, and teachers' academic expectations. Social self-efficacy items are about children's beliefs in their capability to initiate and maintain social relationships and manage interpersonal conflicts, as well as the capability to voice their opinions, to stand up to mistreatment, and to refuse unreasonable requests. Self-regulative self-efficacy items concern children's perceived capability to resist peer pressure to engage in high-risk activities. Participants are asked to rate the strength of their belief in their ability to execute the requisite activities. They record the strength of their efficacy beliefs by rating each item on a 10-point Likert-scale, ranging from 0 ("cannot do"); through intermediate degrees of assurance, 5 ("moderately certain can do"); to complete assurance, 10 ("highly certain can do").

For the purposes of this research the CPSE has been translated into Latvian with forward-reverse translation. The scales show high internal consistency levels. Cronbach's  $\alpha$  reliability coefficients for the three scales were as follows: 0.90 for academic self-efficacy; 0.87 for social self-efficacy; 0.74 for self-regulative efficacy and 0.94 for the Total Self-efficacy score that was obtained by summing all items, with higher scores indicating higher perceived self-efficacy.

*Family Environment.* To assess different characteristics of adolescents' family psychological environment the Family Environment Scale (FES; Moos & Moos, 2002) was used. The FES contains 90 declarative statements which are rated true or false in the original version. The subscales of the FES are grouped into three dimensions: Relationships (Cohesion, Expressiveness, Conflict); Personal Growth (Independence, Achievement Orientation, Intellectual-Cultural Orientation, Active-Recreational Orientation, Moral—Religious Emphasis); and System Maintenance (Organization, Control).

For purposes of this research the FES was translated into the Latvian language with forward-reverse translation. The format of possible answers was changed from true/false to Likert ratings, because in the pilot research using FES with true/false ratings the obtained Cronbach's alphas for some scales were particularly low, and it was expected that the internal consistency ratings may improve. The participants were asked to rate each item on a 5-point scale, ranging from "never or almost never characterizes my family" to "always or almost always characterizes my family". In the present study, only the Family Cohesion, Conflict, Independence, Family Achievement Orientation, Organization and Control subscales were used.

The Cohesion subscale demonstrated a high level of internal consistency - Cronbach's Alpha of 0.75. The internal consistencies for the subscales Family Conflict and Family Organization were 0.67 and 0.57 respectively. The Independence and Family Control subscales demonstrated a lower level of internal consistency of 0.31 and 0.46 respectively and were excluded from subsequent analyses. This finding is consistent with

other previous research using the FES and also reporting low alphas, often below 0.50, for some specific scales, including the Control and Independence scales (Gondoli & Jacob, 1993; Roosa & Beals, 1990; Sanford, Bingham, & Zucker, 1999).

*Demographic information.* Participants were also requested to answer social and demographic questions about age, gender, family income, parent education, and parent marital status.

### Procedure

A researcher distributed the questionnaires to groups of 15 to 20 pupils during a home-room period when the teacher was not present. The questionnaires were completed and returned to the researcher during the same period.

Pupils and their parents were informed about the research and parental consent was initially established. Participants and their parents were informed that the research was about adolescents' behaviour and emotions, efficacy to perform different daily tasks, and opinions concerning family. They were assured that participation was voluntary and anonymous. Six percent of the contacted parents indicated that they did not want their child to participate in the research, and this was respected.

## Results

All mean values for obtained YSR scales fall within the normal range according to the Latvian standardization sample (Sebre & Laizane, 2006).

The Pearson correlations of perceived family environment characteristics, adolescents' self- efficacy and problem behaviour ratings are shown in Table 1.

*Table 1. Pearson Correlations of Perceived Family Environment Characteristics, Adolescents' Self-efficacy and Problem Behavior Ratings (n = 554)*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Family cohesion	-										
2. Family conflict	-.57**	-									
3. Family achievement orientation	.15**	0	-								
4. Family organization	.43**	-.32**	.34**	-							
5. Academic self-efficacy	.41**	-.27**	.15**	.32**	-						
6. Social self-efficacy	.42**	-.32**	.10*	.19**	.62**	-					
7. Self regulative efficacy	.35**	-.29**	.07	.21**	.59**	.59**	-				
8. Anxious/ depressed	-.29**	.33**	.18**	-.08	-.15**	-.30**	-.18**	-			
9. Withdrawn/ depressed	-.34**	.33**	.11**	-.11**	-.23**	-.43**	-.26**	.71**	-		
10. Social problems	-.29**	.31**	.08	-.08	-.23**	-.41**	-.22**	.73**	.66**	-	
11. Rule breaking behavior	-.31**	.29**	.08	-.15**	-.34**	-.28**	-.42**	.46**	.42**	.46**	-
12. Aggressive behavior	-.33**	.39**	.10*	-.16**	-.29**	-.26**	-.35**	.54**	.50**	.55**	.75**

Note. \* p < .05; \*\* p < .01;

It was found that the perceived family environment relationship characteristics, family cohesion and family conflict, are associated significantly with three aspects of perceived self-efficacy, academic self-efficacy, social self-efficacy and self regulative efficacy, as well as with adolescents' behaviour problem ratings. Family cohesion was positively associated with the sense of self-efficacy, and negatively with the internalizing and

externalizing behaviour problem ratings. The associations with family conflict were in the opposite direction: conflict was negatively associated with sense of self-efficacy, and positively, – with internalizing and externalizing behaviour problem ratings (Table 1).

As to the other characteristics of perceived family environment, results suggest that family organization is associated positively with all three aspects of perceived self-efficacy and negatively associated with adolescents' withdrawal/depression, rule breaking and aggressive behaviour (Table 1).

The results also reveal that perceived self-efficacy was negatively associated with internalizing and externalizing behaviour problem ratings. Among the three perceived self-efficacy domains, the social self-efficacy correlated more strongly than the other two domains with the internalizing behaviour problems (Anxiety/depression, Withdrawal/depression) and with social problems' ratings. However, the self-regulative efficacy domain correlated more strongly than the other two domains with the rule breaking behaviour and aggressive behaviour ratings, as seen in Table 1.

Subsequent analyses involved a series of simultaneous multiple regression computations to examine the relative strength of the perceived family environment domains and self-efficacy domains in the predicting of adolescents' externalizing and internalizing behaviour problems.

As shown in Table 2, significant predictors of externalizing problem behaviours for 12-14 years old adolescents the variables predicting externalizing problem behaviour ratings were interpersonal relationships within the family and one of the domains of perceived self-efficacy.

**Table 2. Simultaneous Multiple Regression of Family Environment and Self-efficacy Variables onto Adolescent Externalizing Problem Behaviour Ratings (n = 554)**

<i>Variable</i>	<i>B</i>	<i>SE (B)</i>	$\beta$	<i>F</i>	<i>R</i> <sup>2</sup>
<i>Externalizing problem behaviour</i>					
Aggressive behaviour				81.80***	.23
Family conflict	0.42	0.05	.27***		
Self regulative efficacy	-0.72	0.11	-.24***		
Rule breaking behaviour				69.26***	.20
Self regulative efficacy	-0.83	0.10	-.34***		
Family cohesion	-0.19	0.04	-.21***		
Social problems				87.47***	.24
Social self-efficacy	-1.05	0.11	-.38***		
Family conflict	0.18	0.03	.21***		

Note. \*\*\*  $p < 0.001$ ;

In the first regression analysis adolescents' aggressive behaviour was entered as the dependent variable and all the perceived family environment and self-efficacy variables were entered as independent variables. The multiple correlation was significantly different from zero,  $F(2, 551) = 81.80, p < .001$ . Family conflict accounted for 17% of the variance and lower sense of self-regulative efficacy accounted for an additional 6% of the variance (Table 2). In the second regression analysis rule breaking behaviour was entered as the dependent variable and all the perceived family environment and self-efficacy variables were entered as independent variables. The multiple correlation was significantly different from zero,  $F(2, 551) = 69.26, p < .001$ . Adolescents' sense of self-regulative

efficacy accounted for 16% of the variance, and lower family cohesion accounted for an additional 4% of the variance (Table 2). When similar regression analysis was done with adolescents' social problems entered as the dependent variable, the regression was also significantly different from zero,  $F(2, 551) = 87.47, p < .001$ . Lower sense of social self-efficacy accounted for 20% of the variance, and family conflict accounted for an additional 4% of the variance (Table 2).

As seen in Table 3, for adolescents' internalizing behaviour problems the strongest predictor variables involved family conflict and sense of social self-efficacy.

**Table 3. Simultaneous Multiple Regression of Family Environment and Self-efficacy Variables onto Adolescent Internalizing Problem Behaviour Ratings (n = 554)**

Variable	B	SE (B)	$\beta$	F	R <sup>2</sup>
<i>Internalizing Problem Behaviour</i>					
Anxiety/ Depression				59.29***	.18
Family conflict	0.27	0.04	.27***		
Social self-efficacy	-0.80	0.13	-.25***		
Withdrawal/ Depression				82.44***	.23
Social self-efficacy	-0.78	0.08	-.37***		
Family conflict	0.14	0.03	.21***		

Note. \*\*\*  $p < 0.001$ ;

In the first regression analysis adolescents' anxiety/depression was entered as the dependent variable and all the perceived family environment and self-efficacy variables were entered as independent variables. The regression was significantly different from zero,  $F(2, 551) = 59.29, p < .001$ . Family conflict accounted for 12% of the variance and lower sense of social self-efficacy accounted for an additional 6% of the variance (Table 3). In the second regression analysis adolescents' withdrawal/depression was entered as the dependent variable and all the perceived family environment and self-efficacy variables were entered as independent variables. The regression was significantly different from zero,  $F(2, 551) = 82.44, p < .001$ . Lower sense of social self-efficacy accounted for 19% of the variance, and family conflict accounted for an additional 4% of the variance (Table 3).

**Table 4. Summary of Regression Analyses Predicting the Mediating Role of Perceived Self-efficacy in the Relation between Problem Behaviour and Family Cohesion**

		$\beta$	R <sup>2</sup>	Sobel test	
				z	p
Regression 1 <sup>a</sup>	Family cohesion	.42***	.18***		
Regression 2 <sup>b</sup>	Step 1				
	Family cohesion	-.38***	.15***		
	Step 2				
	Family cohesion	-.25***	.23***	-6.28	.000
	Total self-efficacy	-.32***			

Note. <sup>a</sup> Dependent variable is Total Self-efficacy, <sup>b</sup> Dependent variable is Total Problem Behaviour, \*\*\*  $p < 0.001$

For testing the hypothesis of perceived self-efficacy mediating the relationship between family cohesion and behaviour problems, first adolescents' total self-efficacy was regressed on family cohesion. This was followed by a two-step hierarchical linear regression with Total Problem Behaviour ratings entered as the dependent variable (see Table 4). In Step One, problem behaviour was regressed on family cohesion, followed

by Step Two wherein family cohesion was controlled and perceived self-efficacy was introduced. Finally the Sobel's test for testing the significance of mediation was computed (Preacher & Leonardelli, 2001). The formula for the test was drawn from MacKinnon, Lockwood, Hoffman, West, and Sheets (2002).

As shown in Table 4, the regression coefficient for perceived self-efficacy was significant in contributing to adolescents' problem behaviour when family cohesion was controlled, indicating the mediating role of perceived self-efficacy ( $\beta = -.32$ ;  $R^2 = .23$ ,  $p < .001$ ). The regression coefficient of family cohesion decreased in Step 2, which signified that perceived self-efficacy partially mediated the relationship between problem behaviour and family cohesion. The Sobel test revealed significant evidence of partial mediation by perceived self-efficacy ( $z = -6.28$ ,  $p < .001$ ).

The same procedure was repeated for testing the mediating role of perceived self-efficacy between problem behaviour and family conflict. The analyses, summarized in Table 5 show a significant regression coefficient for perceived self-efficacy, which contributed to adolescents' problem behaviour when family conflict was controlled; this again indicated the mediating role of perceived self-efficacy ( $\beta = -.33$ ;  $R^2 = .26$ ,  $p < .001$ ). The regression coefficient of family conflict decreased in step 2, which signified that perceived self-efficacy partially mediated the relationship between problem behaviour and family conflict. The Sobel test revealed significant evidence of partial mediation by perceived self-efficacy ( $z = 5.79$ ,  $p < .001$ ).

**Table 5. Summary of Regression Analyses Predicting the Mediating Role of Perceived Self-efficacy in the Relation between Problem Behaviour and Family Conflict**

		$\beta$	$R^2$	<i>Sobel test</i>	
				<i>z</i>	<i>p</i>
<i>Regression 1<sup>a</sup></i>	Family conflict	-.33***	.11***		
<i>Regression 2<sup>b</sup></i>	<i>Step 1</i>				
	Family conflict	.41***	.17***		
	<i>Step 2</i>				
	Family conflict	.31***	.26***	5.79	.000
	Total self-efficacy	-.33***			

*Note.* <sup>a</sup> Dependent variable is Total Self-efficacy, <sup>b</sup> Dependent variable is Total Problem Behaviour, \*\*\*  $p < 0.001$

## Discussion

The goal of the present study was to explore the associations between perceived family environment, sense of self-efficacy and internalizing and externalizing behaviour problem ratings for 12-14 year old adolescents in Latvia. Furthermore, the study examined which of the perceived family environment and self-efficacy domains are the most predictive of internalizing and externalizing behaviour problems and whether there is the mediational effect of perceived self-efficacy in the relationship between family environment and behaviour problems.

On the basis of previous findings, it was expected that a more positive family environment characterized by high cohesion, less family conflict, and good organization as perceived by adolescents would be positively associated with adolescents' self-efficacy ratings and negatively associated with behaviour problems. The Research results



supported these predictions by demonstrating associations of family environment characteristics with self-efficacy domains and externalizing and internalizing behaviour problems. Adolescents who characterized their families as being more cohesive and less conflictual reported a higher sense of self-efficacy and lower internalizing and externalizing behaviour problems ratings than adolescents who perceived their families as less cohesive and higher in conflict. These findings are consistent with previous studies demonstrating that problems in family relationships relate to poorer developmental outcomes for adolescents (DuBois, et al., 1992; Jarvis & Lohman, 2000; Aydin & Oztutuncu, 2001; Pratt et al., 2003; Henderson, 2006; Gutman & Eccles, 2007; Herman, Ostrander & Tucker, 2007).

Family cohesion was negatively associated with all five subscales of adolescents' problem behaviour that were examined, both externalizing and internalizing. Very important is the finding that family cohesion was one of the main variables negatively predicting adolescents' rule breaking behaviour in the present sample. Cohesive families are characterized by emotional connectedness, openness, and flexibility (Moos & Moos, 1976), and these aspects facilitate the adolescents' ability to cope with developmental challenges. Adolescents in cohesive families may be more likely to use multiple family members as sources of support and feel more comfortable discussing personal issues than adolescents in families characterized by strife, rigidity, and emotional distance.

Ratings of family conflict were positively associated to adolescents' behaviour problems and appeared to be the main variable predicting adolescents' aggressive behaviour and anxiety and depression ratings. It can be proposed that persistent negative social interactions may cause adolescents insecurity and psychological distress and leading to maladjustment and emotional difficulties, such as anxiety, withdrawal and depression. Conflict within the family can undermine adolescents' self-confidence, increase stress, and distance the adolescent from an important source of social support. Higher levels of family conflict also in previous studies have been related to adolescent psychological difficulties, such as aggressive behaviour and conduct disorder (Jenkins, et al., 2005; George, Herman & Ostrander, 2006), avoidant coping (Jarvis & Lohman, 2000) and depression (Herman, Ostrander & Tucker, 2007).

As to the other characteristics of perceived family environment, the results show that family organization is associated positively with all three aspects of perceived self-efficacy, and negatively with adolescents' withdrawal/depression, rule breaking and aggressive behaviour. These results support the importance of clear organization and structure in planning family activities and assigning responsibilities to enhance adolescent self-confidence and more adaptive behaviour, as has also been emphasized in the literature (Hamid, Leung, & Dong Yue, 2003).

The results of the current study reveal that all three of the assessed aspects of perceived self-efficacy were significantly negatively associated with internalizing and externalizing behaviour problem ratings. This finding is consistent with previous empirical research indicating that perceived self-efficacy plays an important role in different spheres of human self-development and adaptation (Boyer, et al., 2000).

The finding that adolescents' perceived academic self-efficacy was negatively associated with all of the problem behaviors and positively associated with social and self-

regulative efficacy is consistent with the assumption that school achievement is one of the critical tasks defining a sense of competence during the developmental period of adolescence (Dotterer, et al., 2008). Adolescents spend about a third of their day (and more if homework time is included) in the academic setting, therefore, their beliefs and perceptions about their academic capabilities may be crucial for a positive self-concept, emotional well-being and adaptive functioning across different domains. The finding that academic self-efficacy is positively correlated with family cohesion suggests that a positive and supportive family environment can enhance the adolescents' preparation for school and positive academic behaviors within the school setting. In contrast, the finding that family conflict is associated with less academic self-efficacy suggests that the lack of a supportive family environment can serve to undermine the adolescents' engagement in schoolwork and undermine the ability to take on challenging tasks which are necessary for greater success in school. Problems at home can be distracting to adolescents and can interfere with their performance at school. In regard to the possibility of bidirectional influences, it may be possible that when an adolescent is less successful at school, this can be a source of additional stress and tension within the family relationships.

The research results concerning other assessed domains of perceived self-efficacy it is worth noting that the social self-efficacy domain correlated more strongly with the internalizing behaviour problems and with social problems ratings than with the other two domains of perceived self-efficacy. This finding underlines the importance of positive peer relations for the development and emotional well-being of adolescents. The self-regulative efficacy domain correlated more strongly with rule breaking behaviour and aggressive behaviour ratings than the other two domains of perceived self-efficacy. In the case of adolescents' perceived capability to resist peer pressure toward engaging in high-risk activities, self-regulative efficacy may be hypothesized to be one of the protective factors reducing the possibility of externalizing behaviour problems in adolescence.

Research results showed the effect of partial mediation of Total self-efficacy in the associations between family relationships characteristics (family cohesion, family conflict) and adolescents' behaviour problems. This finding indicates that the impact of family relationships on adolescents' externalizing and internalizing behaviour problems is both direct and indirect through the effect of self-efficacy. For example, family conflicts and decreased family cohesion through the social learning process enhance the probability of adolescent imitating aggressive behaviour and using aggression to solve problems. In addition the negative family environment and relationships between family members may lead to adolescent's insecurity, the development of negative cognitions and negative self-schemas, and a disabling sense of inefficacy that makes adolescents vulnerable to different stressors and the development of maladaptive functioning.

The research results are consistent with the theoretical assumption, that self-efficacy is a positive psychological concept that is important in preventing internalizing and externalizing symptoms in adolescents.

### *Limitations of the study and implications for further studies*

A number of limitations need to be considered. First, the study was focused solely on the family environment context. As stated in the introduction, there are many other contexts which influence adolescent development, for example, peer relationships and school environments, which are influential during the adolescent period. Second, the effects of using adolescents' own reports of their behaviour problems, sense of self-efficacy, and perceptions of family environment should be considered. Additional evaluations of the family environment and adolescents' behaviour from several sources would be useful in future studies. However, it should be noted that some adolescent researchers stress the importance of the adolescent's subjective experience arguing that the way children perceive family environment has greater influence on their development than the parents' actual behavior and family environment characteristics (Smetana & Daddis, 2002). It can be suggested that since individual's perceptions guide behaviour they are important regardless of the degree to which they reflect the actual situation. Thus, the adolescent perceptions reported in this paper are important data sources regarding family environment.

A more important limitation involves certain specific aspects of the measures used. In regard to the measurement of family environment, it is unfortunate that in this study the Independence and the Control subscales items showed such low levels of consistency that it was not appropriate to use the ratings from these subscales in further analyses. However, in further studies regarding behaviour problems within the context of the family environment the issue of adolescent autonomy and family control should be examined with the scales that are reliable and valid within the Latvian sociocultural context.

It is worth noting that the design of the current study does not allow making conclusions about the direction of effects. One can assume that family variables predict adolescent outcomes. Yet, it is likely that the family psychological environment may change as a result of the adolescents themselves. For example, adolescents with behavioural problems are likely to make it difficult for a family to interact in an open, flexible, and harmonious manner, with the result that family conflicts may increase. Moreover, parents may give their adolescent children more independence if the adolescents appear to be strong in feelings of self-efficacy and be able to handle more responsibility. The possibility that the influence of family characteristics, children's behavioural problems and self-efficacy beliefs is bidirectional and fluctuating permits the suggestion that further exploration of the proposed variables by means of longitudinal research designs would be important. Longitudinal data would help describe the relationship between adolescent internalizing and externalizing behaviour problems, sense of self-efficacy and perceived family environment better, and would shed more light on the developmental trajectory of adolescent difficulties associated with impaired family functioning.

### *Clinical implications*

The given research results have practical implications concerning different preventive programs for adolescent internalizing and externalizing symptoms. This study suggests that these preventive efforts can target different aspects of adolescent life. A positive family psychological environment and positive family relationships can be a precious

resource for adolescent successful negotiation of developmental challenges. Concerning psychological help for adolescents with problem behaviour or emotional difficulties, the functioning of the entire family should be addressed. Interventions aimed at promoting communication among family members, developing family cohesion, and improving conflict resolution skills of family members can be important for the psychological support of the adolescent. The importance of self-efficacy for adolescent adaptive functioning highlights possible interventions by working with the adolescent on the individual level. These might include exercises to foster self-efficacy through positive experience at school, in extracurricular activities (sports, music, social events), and training in specific skills that are important in adolescent everyday life (academic skills, social skills, coping and problem-solving skills). Within the bioecological model of individual development, it can be proposed that intervention programs in the educational system designed to contribute to the development of adolescent positive self-efficacy can serve as protective factors against adolescents' emotional and behavioural difficulties.

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# Factorial validity of the Latvian and Russian versions of the Zimbardo Time Perspective Inventory in Latvia

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This study evaluates the factor structure of Latvian and Russian versions of the Zimbardo Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999) in two ethnolinguistic samples in Latvia. The Latvian sample consisted of 278 high school students (93 male and 185 female). The Russian sample included of 407 high school students (258 female and 149 male). Exploratory factor analysis revealed similarities and differences in the structure of the Latvian and Russian ZTPI. Seven factors yielded by parallel analysis in both samples provide evidence of a more complex structure of time perspective and a basis for the further progress in research on it.

**Key words:** time perspective, the ZTPI, exploratory factor analysis, parallel analysis

## Introduction

The continuous flow of time results in the extension of individual past experiences and limitation of future opportunities. The concept of *time perspective* (TP) introduced by Lewin (1951) involves the totality of individual's views on the past and the future presented at a given time. Research on TP highlights the complexity of the construct (Nuttin & Lens, 1985) and the lack of instruments for measuring the three categories of TP: the past, the present and the future (Keough, Zimbardo & Boyd, 1999). Empirical studies of TP were predominantly future-oriented (for a review see Nurmi, 1991), which is in accordance with the orientation towards the future in industrialized individualistic cultures (e.g., Kim, 2000). An important expansion of the research field is related to the development of *the Zimbardo Time Perspective Inventory* (ZTPI, Zimbardo & Boyd, 1999). The present study examines the factorial structure of the Latvian and Russian versions of the ZTPI in the context of recent findings.

## Zimbardo Time Perspective Inventory

The ZTPI was constructed in the process of various iterations from the first version of the inventory (Gonzalez & Zimbardo, 1985; Zimbardo & Gonzalez, 1984) through the three factor structure (Zimbardo, Keough, & Boyd, 1997; Keough, Zimbardo, & Boyd, 1999) to the best known five factor structure of TP (Zimbardo & Boyd, 1999). The final structure of the inventory reflects an empirically established model of TP that includes the individual's views on the past, present and future.

The structure of the ZTPI is more complex than three time categories. The past, present and future in each individual's TP are presented as *five* factors. The past is presented as negative or positive in the *Past-Negative* and *Past-Positive* scales. The present

appears as a disposition to enjoy life, or submissiveness to fate. These dispositions are reflected in the *Present-Hedonistic* and *Present-Fatalistic* scales respectively. The *Future* scale represents an individual's goal-orientation and planning activities.

In general, research using TP as a key variable and the ZTPI as a measurement instrument looks at how concrete time orientation is related to an individual's attitudes and behaviour. Using the inventory extends the research field to a variety of topics: self-regulation (Harber, Zimbardo, & Boyd, 2003; Twenge, Catanese, & Baumeister, 2003) and procrastination (Diaz-Morales, Ferrari, & Cohen, 2008), achievement (Adelabu, 2007) and well-being (Drake, Duncan, Sutherland, Abernethy, & Henry, 2008), health (Pluck, Lee, Lauder, Fox, Spence, & Parks, 2008; Shores & Scott, 2007) and substance misuse (Keough et al., 1999), risky behaviour (Apostolidis, Fioulaine, Simonin, & Rolland, 2006; Zimbardo et al., 1997) and gambling (MacKillop, Anderson, Castelda, Mattson, & Donovanick, 2006).

Establishment of the five factor structure of TP increased the percent of variance explained by the factors and the reliability of ZTPI scales. Thus, an earlier form of the ZTPI demonstrated Cronbach's alpha coefficients from .57 to .72 (Adelabu, 2007; Keough et al., 1999), but the five factor model of the inventory demonstrates internal consistency from .74 to .82 (Zimbardo & Boyd, 1999). The maximum variance explained (35.9%) was achieved in the Zimbardo and Boyd (1999) study. One more important step in developing the ZTPI was its wide ranging validation (Zimbardo & Boyd, 1999).

The adaptation of the ZTPI into many languages extended research on TP. The factorial structure of the ZTPI, the reliability of its scales and the validity of the constructs were in question for researchers. Two important tendencies can be observed. The first is confirmation of the five factor structure with some loss in total variance explained. For example, the French version explains from 32.8% to 34.4% of variance (Apostolidis et al., 2006). The second is the lower reliability of adapted versions than of the original. For example, the Italian version of the shortened ZTPI showed a decrease in the internal consistency of the scales (D'Alessio, Guarino, De Pascalis, & Zimbardo, 2003). Cronbach's alpha coefficients of the Italian shortened version range from .49 to .67. Table 1 presents Cronbach's alphas of the original inventory (Zimbardo & Boyd, 1999) and of the French (Apostolidis et al., 2006), German (B. Reuschenbach, personal communication, May 24, 2006), Brazilian-Portuguese (Milfont, Andrade, Belo, & Poesa, 2008) and Spanish (Diaz-Morales et al., 2008) ZTPI scales. Changes in reliability were interpreted within the context of the construct (e.g., Apostolidis et al., 2006) and cultural differences in TP (e.g., Milfont et al., 2008).

**Table 1. Internal consistency of the original and adapted versions of the ZTPI**

<i>Language</i>	<i>Past-Negative</i>	<i>Present-Hedonistic</i>	<i>Future</i>	<i>Past-Positive</i>	<i>Present-Fatalistic</i>
English (original ZTPI)	.82	.79	.77	.80	.74
French	.77	.77	.75	.70	.67
German	.78	.80	.67	.71	.72
Brazilian-Portuguese	.60	.55	.67	.60	.46
Spanish	.80	.79	.70	.70	.64

*Note.* Data for the German version are from personal communication (B. Reuschenbach, personal communication, May 24, 2006).



At the same time, researchers examined alternative structures of individual TP measured by the ZTPI. On the one hand, the five factor structure demonstrates a statistically better fit than both the one-dimensional and the three-factorial solutions (Milfont et al., 2008). On the other hand, Worrell and Mello (2007) found that exploratory factor analysis supported a six-factor structure with the additional factor reflecting negative feelings about the future. One more finding emerged from a cluster analysis conducted by Shores and Scott (2007). The *Undifferentiated* cluster was identified in addition to five clusters of respondents consistent with five ZTPI factors. These findings indicate that the ZTPI does not fully describe individual TP. However, this Inventory does it more fully than any other existing TP scale (Apostolidis et al., 2006; Zimbardo & Boyd, 1999).

### **Latvian and Russian ZTPI versions**

The ZTPI was used in Latvia for the first time in a study of the relationship between high school students' TP and locus of control (Kolesovs, 2002). The ZTPI was translated into Russian for the Russian participants (ethnic minority in Latvia). The results of confirmatory factor analysis (via maximum-likelihood estimation with varimax rotation) confirmed the five factor structure of the ZTPI with 29.2% of variance explained. Cronbach's alphas of scales ranged from .70 to .79.

A decrease in the reliability of two scales was observed when comparing the first Latvian version of the ZTPI with the Russian one (Kolesovs, 2004). Reliability coefficients of the Past-Positive and Present-Fatalistic scales ranged from .54 to .74 for both Latvian and Russian versions of the ZTPI. The Past-Negative, Present-Hedonistic and Future scales had sufficiently high reliability coefficients, ranging from .71 to .90. The Latvian version showed a similar five factor structure with 29.0% percent of variance explained.

Continuous research on TP in Latvia (Kolesovs, 2005, 2007) and recent findings on the structure of the ZTPI (e.g., Worrell & Mello, 2007) have opened new possibilities for exploring the model of TP. For this reason, the present study is focused on the evaluation of the factorial structure of the Latvian and Russian versions of the ZTPI. It is expected that exploratory factor analysis may yield more than five factors in the model of TP.

## **Method**

### ***Participants***

Research participants were 685 high school students (mean age = 17.68, *SD* = 0.60). The Latvian sample consisted of 278 students (93 male and 185 female, mean age = 17.73, *SD* = 0.61). The Russian sample consisted of 407 students (258 female and 149 male, mean age = 17.65, *SD* = 0.60).

### ***Measures***

*The Zimbardo Time Perspective Inventory* (Zimbardo & Boyd, 1999). The ZTPI consists of 56 items and asks respondents to rate each statement on a 5-point Likert scale ranging from "very uncharacteristic" to "very characteristic". The ZTPI was translated from English into Russian and Latvian and then back into English (Kolesovs, 2002, 2004). The

translation of the inventory was carried out according to the guidelines for translating psychological instruments (Van de Vijver & Hambleton, 1996). Below is a brief description of the scales and the reliability coefficients for the Latvian and Russian versions of the ZTPI (Kolesovs, 2004):

1. *Past-Negative*. The scale reflects a generally negative, aversive view of the past. It includes 10 items. A typical item is: "I think about the bad things that have happened to me in the past." Cronbach's alpha coefficients were .77 for the Latvian version and .76 for the Russian version of the scale. Retest coefficients (four weeks later) were .89 and .90, respectively.
2. *Present-Hedonistic*. The scale reflects a hedonistic, risk-taking attitude towards time and life. It contains 15 items. A typical item is: "I do things impulsively." Cronbach's alpha coefficients were .77 for the Latvian version and .73 for the Russian version. Retest coefficients were .84 and .73, respectively.
3. *Future*. The scale reflects a general future orientation. The number of items is 13. A typical item is: "I make lists of things to do." Cronbach's alpha coefficients were .77 and .72. Retest coefficients were .82 and .78 for the Latvian and the Russian versions.
4. *Past-Positive*. The scale reflects a warm, sentimental attitude towards the past. It consists of nine items. A typical item is: "Happy memories of good times spring readily to mind." Cronbach's alpha coefficients were .64 and .63. Retest coefficients were .74 and .54 for the Latvian and the Russian versions.
5. *Present-Fatalistic*. The final scale of the ZTPI, composed of nine items, represents a fatalistic, helpless, and hopeless attitude towards the future and life in general. A typical item is: "My life path is controlled by forces I cannot influence." Cronbach's alpha coefficients were .66 for both versions. Retest coefficients were .69 and .81 for the Latvian and Russian versions, respectively.

### *Procedure*

Data analysis was performed on the data collected in the spring semesters of 2002, 2003 and 2004. The Zimbardo Time Perspective Inventory was filled out with no time limit in groups of 10 to 30 people. The questionnaire was administered in Latvian for Latvian school students and in Russian for Russian school students.

## **Results**

The analysis of the data was performed for the Latvian and Russian samples separately. The Kaiser-Meyer-Olkin measure of sampling adequacy was .74 for the Latvian sample and .77 for the Russian one.

Exploratory factor analysis via the principal component method with varimax rotation yielded 17 factors with eigenvalues greater than 1.0 (Kaiser method) in the Latvian sample. The same procedure with the data of the Russian sample also yielded 17 factors with eigenvalues greater than 1.0. The percentage of variance explained by these factors was 63.3% in the Latvian sample and 60.2% in the Russian sample. Both structures were not parsimonious (i.e., they did not explain variance with as few factors as possible).

Therefore, an alternative criterion was applied to determine the number of factors in both models.

The procedure of parallel analysis (PA) suggested by Horn (1965) was applied to determine the number of factors that should be retained. The PA procedure is regarded as one of the best criteria for deciding on the number of factors (e.g., O'Connor, 2000). Examination of the results of PA (Table 2) indicated that the first seven actual eigenvalues are greater than those generated by PA. Therefore, seven factors were retained for a further interpretation of the Latvian and Russian versions of the ZTPI.

**Table 2. Actual, random averages and random 95th percentile eigenvalues from exploratory factor analysis and parallel analysis on data of the Latvian (n = 278) and Russian (n = 407) samples**

Factor	Latvian			Russian		
	Actual eigenvalue	Average eigenvalue	$P_{95}$ eigenvalue	Actual eigenvalue	Average eigenvalue	$P_{95}$ eigenvalue
1	<b>5.81</b>	1.99	2.10	<b>5.82</b>	1.81	<b>1.90</b>
2	<b>4.78</b>	1.89	1.98	<b>4.31</b>	1.73	<b>1.78</b>
3	<b>4.11</b>	1.83	1.88	<b>3.87</b>	1.67	<b>1.72</b>
4	<b>2.77</b>	1.76	1.81	<b>2.44</b>	1.62	<b>1.67</b>
5	<b>2.08</b>	1.71	1.76	<b>2.08</b>	1.58	<b>1.62</b>
6	<b>1.84</b>	1.66	1.70	<b>1.87</b>	1.54	<b>1.58</b>
7	<b>1.67</b>	1.61	1.65	<b>1.58</b>	1.50	<b>1.54</b>
8	1.52	1.57	1.61	1.43	1.47	<b>1.50</b>
9	1.45	1.53	1.57	1.37	1.44	<b>1.47</b>
10	1.42	1.49	1.52	1.32	1.40	<b>1.43</b>

*Notes.* Parallel analysis was conducted with 50 sets of random data. The table shows the first 10 actual eigenvalues drawn from exploratory analysis. Boldfaced actual eigenvalues were greater than the corresponding eigenvalue from the random data (either the average or the 95th percentile).

The seven factors of the Latvian ZTPI explained 34.1% of the variance. Table 3 presents factorial loadings of items. Factor 1 was interpreted as an actualization of individuals' traumatic past experiences. Factor 2 reflected focusing on feelings and emotional experiences. Factor 3 characterized dealing with deadlines. Factor 4 reflected risk-taking behaviour and sensation seeking. Factor 5 characterized external control over the individual's life course. Factor 6 reflected daily planning activities and consideration of consequences. The last factor, Factor 7, was interpreted as internal attributions of past failures.

Five factors of the original ZTPI were not identified as independent factors. The Past-Negative factor was represented in two factors: negative experiences (Factor 1) and internal attribution of past failures (Factor 7). It should be noted that Factor 1 included the most highly loading items of the original Past-Negative factor (Items 50, 16 and 34). The Present-Hedonistic factor combined with the Past-Positive factor in Factor 2. However, risk-taking attitude (Factor 4) was represented separately from positive emotions and enjoyment of life. The Future factor was represented in two factors: dealing with deadlines (Factor 3) and daily planning and consideration of future consequences (Factor 6). The most highly loading items of the Future factor (Items 13 and 40) were involved in Factor 3. The Present-Fatalistic factor was represented separately in Factor 5.

**Table 3. Exploratory factor analysis: Factorial loadings of items for the seven factor structure of the ZTPI based on data from the Latvian sample (n = 278)**

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
16	.76						
50	.75						
34	.73						
25	-.68						
11	-.63						
22	.57						
46		.76					
26		.68					
44		.65					
55		.49					
48		.40					
21			.74				
40			.74				
13			.64				
31				.80			
42				.67			
17			.38	.46			
19				.45			
39					.75		
38					.67		
14					.58		
37					.49		
33					.48		
24						.76	
6						.75	
43						.68	
30			.34			.36	
4							.71
54							.67
27	.40						.58
36							.46
5							.32

Note. Only factor loadings  $\geq 0.30$  are presented.

Seven factors of the Russian ZTPI explained 32.6% of the variance. Table 4 presents factor loadings of the items of the Russian ZTPI. Factor 1 also reflected actual traumatic past experiences. Factor 2 was interpreted as individual's future orientation including goal setting, consideration of future consequences, planning and taking deadlines into account. Factor 3 reflected risk-taking and sensation seeking. Factor 4 characterized daily planning. Factor 5 characterized external control over the individual's life course. Factor 6 reflected attitude to enjoying life. Factor 7 was interpreted as positive feelings concerning the individual's past.

It is also impossible to identify all factors of the ZTPI based on the data of the Russian sample. The Past-Negative factor remained the first factor in the structure. The Present-Hedonistic factor was present as two factors: risk-taking and sensation seeking (Factor 3) and an attitude to enjoying life (Factor 6). It should be noted that the most highly loading items of the Present-Hedonistic factor (Items 43 and 26) loaded on Fac-

tor 3. The Future factor was also represented as a combination of two factors: Factor 2 characterized general orientation towards the future and Factor 4 characterized specific daily planning. The most highly loading items of the Future factor (Items 40 and 13) were represented in Factor 2. The Past-Positive and the Present-Fatalistic factors were represented separately as Factor 7 and Factor 5 respectively.

**Table 4. Exploratory factor analysis: Factorial loadings of items for the seven factor structure of the ZTPI based on data from the Russian sample (n = 407)**

Items	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
34	.71						
27	.71						
50	.70						
16	.69						
22	.64						
54	.53						
36	.48						
10		.65					
40		.61					
51		.60					
13		.58					
21		.55					
30		.53					
42			.83				
31			.81				
26			.53				
6				.76			
24				.69			
43				.62			
38					.80		
39					.72		
37					.43		
28						.71	
52						.56	
48						.48	
32						.45	
45		.41				-.44	
7							.72
11							.63
25	-.48						.55

*Note.* Only factor loadings  $\geq 0.30$  are presented.

## Discussion

In general, the results of exploratory factor analysis are in line with expectations. Two contrasting groups of findings are presented those confirming the ZTPI structure and those not supporting the model. These findings will be discussed below.

As expected, the results of exploratory factor analysis provide evidence of more than five factors in the structure of individual TP. On the one hand, temporal attitudes suggested by Zimbardo and Boyd (1999) are partly detectable in the present set of data. On the other hand, the results of the analysis support the complexity of these attitudes.

Exploratory factor analysis of the structure of the Russian ZTPI showed that two original factors (Present-Hedonistic and Future) were combinations of four factors. Risk-taking attitude split off from enjoyment of life, and daily planning activities split off from general orientation towards the future. Exploration of the Latvian ZTPI reveals a more complex structure of temporal attitudes. The Past-Negative and Future factors are represented as combinations of four factors, but elements of the Present-Hedonistic and Past-Positive factors are joined into one factor. Moreover, part of the Present-Hedonistic factor forms an independent factor reflecting a risk-taking attitude.

It should be noted that the risk-taking attitude was independent of enjoying life in both factorial structures. This finding is in contrast to the single factorial structure of the Present-Hedonistic factor, and raises the question of differentiation of TP factors and personality. It is also important to take into account the actual structure of the Present-Hedonistic factor in predictions of individuals' behaviour. Several predictions propose that present-oriented individuals are inclined towards risky behaviour (Apostolidis et al., 2006; Zimbardo et al., 1997), substance misuse (Keough et al., 1999) and gambling (MacKillop et al., 2006). If risk-taking attitude emerges separately from individuals' present-orientation, the predictions can be re-examined.

Splitting the Future factor into separate factors supports findings discussed by Zimbardo and Boyd (1999). Specific daily planning activities were identified in the Gonzalez and Zimbardo (1985) study as one of four independent future-related factors. Exploration of the Latvian and Russian ZTPI supported daily planning as a factor in TP. However, Zimbardo and Boyd (1999) identified four factors in a broader non-college population in contrast with the single future-related factor in the five factor ZTPI model based on the college student sample.

In the context of research on future orientation, a complex structure of individual orientation towards the future is preferred to the one-dimensional model (Nurmi, 1991, 1994; Seginer, Vermulst, & Shoyer, 2004). This is in accordance with the conclusion of TP researchers that temporality of individuals is more complex than the TP measured by the ZTPI (Apostolidis et al., 2006; Worrel & Mello, 2007). One of the possible ways of broadening the understanding of TP is a new model involving differentiation of attitudes with positive and negative valences (Worrel, Mello, & Buhl, 2008). The model consists of six independent components differentiated by temporal category (past, present and future) and valence (positive and negative).

The limitations of the study concern two important issues. First, the Latvian and Russian samples consisted of high school students who are not the same as college students. The importance of sample characteristics was demonstrated in a study of a non-college population (Gonzalez & Zimbardo, 1985) as well as in a sample of elderly people in Brazil (Milfont et al., 2008). Thus, it is difficult to identify precisely the sources of discrepancies between the original model and the Latvian and Russian ZTPI versions. Secondly, possibilities for developing a new view on TP are limited, because only the ZTPI and its items were included in the analysis. Possible progress is related to research on the construct of TP and the development of a new item pool (Shores & Scott, 2007; Worrel & Mello, 2007). A multidimensional structure of orientation towards the future

is one of the expected features in new models of TP (Apostolidis et al., 2006; Worrel & Mello, 2007).

In sum, the results of the study provide evidence for a more complex structure of individual TP. Exploratory factor analysis reveals similarities and differences in the structure of the Latvian and Russian ZTPI. Splitting of original ZTPI factors is in accordance with recent findings on individual TP. Therefore, the ZTPI and its adaptations provide a basis for the further progress in research on TP in Latvia.

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## The Relationship among Cognitive Abilities and Demographic Factors in Latvia

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The Woodcock-Johnson International Editions Tests of Cognitive Abilities (WJ-IE) is the first adapted and standardized cognitive assessment instrument in Latvia. This study presents the analysis of variance of WJ-IE measures among demographic groups in Latvia: age, gender, urban versus rural residence. The data comes from the WJ-IE standardization sample of 707 people aged from 2 to 97 years (46.82 % male, 53.18 % female). The results display significant age-related differences across all age groups: 2-11; 11-19; 20-40; 41-97 on General Intellectual Ability, Thinking Ability and Cognitive Efficiency. There were no significant differences on Verbal Ability between the age groups 20-40 and 41-97. Significant gender differences were found on General Intellectual Ability, Verbal Ability, and Thinking Ability. Significant urban-rural differences were found on all WJ-IE cognitive ability scales.

**Key words:** cognitive ability, age, gender, urban-rural.

### Introduction

The Woodcock-Johnson International Editions Tests of Cognitive Abilities (WJ-IE) is the first cognitive assessment instrument standardized and adapted in Latvia. There have been many studies of the relationship between intelligence test scores and demographic variables in the U.S. and Europe (Flynn, 1987; Herrnstein & Murray, 1994; Jensen, 1969; Loehlin, 1973, 2000; Neisser, et al., 1995; Plomin, 1994). Some authors (Barona, Reynolds, & Chastain, 1984; Kimura, 1999; Loehlin, 2000; Lynn et al., 2005; Matteson & Babb, 2002) believe that in recent years, due to environmental changes, some demographic variables (urban-rural, gender) have lost their significant influence on IQ scores. There are not many studies with data from the countries of Eastern Europe, where rapid changes in the social and economic environment took place after 1990. The present study examines the relationship between WJ-IE measures of cognitive ability and different demographic factors in Latvia: age, gender and urbanization level.

The WJ-IE consists of a small number of contemporary cognitive assessment instruments for specific Eastern Europe populations (Ruef, Furman, & Muñoz-Sandoval, 2005). The idea of the WJ-IE developed at an International School Psychology Association colloquium in 1998. Latvian psychologists approached Richard W. Woodcock regarding their need for technically sound cognitive assessment instruments. Later, Riverside Publishing Company, the Woodcock-Johnson Tests of Cognitive Abilities-Revised (WJ-R) publisher, granted permission for the development of a shortened version of the WJ-R in four European languages (Slovak, Hungarian, Latvian, and Czech). The WJ-IE battery is a selection of tests from more extensive batteries - the WJ-R: Tests of

Cognitive Ability (Woodcock & Johnson, 1989), the WJ III: Tests of Cognitive Abilities (Woodcock, McGrew, & Mather, 2001) and the Diagnostic Supplement to the WJ III Tests of Cognitive Abilities (Woodcock, McGrew, Mather, & Schrank, 2003). Originally this cognitive assessment instrument was published by Richard W. Woodcock and Mary B. Johnson as the Woodcock-Johnson Psycho-Educational Battery (WJ) in 1977 (Woodcock & Johnson, 1977). The WJ-R is an expanded version of the WJ (Woodcock & Johnson, 1989). The WJ III is the latest version and includes 31 cognitive tests for measuring general intellectual ability, broad and narrow cognitive abilities, and aspects of executive functioning (Woodcock, McGrew, & Mather, 2001).

The WJ III battery is based on the theoretical foundation of the Cattell-Horn-Carroll theory (CHC theory; Cattell, 1941, 1943, 1950, 1963, 1971, 1987; Horn, 1965, 1988, 1989, 1991; Horn & Cattell, 1966, 1967; Carroll, 1987, 1990, 1993, 2003), which describes a hierarchical model of cognitive abilities that vary according to the level of generality: narrow abilities (Stratum I), broad abilities (Stratum II) and, what is called, general ability (g; Stratum III). Narrow abilities include approximately 70 highly specialized abilities. Broad abilities include Fluid Reasoning (Gf), Crystallized Intelligence (Gc), Short-Term Memory (Gsm), Visual-Spatial Processing (Gv), Auditory Processing (Ga), Long Term Retrieval (Glr), Processing Speed (Gs), Quantitative Ability (Gq), Reading and Writing Ability (Grw) (Woodcock, 2001, 2003). There appears to be a consensus that the CHC theory provides a common nomenclature for describing the broad abilities measured across test batteries (Flanagan, McGrew, & Ortiz, 2000; Flanagan & Ortiz, 2001; McGrew & Flanagan, 1998). The influence of the CHC theory began in the late 1980s and early 1990s with the publication of the WJ-R (Woodcock & Johnson, 1989) and the publication of Woodcock's (1990) research examining broad abilities measured by prominent intelligence tests. It led to the revision of several prominent test batteries, including the Woodcock-Johnson III Tests of Cognitive Abilities (WJ III; Woodcock, McGrew & Mather, 2001), the Stanford-Binet Intelligence Scales, Fifth Edition (SB5; Roid, 2003) and the Kaufman Assessment Battery for Children, Second Edition (KABC-II, Kaufman & Kaufman, 2004). The Wechsler Intelligence Scale for Children (Wechsler, 2003) also appears to be more closely aligned with the CHC theory (Flanagan, Ortiz, Alfonso, & Mascolo, 2002).

The WJ-IE provides scores representing intellectual abilities at four different levels: narrow abilities, broad abilities, clusters of abilities, general intellectual ability (Ruef, Furman, & Muñoz-Sandoval, 2001, Rascevska & Upzare, 2001a; Rascevska & Upzare, 2001b). The lowest level represents the narrow abilities measured by specific tasks in the tests. The next level represents cognitive processes combined in clusters of broad abilities. The WJ-IE battery comprises seven tests, each selected to serve as an indicator of at least one of the narrow and broad cognitive abilities (representing intellectual abilities at first two levels): Verbal Comprehension - lexical knowledge and Gc, Memory for Names - associative memory and Glr, Spatial Relations - visualization and Gv, Sound Patterns- speech sound discrimination and Ga, Quantitative Reasoning - inductive and deductive thinking and Gf, Gq, Visual Matching - perceptual speed and Gs, Numbers Reversed - working memory and Gsm. On the third level, the classes of processes are described. Broad abilities are combined into logically derived clusters: Verbal Ability, Thinking Ability and Cognitive Efficiency. The top level is characterized by Full Scale

Intellectual Ability (FSIA) which is equivalent to WJ III General Intellectual Ability (GIA). The GIA score is weighted according to the results of a first-principal-component analysis, and is an index of the common variance among the broad and narrow cognitive abilities measured by the component tests (Woodcock, 1990). It is a representation of psychometric *g*, one of the oldest constructs in the psychology of intelligence and still the focus of much debate, even among proponents of the CHC theory (see Woodcock, 1990; McArdle et al., 2000).

It is possible to consider the WJ-IE Latvian version (Ruef, Furman, & Muñoz-Sandoval, 2005) as a new cognitive assessment instrument in a new environment.

### **Demographic variables and intelligence**

There are not many investigations of the relationship between demographic variables and intelligence with the Woodcock-Johnson Series of Cognitive Tests (Camarata & Woodcock, 2006; Ferrer et al., 2004; McArdle et al., 2000, 2002). Most studies in this field have used the Wechsler Adult Intelligence Scale Revised (WAIS-R; Barona & Chastain, 1986; Barona, Reynolds, & Chastain, 1984; Kaufman & Doppelt, 1976; Reynolds & Gutkin, 1979; Wilson et al., 1978). These research findings can be applied to WJ Tests, because it has been recognized that the WAIS-R and the WJ-R have much in common in terms of the broad or global measure of ability (Cantrell, 1992). Woodcock (1990) performed a confirmatory joint-factor analysis of the WAIS-R and the WJ-R, and displayed that the WAIS-R measures five of the eight WJ-R factors. One of the most profound investigations on a multidimensional relationship between intelligence and demographic variables (age, gender, race, education, occupation, region of residence, urban versus rural residence) indicated that 59% of the variance of intelligence can be explained by education related variables (education, professional occupation, semiskilled workers, race), 25% by age related variables (age, single marital status) and 15% by gender (Chastain & Joe, 1987). The Barona (Barona, Reynolds, & Chastain, 1984) demographic formula, which is based on a demographic regression approach that relies on known relationships between cognitive ability and demographic characteristics, is:  $IQ = 54.96 + 0.47(\text{age}) + 1.76(\text{gender}) + 4.71(\text{race}) + 5.02(\text{education}) + 1.89(\text{occupation}) + 0.59(\text{region})$ . The formula was established for predicting premorbid intelligence. It was found to be extremely reliable (.99) for healthy individuals as well (Raguette et al., 1996). Some investigators have combined demographic regression and current ability approaches (Crawford et al., 1990; Grober & Sliwinski, 1991; Schwartz & Saffran, 1987; Krull, Scott, & Sherer, 1995; Vanderploeg & Schinka, 1995).

#### *Age*

Over a period of 30 years of research, Cattell had developed his investment hypothesis of intelligence, which postulates a complex developmental process of cognitive abilities involving genetic, learning, and environmental influences (Cattell, 1941, 1971, 1987; Horn, 1971, 1988, 1998; Horn & Cattell, 1966, 1967). There is now abundant research supporting both the structural distinction between fluid and crystallized abilities (Carroll, 1993, 1997; Horn, 1968, 1988; Horn & Cattell, 1966) and the different trajectories that these abilities follow over time (Bayley & Oden, 1955; Horn, 1991; Horn &

Noll, 1997; Jones & Conrad, 1933; McArdle et al., 2002; Schaie, 1996). The studies with the Woodcock-Johnson Series of Cognitive and Achievement Tests (Ferrer et al., 2004; McArdle et al., 2000, 2002) suggest that the functions describable as broad fluid reasoning (Gf) and acculturated crystallized knowledge (Gc) are separable entities which have different growth patterns. The same result seems to follow for different kinds of broad memory (Glr and Gsm), processing speed (Gs), and auditory and visual processing (Ga and Gv), and for several forms of academic knowledge (Gq, Grw, and Gk). The curve for Gf shows an initial rapid rise with a quick deceleration after the ages of 18 and 20. The curve for Gc shows a general rapid rise across all ages. The dimension Gf reaches a peak at about the age of 22, Gc at about the age of 36. This research indicates that there are no time-dependent relations between fluid and crystallized abilities as measured by the WJ-R. Broad cognitive abilities reach the peak at about the age of 26, and the slope begins to de-accelerate at about the age of 52. Processing speed theory of cognitive aging indicates that processing speed is a leading indicator of age changes in memory and spatial ability, but not verbal ability (Finkel et al., 2007; Lindenberger, 2001).

### *Gender*

Although gender differences have not been found in general intelligence (Aluja-Fabregat et al., 2000; Colom et al., 2002; Camarata & Woodcock, 2006; Dolan et al., 2006; Jarvik, 1975; Jensen, 1998; Loehlin, 2000) there are some types of cognitive abilities that vary, on average, as a function of gender. The three cognitive abilities that have been identified as the loci of gender differences are verbal, quantitative and visual-spatial abilities (Hyde, Fennema, & Lamon, 1990; Hyde & McKinley, 1997; Van der Sluis et al., 2006). Many researchers agree that the only type of verbal ability that shows a male advantage is solving verbal analogies (Halpern, 1989; Hedges & Nowell, 1995). By contrast, females excel at anagrams, general and mixed verbal ability tests, speech production, writing, memory for words, objects and locations, perceptual-motor skills, and associational fluency (Birenbaum, Kelly, & Levi-Keren, 1994; Halpern & Wright, 1996; Hyde, Fennema, & Lamon, 1990; Eals & Silverman, 1994; Lehrner, 1993). Gender differences favouring males are found on all visual-spatial ability types except spatial visualisation (Linn & Petersen, 1986; Schiff & Oldak, 1990; Hedges & Nowell, 1995; Willingham & Cole, 1997). An analysis of the underlying cognitive processes was proposed, with males performing especially well on tasks that involve maintaining and manipulating mental representations and females performing exceedingly well on tasks that require rapid access to and retrieval of information from memory (Halpern, 2000). In a study (Camarata & Woodcock, 2006) involving an evaluation of three sets of data collected from year 1977 to 2001 as part of the Woodcock-Johnson Series of Cognitive and Achievement Tests with more than 8,000 U.S. males and females ranging in age from 2 to 90, it was found that females have a significant advantage on timed tests and tasks. The study also found that males consistently outperformed females in some verbal abilities, such as identifying objects, knowing antonyms and synonyms and completing verbal analogies.

### *Urban versus rural residence*

A generation or two ago rural-urban IQ differences were substantial, averaging about 6.5 IQ points (Terman & Merrill, 1937). The findings indicated that in rural areas there

were lower scores on the verbal tests and higher on the nonverbal and spatial tests (Noel, Gist & Clark, 1938). The explanation for this was that nonverbal and spatial abilities were more essential for survival in a rural environment than verbal abilities (Burnett, Beach, & Sullivan, 1963). It was found that IQ scores are lower in countries where people work mostly as farmers, and higher where education is more widespread (Barber, 2005). In more recent years, however, urban-rural IQ differences in Western industrialized countries have declined to about 2 IQ points (Loehlin, 2000). The urban-rural difference is now so small that recent test standardizations do not even stratify their samples by this variable (Barona, Reynolds, & Chastain, 1984). The most obvious explanation for this trend is the changes that have taken place in the environment (McGue et al., 1993). Rural and urban populations are much less different in their experiences now. At the same time, there is much urban-rural migration, which is a process that can change IQ differences without changing IQs (Noel, Gist, & Clark, 1938; Taylor & Gibson, 1978).

*Research questions:* What is the relationship between intellectual abilities measured by the Woodcock-Johnson International Editions Tests of Cognitive Abilities, age, gender and urban-rural residence in Latvia?

## Method

### *Participants*

The present study is based on data gathered from a sample of 707 individuals (46.82 % male, 53.18 % female) ranging between the age from 2 to 97 years (age  $M = 20.79$ ,  $SD = 16.61$ ). The data was collected from year 2000 to 2005 which provided WJ-IE standardization in Latvia. In total, the standardization sample consisted of 907 participants. The data of 200 participants was excluded from this analysis for two reasons: some participants had completed a different version of WJ-IE in the process of adaptation (data was included in the standardization, but was not valid for this study), some participants were lost while equalizing the medium age in the demographic subgroups. The sample was selected on the basis of random selection within stratification on three demographic variables: age, gender, and urban versus rural region. The sample was divided into four age groups: 2–10, 11–19, 20–40, 41–97, and into three urbanization levels by region: city, provincial (large) town, rural area (including very small towns). The sample was distributed as follows: city  $N = 356$  (age  $M = 19.29$ ,  $SD = 14.24$ ), provincial town  $N = 156$  (age  $M = 23.56$ ,  $SD = 19.15$ ), rural area  $N = 195$  (age  $M = 21.36$ ,  $SD = 18.16$ ), age group 2–10 ( $N = 154$ , age  $M = 8.06$ ,  $SD = 1.63$ ), age group 11–19 ( $N = 349$ , age  $M = 14.98$ ,  $SD = 2.45$ ), age group 20–40 ( $N = 120$ , age  $M = 26.59$ ,  $SD = 5.65$ ) age group 41–97 ( $N = 84$ , age  $M = 60.27$ ,  $SD = 14.93$ ), male ( $N = 331$ , age  $M = 20.34$ ,  $SD = 15.85$ ) and female ( $N = 376$ , age  $M = 21.19$ ,  $SD = 17.27$ ). Detailed characteristics of the participants are described in Table 1.

ANOVA indicated no significant effects of region,  $F(2,684) = .438$ ,  $p > .001$ , and gender  $F(2,684) = .169$ ,  $p > .001$ , on the mean age in the subgroups, and there are no significant effects of interaction between region and gender  $F(1,684) = .115$ ,  $p > .001$ . There were no significant effects of region and gender in any of age groups: age group 2–10, region,  $F(2,148) = .225$ ,  $p > .001$ , gender,  $F(1,148) = .063$ ,  $p > .001$ ; age group 11–19, region,  $F(2,344) = 1.13$ ,  $p > .001$ , gender,  $F(1,344) = 1.12$ ,  $p > .001$ ; age group 20–40, region,

$F(2,114) = .193, p > .001$ , gender,  $F(1,114) = .012, p > .001$ ; 41–97 age group 41–97, region,  $F(2,78) = .147, p > .001$ , gender,  $F(1,78) = 1.12, p > .001$ . There was no significant effect of interaction between age and gender on any of the age groups. The assumptions of homogeneity of variances, and normal distribution of the dependent variable for each group was checked. The assumption of homogeneity of variances was not violated. Post Hoc test (LSD;  $p < .05$ ) comparisons showed that there were significant ( $p = .043$ ) differences in the mean age between city and provincial town. There were no significant differences in the mean age for regions in any age group. There were no significant differences between city and rural area ( $p = .454$ ), between provincial town and rural area ( $p = .617$ ). Contrast test showed no significant ( $p = .687$ ) mean age differences between gender groups. ANOVA indicated no significant effects of region,  $F(2,158) = .989, p > .001$ , and gender  $F(2,158) = .259, p > .001$  on education level of participants. There were no significant differences ( $p = .396$ ) between education level of males ( $M = 3.51, SD = 1.53$ ) and females ( $M = 3.80, SD = 1.21$ ).

Table 1. Sampling Variables of WJ-IE Study in the Latvian Population

Region	Gender	Age Group								Total	
		2-10		11-19		20-40		41-97		N	%
		N	%	N	%	N	%	N	%		
City	Male	34	4.81	96	13.58	23	3.25	14	1.98	167	23.62
	Female	39	5.52	96	13.58	38	5.37	16	2.26	189	26.73
	Total	73	10.33	192	27.16	61	8.63	30	4.24	356	50.35
Pr. Town	Male	15	1.12	32	4.53	17	2.40	12	1.70	76	10.75
	Female	17	2.40	36	5.09	12	1.70	15	1.12	80	11.32
	Total	32	4.53	68	9.62	29	4.10	27	3.82	156	22.07
Rural Area	Male	19	2.69	43	6.08	16	2.26	10	1.41	88	12.45
	Female	30	4.24	46	6.51	14	1.98	17	2.40	107	15.13
	Total	49	6.93	89	12.59	30	4.24	27	3.82	195	27.58
Total	Male	68	9.62	171	24.19	56	7.92	36	5.09	331	46.82
	Female	86	12.16	178	25.18	64	9.05	48	6.79	376	53.18
Total		154	21.78	349	49.36	120	16.97	84	11.88	707	100

### Instrument

In our study we used two higher levels of the WJ-IE: clusters of the broad abilities- Verbal Ability (VA), Thinking Ability (TA), Cognitive Efficiency (CE) and the scale of General Intellectual Ability (GIA). The cluster of VA is comprised of tests with high linguistic demands. The clusters of TA and CE consist of tests with low linguistic demands. VA cluster contains four tests: Test 1A Picture Vocabulary (Gc), Test 1B Synonyms (Gc), Test 1C Antonyms (Gc), Test 1D Verbal Analogies (Gc, Gf). This is a measure of language development that includes the comprehension of individual words and the comprehension of relationships among words. TA cluster represents a sampling of the different thinking processes that may be invoked when information in short-term memory cannot be processed automatically and contains three tests: Test 2 Memory for Names (Glr), Test 3 Spatial Relations (Gv), Test 5 Quantitative Reasoning (Gf, Gq). Test 4 Sound Patterns (Ga) was included in the cluster of the already standardized WJ-IE version. It was not included in the normed study and data for this test was not collected in Latvia. For this study we used TA scores without Test 4. Cognitive Efficiency cluster represents the capacity of the cognitive system to process information automatically and contains two

tests: Test 6 Visual Matching (Gs), Test 7 Numbers Reversed (Gsm). The results from Verbal Ability, Thinking Ability, and Cognitive Efficiency tests are combined to provide the General Intelligence Ability (GIA) cluster and scores.

All reliabilities are computed with the generic Rasch reliability procedure described in WJ III Technical Manual (McGrew & Woodcock, 2001) and WJ III NU Technical Manual (McGrew, Schrank, & Woodcock, 2007). Internal consistency reliability coefficients ( $r_{11}$ ) for the tests are: Test 1 Verbal Ability (.89), Test 2 Memory for Names (.88), Test 3 Spatial Relations (.89), Test 5 Quantitative Reasoning (.86), Test 6 Visual Matching (.92), Test 7 Numbers Reversed (.89).

## Results

To assess whether people from urban versus rural regions (city, provincial town and rural area) in different age groups (2-10, 11-19, 20-40, 41-97) and different gender groups had different mean scores on the Woodcock- Johnson International Editions Tests of Cognitive Abilities (WJ-IE), and whether there was an interaction between region, age and gender, three factor ANOVA (region x age x gender) was conducted. *W* scores of WJ-IE norming version were used and were calculated for the research purposes by Dr. McGrew. Means and standard deviations for the WJ-IE cognitive ability clusters in subgroups are provided in Table 2 and Table 3.

**Table 2. Means and Standard Deviations on WJ-IE Cognitive Ability Clusters for Males in Region and Age Groups**

Age Group	Region	N	WJ-IE Scale							
			General Intellectual Ability		Verbal Ability		Thinking Ability		Cognitive Efficiency	
			M	SD	M	SD	M	SD	M	SD
2-10	City	34	505.65	10.85	505.11	14.60	506.11	10.84	505.23	13.84
	Pr. Town	15	501.00	19.50	502.34	16.34	503.49	17.63	496.58	26.35
	Rural Area	19	503.85	13.67	498.58	18.65	504.99	13.83	504.76	15.58
	Total	68	504.12	13.82	502.67	16.19	505.22	1.24	503.19	17.81
11-19	City	96	529.64	10.98	530.89	14.27	528.58	11.85	530.62	13.61
	Pr. Town	32	525.79	8.96	529.52	10.03	525.31	10.32	524.65	12.03
	Rural Area	43	525.81	8.29	531.00	13.48	523.68	8.99	526.40	10.98
	Total	171	527.97	10.14	530.66	13.32	526.74	11.07	528.45	12.89
20-40	City	23	538.92	9.92	547.34	13.31	537.35	11.50	537.07	12.39
	Pr. Town	17	536.46	7.49	550.80	9.92	533.92	8.72	533.10	9.70
	Rural Area	16	530.83	9.19	536.00	13.97	528.20	8.02	532.19	14.10
	Total	56	535.86	9.49	545.15	13.75	533.70	10.34	534.47	12.16
41-97	City	14	527.56	13.46	547.34	20.45	524.67	12.64	524.67	18.16
	Pr. Town	12	525.67	14.20	549.05	16.78	523.49	14.88	517.24	18.64
	Rural Area	10	521.05	12.38	539.91	21.12	516.50	10.49	518.46	13.82
	Total	36	525.12	13.31	543.77	19.33	522.01	13.02	520.47	17.10
Total	City	167	525.88	15.32	528.85	19.84	524.91	14.55	525.87	17.53
	Pr. Town	76	523.26	16.97	532.00	21.42	522.64	16.00	519.83	20.48
	Rural Area	88	521.44	13.98	525.92	21.12	519.65	13.06	521.88	16.04
	Total	331	524.11	15.45	528.79	20.67	523.00	15.04	523.43	18.01

**Table 3. Means and Standard Deviations on WJ-IE Cognitive Ability Clusters for Females in Region and Age Groups**

Age Group	Region	WJ-IE Scale								
		N	General Intellectual Ability		Verbal Ability		Thinking Ability		Cognitive Efficiency	
			M	SD	M	SD	M	SD	M	SD
2-10	City	39	504.78	9.86	504.37	11.60	504.75	11.00	505.01	13.19
	Pr. Town	17	503.23	16.23	500.91	17.98	504.45	14.03	502.56	21.69
	Rural Area	30	502.31	18.87	497.98	19.26	504.04	17.68	501.88	23.91
	Total	86	503.61	14.69	501.46	20.67	504.45	14.07	503.43	19.07
11-19	City	96	527.51	11.32	525.44	14.57	527.53	11.78	528.53	13.85
	Pr. Town	36	522.35	9.48	518.33	12.50	521.20	9.35	526.07	12.56
	Rural Area	46	522.87	7.07	520.35	12.54	521.92	8.37	525.56	9.57
	Total	178	525.27	10.26	522.69	13.94	524.80	10.88	527.26	12.62
20-40	City	38	535.74	7.03	543.32	13.12	533.89	7.97	534.72	8.37
	Pr. Town	12	529.32	8.06	532.37	13.68	525.38	9.47	533.69	10.96
	Rural Area	14	529.38	8.30	535.24	10.85	528.18	10.63	528.27	10.86
	Total	64	533.15	8.03	539.50	13.44	531.05	9.44	533.12	9.85
41-97	City	16	524.34	16.42	540.27	16.58	519.87	17.89	534.72	18.45
	Pr. Town	15	522.35	12.81	544.34	17.04	517.67	14.28	518.38	14.81
	Rural Area	17	515.95	18.40	528.96	23.43	511.71	21.02	515.81	13.82
	Total	48	520.75	16.24	537.54	20.12	516.29	18.05	519.04	17.50
Total	City	189	524.21	15.05	525.94	19.12	523.46	15.38	524.46	16.81
	Pr. Town	80	519.33	14.42	521.61	20.61	517.61	13.40	520.77	18.21
	Rural Area	107	516.86	16.57	517.39	20.96	516.11	16.55	517.72	19.42
	Total	376	521.08	15.67	522.59	20.26	520.12	15.67	521.76	18.07

ANOVA (region x age x gender) indicated significant effects of region on General Intellectual Ability (GIA),  $F(2,684) = 10.21, p < .001, \eta^2 = .029$  (The assumptions of homogeneity of variances, and normal distribution of the dependent variable for each group was checked. The assumption of homogeneity of variances was violated; thus, results should be viewed with caution. The assumptions of normal distributions of the dependent variables for each group was not violated), and on all WJ-IE cognitive ability clusters: Verbal Ability (VA),  $F(2,684) = 8.69, p < .001, \eta^2 = .025$ ; Thinking Ability (TA),  $F(2,684) = 9.97, p < .001, \eta^2 = .028$ ; Cognitive Efficiency (CE),  $F(2,684) = 6.16, p < .05, \eta^2 = .018$  (Table 4).

People from less urbanized environment generally scored lower on all WJ-IE cognitive ability clusters (Figure 1).

Significant effects of age were displayed on GIA,  $F(3,684) = 160.26, p < .001, \eta^2 = .413$ , and on all WJ-IE cognitive ability clusters: VA,  $F(3,684) = 184.84, p < .001, \eta^2 = .448$ ; TA,  $F(3,684) = 118.52, p < .001, \eta^2 = .342$ ; CE,  $F(3,684) = 112.58, p < .000, \eta^2 = .331$  (Table 4). Individuals from the age of 2-10 to 20-40 showed increasing mean scores but in the age group of 41-97 almost all mean scores on all scales decreased (Figure 2). Significant effects of gender were indicated on GIA,  $F(1,684) = 6.57, p < .05, \eta^2 = .010$ , and on two WJ-IE clusters: VA,  $F(2,684) = 19.41, p < .05, \eta^2 = .000$ ; TA,  $F(2,684) = 7.52, p < .05, \eta^2 = .011$ . There was no significant gender effect indicated on CE (Table 4). Males generally had higher mean scores on all WJ-IE cognitive ability clusters than females (Table 2-3). The results indicated that mean scores on WJ-IE GIA and VA, TA and CE



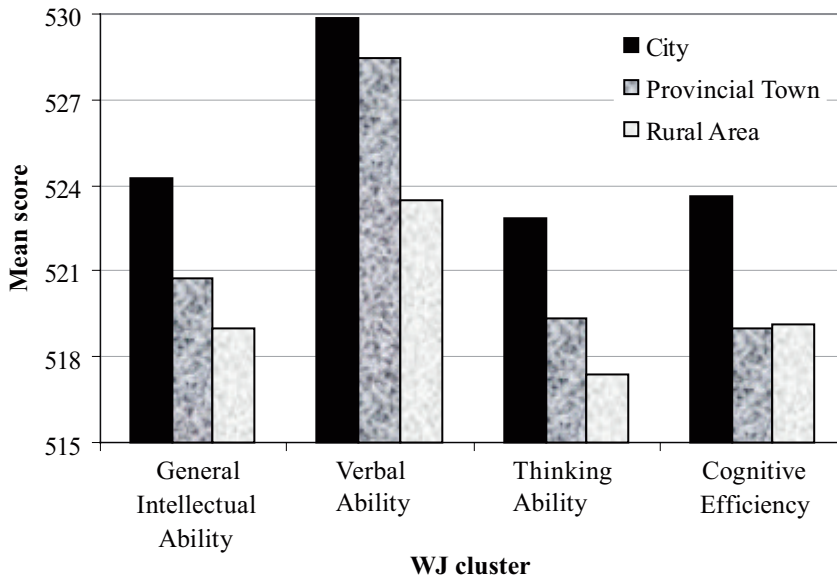
differ for different regions and different age groups. Results showed gender differences on GIA, VA and TA mean scores, but not on CE mean score. No significant interactions between demographical variables (region, age, gender) were found (Table 4). Results signified that mean scores on the WJ-IE cognitive ability clusters (GIA, VA, TA, CE) do not differ for males and females in different age groups, and do not differ for different age groups in different regions. Respectively, the cognitive ability developmental curves generally are similar in different regions and in different gender groups.

**Table 4. ANOVA Test Between Subject Effects for Region, Age and Gender on WJ-IE Cognitive Ability Clusters**

<i>Source</i>	<i>Dependent Variable</i>	<i>df</i>	<i>F</i>	<i>η<sup>2</sup></i>	<i>p</i>
Region	General Intellectual Ability	2	10.21	.029	.000
	Verbal Ability	2	8.69	.025	.000
	Thinking Ability	2	9.97	.028	.000
	Cognitive Efficiency	2	6.16	.018	.002
Gender	General Intellectual Ability	1	6.57	.010	.011
	Verbal Ability	1	19.41	.028	.000
	Thinking Ability	1	7.52	.011	.006
	Cognitive Efficiency	1	.22	.000	.638
Age	General Intellectual Ability	3	160.26	.413	.000
	Verbal Ability	3	184.84	.448	.000
	Thinking Ability	3	118.52	.342	.000
	Cognitive Efficiency	3	112.58	.331	.000
Region x Gender	General Intellectual Ability	2	.02	.000	.971
	Verbal Ability	2	1.73	.005	.176
	Thinking Ability	2	.40	.001	.670
	Cognitive Efficiency	2	1.11	.003	.327
Region x Age	General Intellectual Ability	6	.80	.007	.563
	Verbal Ability	6	2.03	.018	.059
	Thinking Ability	6	1.22	.011	.292
	Cognitive Efficiency	6	.42	.004	.863
Age x Gender	General Intellectual Ability	3	.75	.003	.521
	Verbal Ability	3	2.42	.011	.065
	Thinking Ability	3	.79	.003	.495
	Cognitive Efficiency	3	.20	.001	.894
Region x Age x Gender	General Intellectual Ability	6	.28	.002	.946
	Verbal Ability	6	1.01	.009	.413
	Thinking Ability	6	.32	.003	.922
	Cognitive Efficiency	6	.13	.001	.922

Post hoc (Tamhane;  $p < .05$ ) comparisons showed that there were significant urban-rural differences between the highest and the lowest urbanization levels of regions (city versus rural area) on all WJ-IE cognitive ability scales. There were significant urban-rural differences between the highest and middle urbanization levels of regions (city, versus provincial town) on GIA (city  $M = 524.27$ ,  $SD = 15.18$ ; provincial town  $M = 520.77$ ,  $SD = 15.79$ , rural area  $M = 519.01$ ,  $SD = 15.59$ ), TA (city  $M = 522.84$ ,  $SD = 15.35$ ; provincial town  $M = 519.37$ ,  $SD = 14.89$ , rural area  $M = 517.41$ ,  $SD = 15.14$ ) and CE (city  $M = 523.62$ ,  $SD = 17.14$ ; provincial town  $M = 519.03$ ,  $SD = 19.29$ , rural area  $M = 519.17$ ,  $SD = 18.05$ ) scales, but not on VA (city  $M = 529.84$ ,  $SD = 19.49$ ; provincial town  $M = 528.46$ ,  $SD = 21.58$ , rural area  $M = 523.50$ ,  $SD = 20.67$ ) scale. No significant urban-rural cogni-

tive ability contrasts between the middle and the lowest urbanization levels of regions (provincial town, versus rural area) were found (Table 5).



*Figure 1. Means on WJ-IE Cognitive Ability Clusters in Region Groups*

People from cities showed significantly higher mean score on GIA (3–7 *W* points) than people from provincial towns and rural areas (Figure 1). It is noteworthy that urban-rural cognitive ability differences are increasing with age. The gap between the mean scores of city and rural area on GIA is increasing. The opposite tendency can be observed in provincial towns – in any of the following age groups the gap between the mean score of city and provincial town on GIA is diminishing (Figure 3). People from provincial towns performed better on all WJ-IE tests (1–5 *W* points) than participants from rural areas (Figure 1). The largest urban-rural mean difference was on TA, the smallest – on CE (Table 5).

**Table 5. Pair-wise Comparisons of Means on WJ-IE Cognitive Ability Clusters among Regions**

<i>Dependent Variable</i>	<i>(I) Region_Ind</i>	<i>(J) Region_Ind</i>	<i>Mean Difference (I-J)</i>	<i>p</i>
General Int. Ability	City	Provincial Town	3.74*	.038
		Rural Area	6.06*	.000
	Provincial Town	City	-3.74*	.038
		Rural Area	2.32	.427
	Rural Area	City	-6.06*	.000
		Provincial Town	-2.32	.427
Verbal Ability	City	Provincial Town	.63	.984
		Rural Area	6.07*	.003
	Provincial Town	City	-.63	.984
		Rural Area	5.43	.06
	Rural Area	City	-6.07*	.003
		Provincial Town	-5.43	.06
Thinking Ability	City	Provincial Town	4.07*	.015
		Rural Area	6.43*	.000
	Provincial Town	City	-4.07*	.015
		Rural Area	2.35	.375
	Rural Area	City	-6.43*	.015
		Provincial Town	-2.35	.375
Cognitive Efficiency	City	Provincial Town	4.80*	.023
		Rural Area	5.52*	.002
	Provincial Town	City	-4.80*	.023
		Rural Area	.71	.978
	Rural Area	City	-5.52*	.002
		Provincial Town	-.71	.978

Post hoc (Tamhane;  $p < .05$ ) comparisons showed that there were significant age differences between all age groups on GIA (age group 2–10  $M = 503.47$ ,  $SD = 14.27$ ; age group 11–19  $M = 525.66$ ,  $SD = 10.27$ , age group 20–40  $M = 533.44$ ,  $SD = 8.81$ , age group 41–97  $M = 522.82$ ,  $SD = 15.13$ ), TA (age group 2–10  $M = 504.64$ ,  $SD = 13.67$ ; age group 11–19  $M = 524.70$ ,  $SD = 11.00$ , age group 20–40  $M = 531.16$ ,  $SD = 9.92$ , age group 41–97  $M = 518.99$ ,  $SD = 16.25$ ) and CE (age group 2–10  $M = 502.67$ ,  $SD = 18.46$ ; age group 11–19  $M = 526.97$ ,  $SD = 12.75$ , age group 20–40  $M = 533.17$ ,  $SD = 10.06$ , age group 41–97  $M = 519.61$ ,  $SD = 16.29$ ). There were no essential age differences between the age groups 20–40 and 41–97 on VA (age group 2–10  $M = 502.55$ ,  $SD = 16.04$ ; age group 11–19  $M = 525.92$ ,  $SD = 14.19$ , age group 20–40  $M = 540.84$ ,  $SD = 13.82$ , age group 41–97  $M = 540.76$ ,  $SD = 19.91$ ). The developmental curve of VA is increasing from the age of 2–10 to 41–97, but the developmental curves of GIA, TA and CE at age 41–97 are decreasing (Figure2).

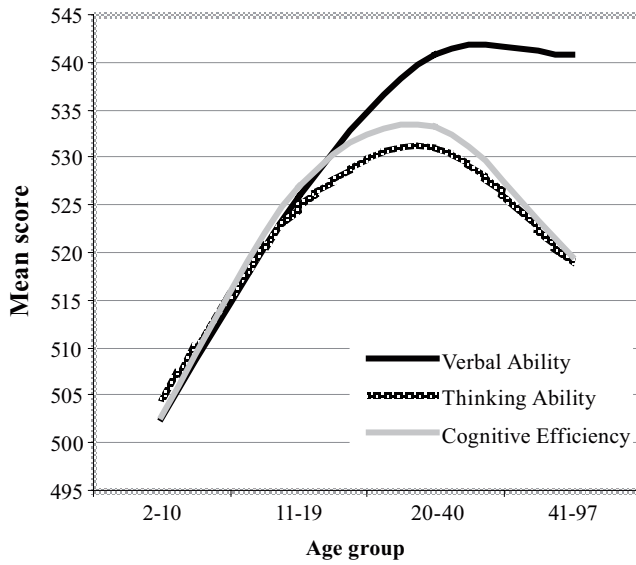


Figure 2. Means on WJ-IE Cognitive Ability Clusters in Age Groups.

The difference between the 2-10 and 11-19 age groups on GIA is +19.35 *W* points (in average 1.13 *W* points per year), between the 11-19 and 20-40 age groups + 7.78 *W* points, and between the two last groups: -10.62 *W* points. The age group of 41-97 presented the largest urban-rural mean difference on all WJ-IE cognitive ability clusters (Table 2 - 3, Figure 3).

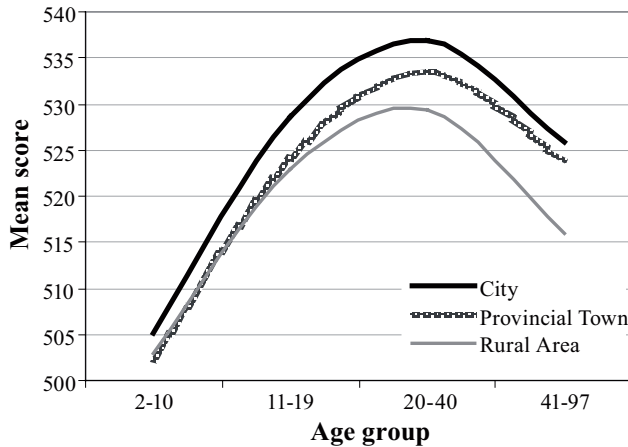


Figure 3. Means on WJ-IE General Intellectual Ability Scale for Age among Region Groups

The results demonstrated that, generally, males (GIA  $M = 522.69$ ,  $SD = 15.45$ ; VA  $M = 530.21$ ,  $SD = 20.67$ , TA  $M = 521.36$ ,  $SD = 15.04$ , CE  $M = 520.91$ ,  $SD = 18.01$ ) had higher mean scores than females (GIA  $M = 520.01$ ,  $SD = 15.67$ ; VA  $M = 524.32$ ,  $SD = 20.26$ , TA  $M = 518.38$ ,  $SD = 15.67$ , CE  $M = 520.30$ ,  $SD = 18.07$ ) on all WJ-IE cognitive ability cluster scales (Table 2 - 3). Males had higher mean scores on WJ-IE in all age groups, except for the age group of 2-10 on CE (Figure 6). The dissimilarity between

males and females on GIA was  $-2.67$  *W* points. There is a tendency for the gender difference on the GIA mean score to increase with age (Figure 4).

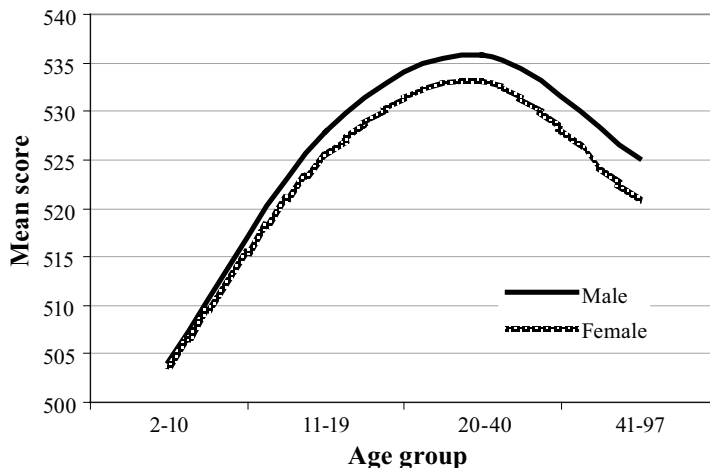


Figure 4. Means on WJ-IE General Intellectual Ability Scale for Males and Females in Age Groups

The largest gender difference on the GIA mean score was in the age group of 41-97 (Table 2 - 3). The gender differences on the GIA mean score increase when the urbanization level of region decreases (Figure 5).

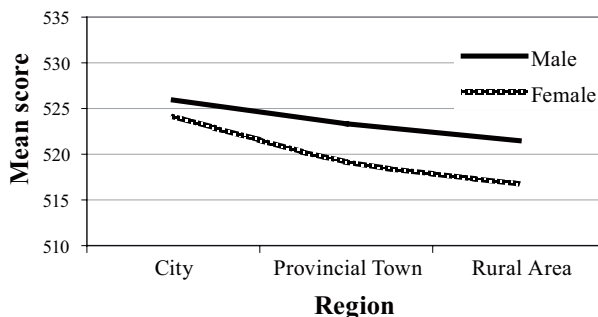


Figure 5. Means on WJ-IE General Intellectual Ability Scale for Males and Females in Region Group

The largest gender dissimilarity on the GIA mean score was in rural areas. From all WJ-IE cognitive ability clusters, the largest gender variation was on VA ( $-5.88$  *W* points), significant on TA ( $-2.67$  *W* points), non significant on CE ( $-.61$  *W* points) (Table 2-3, Figure 6).

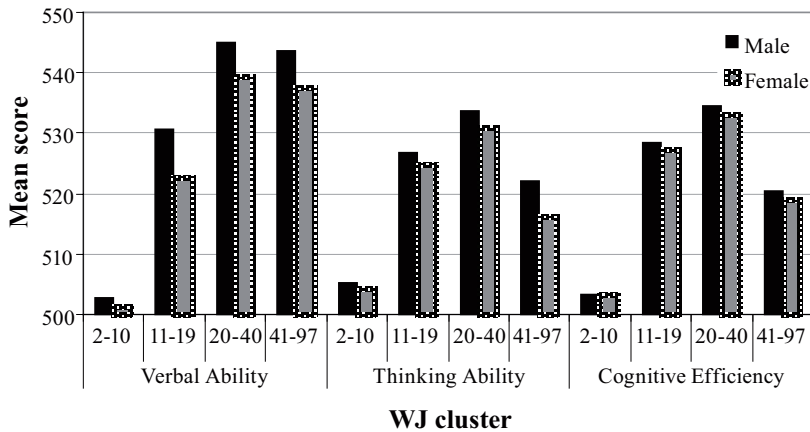


Figure 6. Means on WJ-IE Cognitive Ability Clusters for Males and Females in Age Groups

## Discussion

In conclusion, the current investigation demonstrated that intellectual abilities of Latvian people are related to demographic factors of region, age and gender. Age curves on all WJ-IE cognitive ability clusters indicated the typical patterns (Horn, 1991; Horn & Noll, 1997; McArdle et al., 2002) increasing up to the age group of 20-40 and decreasing in the age group of 41-97. Similar to previous findings (Ferrer et al., 2004; McArdle et al., 2000, 2002) which suggested that fluid reasoning (Gf) and crystallized knowledge (Gc) follow various growth and decline trajectories, we found that VA (which is actually a Gc measure) displayed a non significant decline in the age group of 41-97, whereas TA and CE demonstrated a rapid and significant decline.

The results suggested that Latvia differs significantly from Western industrialized countries, concerning urban-rural cognitive ability differences. In the West urban-rural IQ differences have become almost insignificant and have decreased to about 2 IQ points (Loehlin, 2000). Our findings are more similar to the findings obtained many decades ago in the Western countries (Terman & Merrill, 1937; Noel, Gist, & Clark, 1938). The results provided evidence that people in cities score significantly higher on all WJ-IE cognitive ability clusters. With the decrease of urbanization, there was a decrease in mean scores on all WJ-IE cognitive ability scales. There were non-typical urban-rural cognitive ability differences in fluid and crystallized abilities. Usually, fluid cognitive abilities differ less than verbal abilities between urban-rural areas (Loehlin, 2000). In the Latvian sample there was a larger urban-rural difference on thinking abilities than verbal abilities. One reason could be related to the WJ-IE adaptation problems. Analysis of the WJ-IE Verbal scale items (Latvian version) showed that some items were better known to rural people than to people from the cities (Sipols, 2002). The second reason could be related to the urban-rural differences in the quality of education. Several years ago Latvian scientists claimed that in Latvia, based on OECD international student assessment research results, educational achievement in rural schools is lower than in large city schools, and that urban people (also teachers in schools) are more often involved in lifelong education programs than rural people (Geske, Grinfelds, Kangro, & Kiselova,

2004). Another aspect which influences urban-rural cognitive ability dissimilarities is urban-rural migration. People with higher cognitive abilities tend to migrate from rural to urban environments, which offer more opportunities (Taylor & Gibson, 1978). Obviously the urban-rural migration has a strong influence, as the results of our study indicated that with the increase of age urban-rural cognitive ability differences increase between cities and rural areas, but decrease between cities and provincial towns. Latvian social scientists have found that in the last ten years the rural territory of Latvia has lost much of its population in favour of urban centres (Latvia State Regional Development Agency Survey "The Evaluation of the Interaction Between Latvian Cities and Rural Areas", 2009). Although the decreasing difference between cities and provincial towns could be also caused by significant age differences in the sampling of these subgroups and these results should be viewed with caution.

Contrary to most of the research in the West (Jarvik, 1975; Jensen, 1998; Aluja-Fabregat et al., 2000; Loehlin, 2000; Colom & Garcia, 2002; Camarata & Woodcock, 2006; Dolan et al., 2006) that demonstrates no gender differences in general intelligence, our findings displayed significant gender differences. Males had consistently higher mean scores on all WJ-IE scales, and significantly higher mean scores on verbal and thinking abilities. Furthermore, this tendency was observed in all age groups. The largest difference was shown in verbal abilities. One reason could be the specifics of WJ-IE verbal tests, because Camarata & Woodcock (2006) with Woodcock-Johnson Series of Cognitive and Achievement Tests also found that males consistently outperformed females in some verbal abilities. This contrasts to other research findings (Halpern, 1992; Halpern, 2000; Halpern & Wright, 1996; Hedges & Nowell, 1995) which claim that there are no major gender differences on verbal abilities. Possibly, the tasks of the WJ-IE Thinking Ability cluster are sensitive to the gender specifics. We should note, that The Quantitative Reasoning test from this cluster was constructed specially for WJ-IE, no corresponding USA test is available for which comparable USA statistical information can be presented. Besides, the cluster contains tests that measure such broad abilities as fluid reasoning (Gf), long term retrieval (Glr), visual spatial (Gv) and quantitative ability (Gq), which in many studies were found to be male prerogatives (Hedges & Nowell, 1995; Hyde, Fennema, & Lamon, 1990; Linn & Petersen, 1986; Schiff & Oldak, 1990; Willingham & Cole, 1997). Statistical data indicate that males (70.7% high school-leavers) are less well educated than females (76.7% high school-leavers) in Latvia (Latvia State Central Statistical Bureau Annual Report, 2009). Latvian gender differences in cognitive abilities and education level contrast with the expected relationships between the level of education and intelligence (Barona, Reynolds & Chastain, 1984; Chastain & Joe, 1987). The same tendency was in the male-female group sampling, but the difference in education level was not significant. Interesting that in our study gender differences in cognitive abilities increased with age and increased with a decrease of the urbanization level of regions. This could mark the tendency of cultural and social economical influences on gender differences in cognitive performance (Lippa & Herschenberger, 1999; Lippa, 2002). Investigations demonstrate that gender roles are highly polarized in Latvia (Eglite, 2004; Rosen, 2007). The gender differences could be influenced by age differences in the sampling of some subgroups, although this difference was not significant.

Thus, the results of this study indicated that in Latvia, which is a country where rapid changes in the social and economic environment took place after 1990, the demographic variables interplay differently with cognitive abilities than has been demonstrated in Western countries. Some demographic variables, like region and gender, which, in recent years, due to environmental changes, were believed to have lost their significant influence on IQ scores (Barona & Chastain, 1984; Kimura, 2000; Loehlin, 2000; Matteson & Lynn, 1999) are still significant in Latvia. This should be taken into account when cognitive ability tests are used in applied settings. In future, more detailed investigations on gender differences and age dynamics in the context of urban-rural cognitive ability differences would be useful for practice of cognitive ability diagnostics and scientific understanding. It is possible to assume that these large differences between main demographic groups are impacted by the existing variations in the Latvian education quality in different regions. In the period of the adaptation (1999-2005) and standardization of the WJ-IE cognitive ability tests many rapid economical and education changes took place in Latvia and it is possible that some items of WJ-IE Verbal ability tests are sensitive to gender and cultural specific in the region.

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## REPORTS RELATED TO PRACTICE

### **Teachers' antipathy to creative students: Some implications for teacher training**

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It has long been known that teachers' attitudes to creative students are equivocal. Some regard highly intelligent but less creative students as more creative than highly creative youngsters, some describe creative students as "conforming", while others describe them in terms associated with psychological disturbance. Not infrequently, teachers express dislike of students who are bold, risk-taking, original, and the like. This state of affairs results, to some extent at least, from the characteristics of creativity itself. Divergent thinking processes or personality traits that lead to unexpected or puzzling answers or challenges to authority may breed behaviour that can easily be misunderstood as destructive. An appropriate educational response would involve clarification for teachers of the nature of creativity and of what constitutes a creative product. Some examples of how to do this are given.

**Keywords:** Creative children, teachers, attitudes, teacher training

### **Teachers' antipathy to creative students: Some implications for teacher training**

Despite the fact that a large majority of teachers claim that they enjoy teaching creative children (e.g., Feldhusen & Treffinger, 1975; Runco, Johnson, & Bear, 1993), in real life teachers not infrequently express disapproval or even dislike of the students in their classes who are most creative (Dawson, D'Andrea, Affito, & Westby, 1999). This paradoxical finding is not new: It emerged early in the modern creativity era (i.e., in the years immediately following Guilford, 1950). In a summary of early studies, Torrance (1959) concluded that highly creative children tended to be less well known and less well liked by teachers than children with a high IQ. Holland (1959) showed that teachers actually rated children with high IQs but low scores on creativity tests as more creative than children who obtained high scores on creativity tests. In their seminal work *Creativity and intelligence*, Getzels and Jackson (1962) reported the results of a study in which teachers were asked to comment on members of two groups of children, one group marked by high intelligence, the other by high creativity. The teachers expressed a strong preference for teaching the "merely" intelligent children, and this was not attributable to superior classroom performance by the high IQ group, as there were no differences in achievement between the groups.

This finding has not become outdated: As Smith and Carlsson (2006, p. 222) put it, even today: "... teachers seem to have a confused picture of what is a favourite pupil and

what is a creative pupil." Furthermore. It is not confined to the United States. In a study in USA, Germany, India, Greece and the Philippines, Torrance (1965) showed that there was near unanimous disapproval of creative schoolchildren across countries. Teachers and parents in India reported favourable views of creativity, but also linked several words associated with mental illness (emotional, impulsive) with it (Runco & Johnson, 2002). Chan and Chan (1999) found that Chinese teachers associated socially undesirable traits with creativity in students; they concluded that in Chinese culture, nonconforming or expressive behaviour can be interpreted as arrogant or rebellious. In fact, over the years and right up until today similar findings have consistently been reported in a number of different countries and regions, including Africa (Obuche, 1986), Australia (Howison, 1984), Europe (Brandau, *et al.*, 2007; Karwowski, 2007), the Middle East (Oral & Guncer, 1993), North America (e.g., Dawson, D'Andrea, Affito & Westby, 1999; Scott, 1999), and Singapore (Tan, 2003). Why is this so and what is to be done about it?

### Why teachers dislike creative children

Although it is easy to blame teachers for their antipathy to creative youngsters, and indeed there may be some justification for this, much of the problem lies in the nature of creative learning and of creativity itself.

#### *The nature of creative teaching and learning*

The more traditional approach to teaching and learning favoured by most teachers focuses on acquisition of existing facts, application of traditional methods, mastery of conventional tools and instruments, use of conventional logic, speed, formal correctness and accuracy, and leads to orthodox products. It involves children being quiet, neat and orderly, memorizing prescribed content and accurately regurgitating it upon demand, learning and repeatedly re-applying standard methods, remaining within accepted behavioural norms, and producing products that are along the lines expected by the teacher and other students (and parents too, for that matter). By contrast, creativity-oriented teaching and learning in the classroom is based on *generation of novelty*. This involves processes like recognizing problems and discrepancies in accepted content, looking at things in a different way, making unexpected links among apparently discrepant elements of information, or developing your own solutions to problems, and leads to unconventional products.

A striking demonstration of the practical difference between the two approaches to teaching and learning is to be seen in the differences between mathematics teaching in Japanese secondary schools and in their American and German counterparts described in the third TIMSS study (Stigler & Hiebert, 1997). Analyses of videotapes showed that typical teaching behaviour of German and American teachers was to start by presenting a problem to students, demonstrate a standard solution to this problem, require the students to memorize the solution, and then give them further problems of the same type so that they could re-apply the solution in a cookbook manner. By contrast, Japanese teachers started by drawing students' attention to some issue in mathematics and challenging them to work out their own understanding of the problem, specify what they would regard as a solution, and then develop a solution along the lines they had

just worked out. In a nutshell, the Americans and Germans spent their time practising routine procedures until they had perfected them, whereas the Japanese students spent theirs “inventing, analysing and proving (p. 17).”

Teachers, administrators, legislators, parents, even children themselves are accustomed to the first kind of teaching and learning, and have been for a very long time. Cropley and Cropley (2009) give a case study of two public protests 100 years apart in Australia, both centering on strong public preference for learning based on acquisition of accepted facts and exams based on regurgitation of these. Teaching and learning of this kind is seen as well-founded, and examining via knowledge of facts is seen as objective, fair and safe. Inventing, analysing and proving, by contrast, is seen as subjective, unpredictable, and dangerous. Altering the traditional approach would involve breaking the habits that teachers have been applying throughout the 150 years or so of modern mass education and that are widely accepted as the right way of working in the classroom.

For most teachers, transmitting standard knowledge in an easily understandable manner is the essence of their job. Their knowledge is their stock in trade, and any threat to it is a serious matter. Furthermore, when teachers' knowledge has itself been acquired in a rote-learning manner and is largely parroted off by them, penetrating, unexpected, even challenging questions—no matter how innocently meant—are very threatening. Creative youngsters may challenge teachers to look at their own material in a new way and this challenge may be not merely to teachers' knowledge (cognition), but also to their self-esteem, as well as their authority and status, not only in relation to the creative student but also in the eyes of other students too. Little wonder that this aspect of creativity arouses teachers' unease or dislike. Anything that places their knowledge in question is dangerous.

### *Creative children can be difficult people*

In addition to divergent *processes* such as those outlined above, creative children display:

- *personal properties* like boldness and self-confidence,
- *motivational states* such as dissatisfaction with received wisdom or the drive to fill gaps in knowledge,
- *resistance to social pressure to conform* to classroom norms, and
- *generation of products* that are unexpected or different from what other students produce.

These are tricky for teachers, partly because they may lead to behaviour that is difficult to tell apart from misbehaviour. It is sometimes hard to distinguish between creativity in the classroom and disorderliness or disruptiveness, or even sheer wilful naughtiness. Creative children's attempts to understand things more deeply or from a different angle and express this via apparently strange questions, unexpected answers to the teacher's questions, apparently nonsensical remarks in classroom discussions, choice of exotic contents in classroom exercises, or selection of strange topics in homework or projects can disrupt lessons, and if not stopped by the teacher can seem to other students to involve tolerating misbehaviour, thus encouraging these children to misbehave too. Cropley (2001) gave the example of a first grader who responded to the assignment to



draw a human head in a drawing class by drawing the *inside* of a head, whereas every other child in the class knew enough to draw the outside, without needing any instructions to that effect from the teacher. The boy then compounded the situation by asking for the teacher's help in correctly locating the uvula inside the throat cavity! This embarrassed the teacher—who initially could not make any sense out of the question—and caused great merriment among the other children, unleashing chaos in the otherwise orderly drawing lesson. In short, creativity by its very nature represents a potential threat to good order in the classroom.

Indeed, especially but not only in countries where there is strong emphasis on good order and respect for authority, teachers often see creative children as defiant, chaotic, disruptive (e.g., Brandau, *et al.*, 2007; Karwowski, 2007), or even as psychologically disturbed. In a review of a study by Goertzel and Goertzel (1962)—who found that many children who grew up to be eminent were unhappy in school—Torrance (1963) concluded that the problem was that the children did things like asking unexpected questions or giving unusual answers to teachers' questions, and were then treated as nuisances or troublemakers. Torrance pointed out that some teachers even went so far as to describe such children as mentally defective. Even 30 years later, Westby and Dawson (1995) showed that many teachers who claimed to have a favourable view of creative children not infrequently described them as “conforming,” as absurd as this sounds. When the teachers in the Westby and Dawson study were given adjectives describing traits typical of what creative children are really like (e.g., risk-taking, curious), they said they *disliked* such youngsters; see also Aljughaiman and Mowrer-Reynolds (2005). Thus, one reason for the paradox of lip service to creativity but dislike of actual creative children may be teachers' misunderstanding of their personal properties.

A problem is that although creative children display many highly positive personal characteristics such as autonomy, ego strength, tolerance of ambiguity, or openness, as a group they are also significantly more introverted, more self-willed, less satisfied, and less controlled than children who display lower levels of creativity. Other characteristics associated with creativity also include lack of concern for social norms, and antisocial attitudes, as well as psychopathological tendencies. To put it plainly and briefly, creative students can sometimes seem to teachers to be “weird,” defiant, aggressive, self-centered, or antisocial, characteristics which make them disturbing, even threatening, and this is apparently an inherent part of being creative, at least in some people. On the other hand, teachers also know that creativity is a universally regarded as a good thing, so that they have to cope with the paradox that the “best” students may not display the characteristics most admired in schoolchildren.

### What is to be done?

Within the framework of an educational discussion, the need for an educational solution springs immediately to mind. What is it, then, that teachers need to learn? I will focus here on four major themes that provide core content for the education of teachers—both pre-service and in-service—with regard to creativity:

1. Creativity-oriented teaching and learning facilitates learning, including conventional material and involves all disciplines, not just fine art, performing arts, music, crafts, and the like.
2. Creativity is not always sweetness and light. It has a dark side.
3. Creativity involves rigour and is not just a matter of letting yourself go or doing as you please.
4. Creativity can be assessed fairly.

***Creativity facilitates conventional learning:*** It is not my intention here to suggest that orderliness, acquisition of factual knowledge, mastery of standard solution techniques, and similar behaviours and achievements have no place in the classroom. However, other activities such as inventing, analysing and proving (see above) also facilitate learning. For instance, in the TIMSS study cited above the Japanese children were the third best mathematics achievers out of students from the 41 countries in the project, whereas the Germans reached place 23 and the Americans place 28. In fact, creativity-oriented teaching and learning leads to improved traditional learning in many disciplines. This has been known for many years (e.g., Suchman, 1961), and continues to be demonstrated in relevant research (e.g., Ai, 1999). It also fosters improved motivation and attitudes (e.g., Pleschová, 2007).

Creativity is also relevant to all disciplines. Teachers may believe that it is seen only in disciplines involving performance, production of imaginative objects, and so on, with the result that teachers of “rigorous” disciplines such as science or mathematics may see no place for it and may dismiss it out of hand as irrelevant. They may also equate it with mere unfettered thinking—doing whatever you like regardless of accuracy, appropriateness or effectiveness, i.e. they confuse creativity with what Cattell and Butcher (1968, p. 271) called “pseudo-creativity” (simply letting yourself go) or at best “quasi-creativity” (generating unusual ideas, it is true, but without reference to reality). Thus, teachers need to be convinced that creativity is seen in all disciplines.

Interestingly, however, in recent years even “tough-minded” disciplines have begun moving towards adopting creativity as a guiding principle in curriculum. In a comprehensive review, Lewis (2005) turned to psychological research on creativity for ideas on what is needed in modern technology education (as well as art education, physical education, and music education, among others). He concluded that technology teachers need to promote more than simply knowledge of materials, mastery of special technical skills and techniques, or correct use of tools or instruments and to go beyond these to pursue “more subjective and elusive goals (p. 35).” Among these Lewis includes “creative insight (p. 35).”

***Creativity has a dark side:*** As Craft (2003) pointed out, in both everyday usage as well as scholarly discussions it is almost axiomatic that creativity is good. Various writers such as Rogers (1961), Maslow (1973) and May (1976) emphasized that it is good for the individual and associated it with positive personal properties such as flexibility, openness, courage, or high ego strength, although Boden (1994, p. 4) warned against “the glorification of individuals.” This extremely positive tone was already present at the beginning of the modern creativity era. Bruner (1962) saw creativity as the last bastion of the human spirit in an age in which electronic devices are taking over most non-crea-

tive functions: It thus marks the boundary between the human being and the intelligent machine. Discussions along these lines have not infrequently argued that creativity is a principle of nature, and that it is, by definition, a universal beneficial force fostering growth and rebuilding in all organic systems. The result is that recognizing negative aspects of creativity and discouraging their manifestation or re-directing them are not well developed skills in teachers.

***Creativity can be taught rigorously:*** Cropley and Cropley (2009) outlined a university level class in engineering specifically linked to creativity. Much of their material can readily be transferred to teacher training, both initial and in-service. According to these authors, content should focus on promoting:

1. creative thinking skills;
2. positive attitudes to creativity and creative performance;
3. motivation to be creative;
4. perception of oneself as capable of being creative;
5. positive mood in problem-solving situations;
6. recognising and placing a high value on the creativity of other students, as well as one's own; and
7. reduction of anxiety about creativity.

What is needed is to provide teachers and students with a practical, down-to-earth concept of creativity, and thus reduce their scepticism or other concerns about this topic. Relevant topics include:

1. What has creativity got to do with teaching?
2. Why do teachers and students have problems with creativity?
3. What are the psychological elements of creativity?
4. What are the characteristics of a creative product?
5. How can you solve problems creatively?
6. What blocks creativity in the classroom?

Cropley and Cropley suggested using case studies to teach such material. Analysis of the case studies should emphasize cognition, motivation, affect and social factors.

***Creativity can be assessed rigorously:*** Teachers face increasing demands that their assessment practices be rational, specifiable, and defensible, i.e. that they say what assessments are based on, where and in what way a particular product met or failed to meet the required standard, and how the product could be improved. Relatively early in the modern era, Amabile (1982) emphasised that observers apply their own subjective criteria when assessing creativity and Csikszentmihalyi (1999) argued that "creativity" is essentially something that exists in the eye of the beholder. It involves a value judgement made by people who are knowledgeable in a field. Furthermore there may be disagreement among such people; one person's creativity may be another's banality. This means that the perceived creativity of students' work may depend on the particular teacher, while even when teachers agree their views may differ from those of judges from a different design culture, even teachers of other subjects, educational theorists, or members of the public.

However, Cropley and Cropley (2009) raised the promise of a “universal aesthetic” of creativity which would transcend design cultures and proposed guidelines for teachers that enable them to recognize creativity in students’ work when they see it. These are largely based on the conclusions of and Besemer (2006), Savransky (2000) and Sternberg, Kaufman and Pretz (2002). They involve “indicators” of creativity based on four “dimensions”—relevance and effectiveness; novelty; elegance; genesis. The indicators include “correctness,” “diagnosis,” redirection,” “harmoniousness,” and “transferability,” among others. They presented a case study in which students’ designs were evaluated using the indicators and students subsequently “counselled” on how to make their work more creative.

### Closing remarks

Amid the growing recognition of the fact that not everything about creativity is good is the recognition that both creative thinking and creative personality can cause problems in the classroom, and that many teachers find creative children unpleasant or disruptive. Despite this, there is increasing emphasis on the importance of fostering creativity in educational settings, although reforms of teaching and learning based on creativity sometimes encounter resistance from teachers, administrators, parents and even students themselves. Among other measures, this calls for changes in teacher training, both pre- and inservice.

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## Notes for authors

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