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Seeking the Other Side of Thought-Action Fusion: Implications for Risk-Taking in Young Adulthood

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Seeking the Other Side of Thought – Action Fusion:

Implications for Risk-Taking in Young Adulthood

By

Joan C. Craig

A Thesis

Submitted to the Faculty of Graduate Studies
through the Department of Psychology
in Partial Fulfillment of the Requirements for
the Degree of Master of Arts
at the University of Windsor

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2014

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Implications for Risk-Taking in Young Adulthood

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ABSTRACT

This project identifies a cognitive bias that has not been studied as an independent construct in previous research. This bias is related to the thought-action fusion bias that has been examined in work on obsessive-compulsive disorder and various mood disorders. The newly identified bias, labeled positive thought-action fusion, focuses on a belief that one's personal thoughts regarding positive outcomes can have an influence on real-life events. For example, a person may think that he will win the lottery, and he believes that this thought has actually improved his chance of winning. This project involves two studies, which together show that (1) the positive thought-action fusion bias does exist as an independent construct, (2) we now have a valid measure with which to measure it, and (3) that this bias is related to some forms of risk-taking behaviour and impaired mental control. Implications and future directions for research are discussed.

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Seeking the Other Side of Thought – Action Fusion: Implications for Risk - Taking in Young Adulthood

Traditional university-aged students (aged 18-25) fall within a time-frame of the life-span called emerging adulthood, and risk-taking behaviour is common during this developmental period (Todesco, 2005). Academic risk-taking behaviours, such as skipping classes or not studying, can result in a change in life trajectories for young adults in some circumstances. Gambling behaviours result in problem gambling at double the rate in youth aged 18-24 than in the adult population (Problem Gambling Institute of Ontario, 2013), and can lead to distraction from studies as well as the possible loss of tuition money. Sexual risk-taking behaviours can lead to unwanted pregnancies, or sexually transmitted infections (Norton, Fisher, Amico, Dovidio, & Johnson, 2012). Alcohol and drug-use can lead to unusual behaviours by the users, such as passing out or becoming aggressive, which can contribute to the drug or alcohol user becoming the perpetrator or a vulnerable victim of various crimes (Gustavson et al., 2007; Nayak, Lown, Bond, & Greenfield, 2012). Due to the detrimental nature of many of these risky behaviours, this research project seeks to increase the knowledge base of factors associated with risk propensity by examining a possible risk factor that has not been previously considered in the literature. Specifically, this project investigates a cognitive bias that may contribute to increased risk propensity.

Chapter 1

Thought – Action Fusion

Thought-action fusion (Rachman, 1993) is a phenomenon in which a person believes that his or her thoughts have direct influence on events. This construct has not been previously examined for its possible association to risk propensity; therefore, this investigation of a particular dimension of thought-action fusion will increase the breadth of knowledge regarding risk-taking in young adulthood.

The concept of thought-action fusion (TAF) originated in research with people who experienced obsessive thoughts and displayed compulsive behaviours (Rachman, 1993). These people showed signs of having an exaggerated sense of responsibility, wherein they ascribed internal causal attributions to events from unrelated external forces. Rachman described how this personal responsibility was not only directed at their actions, or omissions of action, but also at their thoughts. These people were found to assign unjustified importance to random, unwanted thoughts. Furthermore, they assumed personal responsibility for these thoughts. For example, a person may have a random thought that there is a possibility that his or her friend might have a car accident, then assume responsibility for the thought (I must want my friend to have a car accident), and assign unjustified importance to that thought (Since I thought about my friend being in a car accident, she will probably have a car accident). Rachman (1997, 1998) developed the cognitive theory of obsession to explain this phenomenon. This theory describes how the perceived importance of normal thoughts can become inflated if one suffers from certain cognitive biases.

The original thought-action fusion (TAF) phenomenon was divided into two subcategories—moral and likelihood—with the second being further divided into likelihood-self and likelihood-other (Shafran, Thordarson & Rachman, 1996a). Moral TAF is the belief that having an unacceptable thought is just as bad as actually performing the act associated with the thought. For example, one item from the TAF moral subscale is “when I have a nasty thought about someone else, it is almost as bad as carrying out a nasty action” (Shafran, Thordarson & Rachman, 1996b). The TAF likelihood-self dimension assesses items that reflect a belief that having intrusive thoughts about oneself will increase the possibility of negative events occurring to the self. For example, an item from the TAF likelihood-self subscale is, “If I think of myself being injured in a fall, this increases the risk that I will have a fall and be injured” (Shafran et al., 1996b). Similarly, the likelihood-other dimension assesses items that reflect a belief that having intrusive thoughts about someone else will increase the possibility of negative events occurring to that person. An example of a TAF likelihood-other subscale item is, “If I think of a relative/friend falling ill this increases the risk that he/she will fall ill” (Shafran, et al., 1996b).

It has been suggested that thought-action fusion may be a specific form of magical ideation (Amir, Freshman, Ramsey, Neary & Brigidi, 2001). The term magical ideation refers to causal beliefs that are considered invalid by conventional standards (Eckblad & Chapman, 1983a). Specifically, it involves the idea that ambiguous behaviours or other events are the actual causal factors of unrelated occurrences. Thought-action fusion is a fairly specific concept, whereas, magical thinking is a broad construct that encompasses a wide variety of causal misconceptions, paranormal phenomena, superstitions, and

religious beliefs. For example, Tobacyk and Wilkinson (1990) found statistically significant relationships between magical thinking and beliefs in spiritualism, superstition, and witchcraft. In a later study, the same authors (Tobacyk and Wilkinson, 1991) reported a significant relationship between playing games of chance (gambling behaviours) and paranormal beliefs, religious beliefs and superstitions. Magical thinking has been investigated in populations with clinical disorders, such as its function as a symptom of schizotypy, or schizophrenia proneness (Eckblad & Chapman, 1983a), and with obsessive-compulsive disorder (Einstein & Menzies, 2004). It has also been investigated for its developmental role with children (Phelps and Woolley, 1994).

Since thought-action fusion is thought to be a component of magical thinking (Amir et al., 2001), it is possible that TAF could be related to several other phenomena, such as superstition, positivity, religion, belief in good luck, and hope. In fact, some authors have described similarities between thought-action fusion and superstition (García-Montes, Pérez-Álvarez, Sass & Cangas, 2008). However, the thought-action fusion construct can be distinguished from superstition because of the thought-action causal attributions in TAF (“If I think it, the likelihood of it happening will be increased”) versus the action-action causal attributions in superstitions (“If I break a mirror, something bad will happen”). These concepts can also be differentiated on the basis of the personal responsibility ascribed by the person to his or her own intrusive thoughts (“I must want her to be in an accident”), rather than a superstitious person’s belief that there is possible misfortune that should be avoided, such as “I must avoid walking under ladders.” The personal-responsibility component ascribed to creating “causal” thoughts can also be used to differentiate between thought-action fusion and belief in outcomes

from religious prayer to a deity. However, research by Rassin and Koster (2003) found a statistically significant correlation between participants who identified with certain religions and the moral TAF subscale, and a moderate correlation between religiosity and the total TAF score. Marino, Lunt, and Negy (2008) performed structural equation modeling to investigate the possible relationship between religion and TAF. They concluded that the degree of religious conviction might have an influence on the relationship between religion and TAF because this association is mediated by a subjective belief of inflated responsibility, which is believed to possibly be influenced by unusually rigid religion-based beliefs.

Berle and Starcevic (2005) performed a review of the TAF literature including past empirical studies. They described how thought-action fusion could be an appraisal or a belief. For an example of TAF as an appraisal, if a person had an intrusive thought, such as “My father is getting older now, and may die soon,” the person might interpret it as “my thought has now increased the chance that my father will die soon.” However, thought-action fusion may also be considered a trait-like belief style, in that the person develops a generalized belief that thinking about things increases the probability of their occurrence. The authors examined the information from multiple studies, and surmised that it is possible that TAF exists as both appraisals and enduring beliefs. Berle and Starcevic also encouraged assessment of TAF across a continuum, because the ranges and variability of scores from the various studies they reviewed suggested that TAF is best conceptualized as a continuous variable.

Past research with thought-action fusion has generally maintained a focus on people’s beliefs that negative events may result as a consequence of their personal

thoughts (e.g., Berle & Starcevic, 2005; Rachman, 1993; Shafran & Rachman, 2004). However, it is possible that there are two different sides to thought-action fusion—positive and negative—and whilst Rachman and others (e.g., Muris, Meesters, Rassin, Merckelbach, & Campbell, 2001; O'Leary, Rucklidge, & Blampied, 2009) have thoroughly investigated the negative part of this construct, there is a lack of literature regarding beliefs that positive events will result as a consequence of personal thoughts. One possible reason for the gap in literature is because the thought-action fusion construct was developed from clinical investigations of people with obsessive-compulsive disorder (OCD). Since that time, investigations involving this construct have remained within the boundaries of populations expressing symptoms associated with clinical disorders. For example, in a literature review, Berle and Starcevic found that TAF was prevalent in depression, eating disorders, psychotic disorders, generalized anxiety disorder, and other anxiety disorders in addition to its association with obsessive-compulsive symptoms.

O'Leary, Rucklidge, and Blampied (2009) provided a specific example of TAF research with their study of TAF and the inflated responsibility that is associated with it. They used a sample of 63 participants including adults diagnosed with OCD ($n = 20$), adults diagnosed with other anxiety disorders ($n = 21$), and non-clinical controls ($n = 22$). The researchers found higher levels of inflated responsibility and TAF in the clinical groups than in the control group. They also found that inflated responsibility was higher in participants with OCD compared to those with other anxiety disorders. On the other hand, TAF was not found to be exclusive to those with OCD, as there were no significant

differences in TAF between the group diagnosed with OCD and the group diagnosed with other anxiety disorders.

Muris and his colleagues (2001) looked at TAF in adolescence. The authors developed the Thought-Action Fusion Questionnaire for Adolescents (TAFQ-A) and administered it to a non-clinical sample of 427 adolescents, aged 13 – 16 years. The TAFQ-A was developed with questions that were designed to be meaningful for adolescents. Similar to the TAF Scale developed by Shafran, Thordarson, and Rachman (1996b), the TAFQ-A focuses on negative consequences. Each question on the TAFQ-A is preceded by a brief vignette to help the adolescents imagine themselves in specific situations. For example, one question on the TAFQ-A reads “Suddenly without any reason you have the thought that you are dying. Having this thought increases the risk that you really are going to die.” The TAFQ-A contains 15 items that are scored on a four-point scale that ranges from 1 = Not at all true to 4 = Very true. The authors were able to provide evidence for the reliability of the TAFQ-A. They also found that thought-action fusion was related to symptoms of obsessive-compulsive disorder and a broad range of anxiety disorders.

The two examples of TAF research provided above (Muris et al., 2001; O’Leary, Rucklidge, & Blampied, 2009) provide examples of how past thought-action fusion studies have focused on negative cognitive distortions in participants who report symptoms associated with clinical disorders. The possible existence of thought-action fusion with positive outcomes has been looked at before this time; however, it has never been investigated as a distinct phenomenon. Previous research has only ever looked at whether or not question items with positive consequences are related to OCD in a similar

fashion as negative items. For example, Shafran, Thordarson and Rachman (1996a) tested eight positive items during construction of the Thought-Action Fusion Scale - Revised. The items that were investigated focused on dimensions of positive thought-action fusion that suggested gains from positive thought, such as “If I think of winning the lottery, that will increase the chance that I win the lottery.” The researchers removed the items because they felt that they were not relevant to obsessive-compulsive symptoms. Amir and his colleagues (2001) also investigated a positive aspect of TAF. These researchers looked at the dimension of positive thoughts that focused on harm prevention from positive thoughts, such as “If I think of a relative/friend being able to avoid a car accident, this increases the chance that he/she will be able to avoid a car accident.” However, this construct was only investigated for its relationship to obsessive-compulsive tendencies, by comparing the scores on the positive TAF items between participants with OCD tendencies and participants without OCD tendencies. While past research has kept the thought-action fusion construct within the boundaries of OCD, anxiety, and the clinical environment, the current project attempted to examine positive TAF as a distinct construct that is relevant to social phenomena, specifically, risk-taking behaviour.

Study1

Since this project seeks to investigate a construct that has not been previously explored, a new scale for measurement was required. A pilot study was conducted with 198 undergraduate student participants for the development and psychometric analyses of a positive thought-action fusion scale. The current Thought-Action Fusion construct (Shafran, Thordarson & Rachman, 1996a) contains the three dimensions, labeled (1)

Moral, (2) Likelihood-Other, and (3) Likelihood-Self; whereas, the Positive Thought-Action Fusion scale constructed for the pilot study included five dimensions, due to the existence of both positive gains and harm-avoidance, as suggested in previous literature (Amir et al., 2001; Shafran, Thordarson & Rachman, 1996a). Items for the new Positive TAF Scale (P-TAF) were developed to closely resemble the items from the TAF-R scale created by Shafran, Thordarson, and Rachman. For example, an item from the TAF-R scale is “If I think of a relative/friend being in a car accident, this increases the risk that he/she will have a car accident,” and an item from the Positive TAF Scale is “If I think of a friend/relative avoiding a car accident, this decreases the chance that they will have a car accident.”

Study 1 was used to establish that there actually is a positive dimension to the thought-action fusion phenomenon, and that it could be measured. It was used to investigate the thought-action fusion construct in a non-clinical environment with a sample of young adults. Specifically, magical ideation was studied due to its relationship to thought-action fusion, and its hypothesized relationship to positive thought-action fusion. In addition, the relationships between positive TAF and positivity, attention to positive information, hope, religion, and belief in good luck were investigated. These variables were chosen as they represent conceptually similar phenomena. Positivity, attention to positive information, and hope all relate to positive thinking, while religion and belief in good luck both represent cognitive biases, in that they are based in faith. The hypotheses for Study 1 were:

H₁: There is a positive dimension to the thought-action fusion phenomenon

H₂: The positive thought-action fusion phenomenon is related to magical ideation

H₃: The positive thought-action fusion scale can demonstrate convergent and discriminant validity with low to moderate correlational relationships to conceptually similar phenomena (hope, positivity, religiosity, belief in good luck, and attention to positive information)

H₄: The construct validity of the positive thought-action fusion scale will be supported through its relationship to Shafran, Thordarson, and Rachman's (1996b) Thought-Action Fusion Scale - Revised

H₅: The Positive TAF scale has 5 subscales, including Moral, Others-Gain, Self-Gain, Others-Harm-avoidance, and Self-Harm-Avoidance

Method

Participants

A sample of 198 students was obtained through the University of Windsor's Psychology participant pool. There was a diverse representation of the student population for both age (range = 16 to 44; $M = 21.51$) and ethnicity (White / European = 56.1%, Black / African / Caribbean = 7.6%, Latin / South American = 3%, East Asian / Chinese / Japanese = 8.6%, South Asian / Indian / Pakistan = 12.6%, Middle Eastern = 11.6%, Multiracial = 1.5%, Other = 1.5%). There was an overrepresentation of female students in the sample (Female = 161, Male = 36, No Response = 1), which is common with samples drawn from the participant pool.

Measures

Thought-Action Fusion Scale – Revised (TAF). This instrument was developed by Shafran, Thordarson, and Rachman (1996b). The Thought-Action Fusion Scale Revised (TAF-R) contains 19 items that are measured on a five-point scale that ranges from “strongly disagree” to “strongly agree.” The TAF-R has three subscales, including the TAF-Moral subscale, which has items such as “Thinking of making an extremely critical remark to a friend is almost as unacceptable to me as actually saying it.” The second subscale is TAF-Likelihood-Others, and these items focus on a belief that unwanted thoughts can result in negative consequences for others, such as “If I think of a relative/friend losing their job, this increases the risk that they will lose their job.” The third subscale is TAF-Likelihood-Self, and these items focus on a belief that unwanted thoughts can result in negative consequences for the person thinking those thoughts. For example, one item is, “If I think of myself falling ill, this increases the risk that I will fall ill.”

Shafran, Thordarson, and Rachman (1996a) provided evidence for the adequate psychometric properties of the TAF-R Scale at the time the measure was developed. Since that time, the scale has gained supporting evidence from several sources (e.g., Pourfaraj, Mohammadi, & Taghavi, 2008; Rassin, Merckelbach, Muris, & Schmidt, 2001; Yorulmaz, Yilmaz, & Gençöz, 2004), some of which have involved research in a variety of nations.

Positive Thought-Action Fusion Scale (P – TAF). This instrument was developed for the current project. It contains 26 items that are measured on a seven-point

scale ranging from “strongly disagree” to “strongly agree,” rather than the five-point scale that was used in the TAF-R scale (please see Appendix A). The P - TAF scale was made with this scale differentiation in order to increase the variability of the scale, which attempts to address the idea that positive thought-action fusion should be best conceptualized on a continuum. A main difference between the Positive TAF Scale and the TAF – R scale is that the Positive TAF is intended to measure people’s beliefs about their thoughts having a direct influence on positive outcomes, rather than on the negative outcomes that are assessed by the TAF - R scale. Another difference between the TAF – R scale and the positive TAF scale is that the Positive TAF Scale conceptually has five subscales instead of three. The TAF-Likelihood-Others and TAF-Likelihood-Self subscales were further divided for the Positive TAF scale into positive-gain and harm-avoidance categories, resulting in Moral, Others-Gain, Self-Gain, Others-Harm-avoidance, and Self-Harm-Avoidance; however, an item-level analysis was required to verify this conceptualized subscale structure.

Magical Ideation Scale (MIS). This instrument was developed by Eckblad and Chapman (1983b). It is a 30-item, true/false measure that has been used to study magical beliefs for approximately 30 years. This scale measures people’s beliefs in superstitions, paranormal activity, extraterrestrials, and other unconventional beliefs. The authors reported good coefficient alpha values (Males, $\alpha = .82$; Females, $\alpha = .85$). They also provided evidence of validity through correlational analyses of the relationships between the MIS and conceptually relevant scales.

Illusory Beliefs Inventory (IBI). This instrument was recently developed by Kingdon, Egan, and Rees (2012). The IBI is a 24-item measure that has been developed

to assess magical beliefs on a five-point scale. The IBI has a three-factor structure including (1) magical beliefs, (2) spirituality, and (3) internal state and thought-action fusion. This measure was created mainly because The Magical Ideation Scale (MIS: Eckblad & Chapman, 1983b) was designed to measure magical thinking in a clinical sample, not the general population; hence, the MIS contains items that measure delusions and other symptoms of psychosis. Although the IBI removed the items that were indicative of psychosis, it created items specifically intended to assess TAF and superstition, because Kingdon and her colleagues considered these items to be more applicable in research using non-clinical samples. The IBI demonstrated acceptable internal reliability for the subscales (Magical Beliefs, $\alpha = .84$; Spirituality, $\alpha = .87$; Internal State, $\alpha = .75$), and excellent internal consistency reliability for the overall scale ($\alpha = .93$), as reported by Kingdon and her colleagues. This study used both the MIS and the IBI due to the recent development of the IBI, and the variation of factors assessed in both scales.

Hope Scale. This instrument was developed by Snyder et al. (1991). This is a twelve-item measure that measures hope using both agency and pathway subscales. ‘Hope agency’ refers to an individual’s belief that he or she capable of achieving positive outcomes, and ‘hope pathways’ refers to the planning in order to achieve goals. These items are rated on a four-point scale that ranges from “definitely false” to “definitely true,” and includes items such as “There are lots of ways around any problem.” The authors documented evidence of convergent and discriminant validity, as well as demonstrating acceptable internal consistency and test-retest reliability.

Positivity Scale. This instrument (Caprara et al., 2012b) is an 8-item measure assessing participants' tendency to view life and experiences with a positive outlook on a five-point scale that ranges from "strongly disagree" to "strongly agree." Caprara and his colleagues (2012a) provided evidence of internal reliability, construct validity, and test-retest reliability. They also provided evidence for the validity of the scale's use in cross-cultural studies, which suggests that the measure is applicable for diverse populations.

Spirituality/Religiosity Scale. This instrument was developed by Good, Willoughby, and Busseri (2011). It is an eight-item measure that assesses religiosity and spirituality. Four questions use a five-point rating scale ranging from 1 (never) to 5 (every day). One question uses a four-point scale from 1 (I never enjoy these activities) to 4 (I usually enjoy these activities). The remaining three items use a five-point scale from 1 (strongly disagree) to 5 (strongly agree). This measure contains items such as "In the past month, how often have you prayed?"

Belief in Good Luck Scale (BIGL). This instrument was developed by Darke and Freedman (1997). It is a 15-item scale that measures the participants' beliefs about good luck on a six-point scale, with items such as "Some people are consistently lucky, and others are unlucky." Darke and Freedman reported a good internal consistency ($\alpha = .85$), and provided evidence to support the test-retest reliability, as well as the discriminant validity and convergent validity of the scale.

Attention to Positive and Negative Information Scale (APNI). This instrument (Noguchi, Gohm, & Dalsky, 2006b) assesses individual differences concerning the cognitive tendencies to focus on either positive or negative information. This measure

uses a five-point scale that ranges from “very untrue of me” to “very true of me,” and contains items such as “I easily see the fun side of any activity that I’m in.” Noguchi, Gohm, and Dalsky (2006a) provided evidence for construct validity, as well as convergent and discriminant validity during the construction of this measure.

Background Information. This is a demographic measure used to collect information about the participants’ gender, age, ethnicity, and year of study. It was included mainly for the purpose of describing the sample.

Procedure

The pilot study was conducted online using FluidSurveys, and took approximately 30 minutes to complete. Students were awarded 0.5 bonus point through the participant pool, to be used toward an eligible psychology course. The items on many of the scales are similar, such as those on the Magical Ideation Scale and those on the Illusory Beliefs Inventory. Therefore, the order of the scales was chosen to vary the subject matter of the items, as an attempt to reduce fatigue effects. The Positive Thought-Action Fusion Scale was ordered first to ensure that the participants’ responses to the new scale would not be biased by reading any other measures before completing the new scale. The Positive Thought-Action Fusion Scale was followed, in order, by the Hope Scale (Snyder et al., 1991), the Magical Ideation Scale (MIS; Eckblad & Chapman, 1983b), the Positivity Scale (Caprara et al., 2012), the Spirituality/Religiosity Scale (Good, Willoughby, & Busseri, 2011), the Illusory Beliefs Inventory (IBI; Kingdon, Egan, & Rees, 2012), the Belief in Good Luck Scale (BIGL; Darke & Freedman, 1997), the Thought-Action Fusion Scale-Revised (TAF Scale; Shafran, Thordarson & Rachman, 1996b), the

Attention to Positive and Negative Information Scale (APNI; Noguchi, Gohm, & Dalsky, 2006), and the background information measure.

Results

Data analyses for Study 1 were focused on the psychometric evaluation of the Positive Thought-Action Fusion Scale. As evidence for construct validity, both convergent and discriminant validity were investigated using correlational analyses. Positive TAF is a new construct, so there are no measures that are conceptually equal. However, if someone has the positive TAF cognitive bias, it could be expected that they would also endorse good luck, hope, and other similar constructs. This relationship is probably one-sided; wherein, those who endorse positive TAF also endorse constructs such as hope and luck, but those who endorse hope and luck would not necessarily endorse positive TAF.

A total of 227 participants were recruited through the Psychology participant pool to take part in the survey. There were 29 incomplete entries, resulting in 198 cases for use in the study. The entire survey, including all measures, contained 156 items. There were 46 cases that were missing data for one item, two cases that were missing data for three items, one case that was missing data for four items, and one case that was missing data for six items. Analyses of the missing data patterns suggested that all these data were missing at random; therefore, a multiple imputation method was used to fill in the missing data prior to analyses.

Normality was examined with the use of histograms, as well as skew and kurtosis values. All histograms approached normal distributions, and the skew and kurtosis values

fell within the acceptable ranges (skew between -2 and 2, kurtosis between -3 and 3). Linearity and outliers were assessed by visual inspection of bivariate scatterplots. All of the scatterplots displayed linear relationships. There was no indication of any outliers that were influencing the relationships between any of the variables. Please see Appendix B for descriptive information of all scales for Study 1.

The internal reliability of all scales and subscales were tested using Cronbach's alpha. Most of the internal consistencies fell in the acceptable ($.6 \leq \alpha < .7$), good ($.7 \leq \alpha < .9$), or excellent ($\alpha \geq .9$) ranges. There were two scales that were in the poor ($.5 \leq \alpha < .6$) range: The Hope Scale ($\alpha = .55$) and the Positivity Scale ($\alpha = .59$). Please see Table 1 for all reliability values.

In assessing discriminant validity, a correlational analysis between the P - TAF Scale and the Hope Scale (Snyder et al., 1991) resulted in a weak correlation that was not significant, $r(198) = .12, p = .094$. Similarly, there was not a significant correlation between the Positivity Scale (Caprara et al., 2012) and the P - TAF Scale, $r(198) = .03, p = .725$. Attention to positive information (as measured by the positive subscale of the Attention to Positive and Negative Information Scale; Noguchi, Gohm, & Dalsky, 2006) was also not significantly related to the P - TAF Scale, $r(198) = .12, p = .104$. These results provide evidence for discriminant validity, as the P-TAF Scale is intended to measure a cognitive bias, rather than positive thinking.

The Positive Thought-Action Fusion Scale was moderately positively correlated with the Belief in Good Luck Scale, $r(198) = .42, p < .001$, the Magical Ideation Scale, $r(198) = .51, p < .001$, the Illusory Beliefs Inventory, $r(198) = .53, p < .001$, the TAF-R,

$r(198) = .57, p < .000$, and the Spirituality / Religiosity Scale, $r(198) = .36, p < .001$.

These relationships provide support for convergent validity for the P - TAF Scale, as these scales all assess various cognitive biases. Please see Appendix C for a listing of all correlations, including correlations between the measurement subscales.

Table 1 Scale and Subscale Reliabilities (Cronbach's alpha) for all measures

Scale	Number of Scale Items	Alpha
Thought-Action Fusion Scale – Revised (TAF-R)	19	.94
TAF-R Moral	12	.94
TAF-R Likelihood Others	4	.95
TAF-R Likelihood Self	3	.81
Positive Thought-Action Fusion Scale (P-TAF)	26	.95
P-TAF Moral	3	.71
P-TAF Likelihood Others Gain	5	.91
P-TAF Others Harm-Avoidance	5	.86
P-TAF Likelihood Self Gain	8	.87
P-TAF Self Harm-Avoidance	5	.78
Magical Ideation Scale (MIS)	30	.88
Illusory Beliefs Inventory (IBI)	24	.88
IBI Magical Beliefs	10	.79
IBI Spirituality	9	.80
IBI Internal State/Thought-Action Fusion	5	.79
Hope Scale	12	.55
Hope Agency	4	.80
Hope Pathways	4	.67
Positivity Scale	8	.59
Spirituality / Religiosity Scale	8	.86
Belief in Good Luck Scale (BIGL)	15	.85
Attention to Positive and Negative Information Scale (APNI)	22	.85
APNI positive	11	.92
APNI negative	11	.88

Study 1 Discussion

The Positive TAF Scale contains 26 items on a seven-point scale. Therefore, the participants' total scores had possible values ranging from a minimum of 26 to a maximum of 182. The participants in this study reported values that ranged from 26 to 161, with 14.4% of the participants scoring over 100. This supports Hypothesis 1, which stated, "There is a positive dimension to the thought-action fusion phenomenon."

Hypothesis 2 purported that the positive thought-action fusion phenomenon is related to magical ideation. This hypothesis was supported with moderate correlations between positive TAF and magical beliefs, as measured by the Magical Ideation Scale and the Illusory Beliefs Scale.

Hypothesis 3 stated that the positive thought-action fusion scale can demonstrate convergent and discriminant validity with low to moderate correlational relationships to conceptually similar phenomena. Positive TAF was not significantly related to hope, positivity or attention to positive information. This supports the discriminant validity of the Positive TAF construct, as this measure was designed to assess a cognitive bias instead of assessing positive thinking. The absence of high correlations provides evidence that positive TAF is not the same as optimism or positive thinking, but rather it is a distinct construct.

Support for convergent validity was gained through the moderate correlations between positive TAF and spirituality, and between positive TAF and belief in good luck. Both spirituality (faith) and belief in good luck are forms of cognitive biases. These moderate correlations show that the Positive TAF Scale is measuring a construct that is

conceptually similar to these other constructs, which is consistent with theory. At the same time, the absence of extremely high correlations shows that positive TAF is distinct from these other constructs. Please see Appendix C for the relationships between positive TAF and conceptually similar constructs.

The construct validity of the positive thought-action fusion scale was supported through its relationship to Shafran, Thordarson, and Rachman's (1996b) Thought-Action Fusion Scale, which provides support for Hypothesis 4.

The subscale structure of the Positive TAF scale (Moral, Others-Gain, Self-Gain, Others-Harm-avoidance, and Self-Harm-Avoidance) was examined using the internal reliability of each subscale. The Cronbach's alpha values provided support for Hypothesis 5 with evidence for the five-subscale structure, including P-TAF Moral, P-TAF Likelihood-Others Gain, P-TAF Others Harm-Avoidance, P-TAF Likelihood-Self Gain, and P-TAF Self Harm-Avoidance.

Overall, Study 1 was successful in providing support for the validity and internal reliability of the Positive Thought-Action Fusion Scale. The results indicated that the P-TAF Scale is suitable for use in Study 2, which looks at the relationship of the positive TAF cognitive bias to various forms of risky behaviour and risk perception. One of the limitations for Study 1 is the inability to perform an exploratory factor analysis due to an insufficient sample size. Another limitation is that the positive TAF construct was not tested for its association to obsessive-compulsive symptoms. Both of these limitations were addressed in Study 2.

Chapter 2

Risk Taking in Young Adulthood

The focus of Study 2 is on the relationship of positive thought-action fusion to risky behaviour. There are several forms of risk that are prevalent among young adults. These forms of risk include academic risk-taking, gambling behaviours, risky sexual behaviours, and alcohol and drug use. Academic risk-taking can involve a wide variety of behaviours, including skipping class and failing to do assignments. Other academic behaviours, such as procrastination, have also been found to be a form of risk-taking (Keinan & Bereby-Meyer, 2012; Schouwenburg, 1992). Procrastination and other risky academic behaviours can affect students' grades and academic standing. Gambling behaviours are pure risk by definition, and thus, provide an exemplar for studying risk propensity. Additionally, gambling behaviours have been implicated as an impediment to academic success (Dickson & Derevensky, 2006).

Most people engage in risky behaviours on a daily basis. For example, in 2010, 170,629 Canadians were injured in vehicle collisions (Transportation Canada, 2014), yet most people still choose to drive their car every day. Furthermore, there are also many risks that are beneficial to the person taking the risk and to society as a whole. If no one engaged in risk-taking behaviour, progress would be non-existent—new drugs could not be developed without human drug trials, and new inventions would not be realized if no one took a risk to invest in their development. Risk is also discussed in the context of situations that people find themselves in, such as the risk associated with growing up in poverty. Extensive research has focused on risky contexts and people who display

resilience to these risks (Fraser, Galinsky & Richman, 1999). However, the current study only focuses on four distinct forms of risk-taking behaviour: Gambling, Drug / alcohol use, risky sexual behaviour, and academic risk. These forms were chosen for this study as they represent some of the more common forms of risky behaviour among older adolescents and young adults. In addition, these forms of risk-taking behaviour represent some of the variability that is found in various forms of risk taking.

Not all forms of risk are the same. For example, if you want to participate in a gambling activity, the risk is inherent and unavoidable. The consumption of alcohol and drugs has a certain amount of inherent risk, but many of these risks can be minimized by actions such as avoiding binge drinking or avoiding drinking around strangers. Similarly, engaging in sexual activity carries a certain amount of risk, but these risks can also be minimized with such things as contraceptive use and avoidance of dangerous situations. Academic activities do not carry any inherent risks, and are only risky if the student chooses to engage in risky behaviour. Therefore, a person can still engage in academic activities even if they are risk averse. Alcohol, drug consumption, and sexual activity can still be engaged in by a risk-averse individual, provided they take measures to reduce the risk. However, a person is unable to participate in gambling without unavoidable risk. The current study employs these four types of risk-taking behaviour in an attempt to sample some of the diversity found in risk-taking behaviours.

Gambling

Due to its entertainment value, gambling is generally considered a socially acceptable behaviour. Gambling operations such as bingo halls and casinos employ a

large number of personnel and generate revenue. Additionally, schools, community groups, and sports groups hold raffles and various gambling events as fundraising initiatives. The negative effects of excessive youth gambling, such as personal, social, legal and educational consequences remain largely unnoticed by the general public. Although most youth gamble in a controlled manner, many do experience serious problems (Dickson & Derevensky, 2006).

Gupta and Derevensky (1998) examined gambling behaviour and cognitive perceptions of gambling activities in a study with 817 secondary school students from the Montreal Region in Quebec. Over 80% of the students reported gambling in the past year. Furthermore, they reported gambling more often than they reported participating in other risky behaviours, such as alcohol and drug use. Pathological gamblers (4.7% of the students, as measured by the DSM-IV-J; Fisher, 1992) were more likely to be engaging in illegal activities than non-pathological gamblers. They were also more likely to have parents with gambling problems.

Barrault and Varescon (2012) researched cognitive distortions in gamblers using assessments by others and self-report scales. The authors found that people with irrational beliefs tended to overestimate their control over the outcome of gambling events, and that having good numeric reasoning did not prevent gamblers from developing false beliefs. They also found that cognitive distortions were more prevalent in pathological gamblers, leading them to increase their frequency, and the intensity (financial risk taking) of their gambling.

In a review of the literature, Toneatto and Ladoceur (2003) found that there are very few programs for problem gambling that have been empirically supported; though, they did find substantial support suggesting that problem gamblers are not a homogenous group. Toneatto and Ladoceur found that gambling entails a complex interaction between several components (ecological, psycho-physiological, developmental, cognitive, and behavioural). The authors evaluated 11 programs and found that programs that employed cognitive-behavioural methods received the most empirical support. It is possible that these cognitive-behavioural programs may benefit from the current study, as it seeks to provide information that will increase the knowledge base about cognitive biases that may influence risk-taking behaviour.

Drug and Alcohol Use

A study by Killen, Leviton, and Cahill (1991) examined adolescents' conceptions of drug use in research with 60 students in Grades 10 to 12. Results indicated that the participants evaluated drug use as either a moral or personal issue. They rarely evaluated drug use as a social-conventional issue. The students consistently categorized legal and illegal drugs differently, but they acknowledged that all drugs can cause harm. This suggests that youth are aware of the risk associated with drug use, but they feel that the decision of whether or not to use drugs is a personal or moral issue.

Peterson, Baer, Wells, Ginzler, and Garrett (2006) performed a randomized trial with high-risk youth to evaluate a drug intervention program. Homeless adolescents ($N = 285$) were assigned to one of three groups, which included two different control groups and a brief motivational enhancement (ME) group. The ME group was presented with

personal feedback about patterns of risk related to alcohol or drug use. Follow-up interviews (1 month and 3 months after the intervention) revealed that the youths in the ME group did not report any treatment effects for alcohol or marijuana use, but they did report less illicit drug use for drugs other than marijuana at the one month follow-up. Unfortunately, this reduction in drug use was not supported at the three-month follow-up, suggesting that any benefits from this program are temporary. The current study aimed to increase the knowledge base of cognitive distortions that are associated with risky behaviours, such as drug use. In doing so, it is possible that the knowledge gained from this study may be used to strengthen current intervention programs, such as the ME intervention program described above.

Past research has investigated cognitive distortions in relation to drug use. For example, Dalton (2006) used archival records from a drug treatment facility for criminal offenders to investigate the frequency of substance use in relation to cognitive distortions. The author examined five classes of drugs (ecstasy, alcohol, opiates, hallucinogens, and amphetamines) and four categories of cognitive distortions (self-centered, blaming others, minimizing/mislabeling, and assuming the worst). Dalton found a main effect for patterns of cognitive distortions on ecstasy use, but there were no significant findings for any of the other substances. By expanding the breadth of cognitive distortions, the current project may be able to identify a cognitive distortion that relates to other drug use and other risky behaviours.

Fromme, Katz, and D'Amico (1997) investigated the effects of intoxication on young adults' perceptions of negative consequence. Participants ($N = 107$) were randomly assigned to either an alcohol consumption group or a control group. Using the

Cognitive Appraisal of Risky Events Scale (CARE: Fromme, Katz, & Rivet, 1997), the participants provided ratings of the likelihood that positive or negative consequences would result from a variety of risky activities. The results indicated that participants perceived significantly fewer negative consequences for drug use, aggressive / illegal activities, or risky sexual behaviour if they were intoxicated. The findings from this study suggest that risk perception is rather fluid, and may become distorted on a temporary basis under certain conditions. It is therefore possible that risk perceptions may become distorted if someone is suffering from a cognitive distortion that is a temporary appraisal rather than a trait-like belief, and as mentioned previously, thought-action fusion is thought to exist as both appraisals and trait-like beliefs (Berle and Starcevic, 2005).

Risky Sexual Behaviour

In a study of risky sexual behaviour (Norton, Fisher, Amico, Dovidio, & Johnson, 2012), college students ($N = 198$) were randomized into one of four groups, three of which each received an intervention that focused on a specific negative consequence from risky sexual activity. The four groups were (1) control group, (2) pregnancy, (3) STIs, and (4) HIV, and they received an identical intervention program, except that the emphasis was placed on a different negative consequence for each group. The experimenters found that participants who were exposed to the pregnancy or STI intervention programs reported less risky sexual behaviour and greater condom use at follow-up than those in the HIV group. The authors concluded that participants may have different behaviour-change outcomes, depending on the focus of the sexual risk intervention programs they attend. This finding highlights the variability of risk

perception, and the importance of assessing individual perception when researching risk-taking behaviour.

Academic Risk

Bridges and Roig (1997) investigated the relationship between irrational thinking and academic procrastination. The authors found that procrastination correlated with a general measure of irrational beliefs, as well as with a subscale of problem avoidance. Since there is a relationship between thought-action fusion and illusory beliefs (Amir et al., 2001), and the study by Bridges and Roig found a relationship between irrational beliefs and procrastination, it follows that there may be a relationship between positive thought-action fusion and procrastination, which is a form of academic risk.

General Risk

Todesco (2005) examined developmental differences in general risk-taking behaviours. He also investigated developmental differences in sensation seeking and perceptual appraisals of risk. The study had 236 participants, who were college students at a Midwestern University. There were significant differences found between adults aged 18-25 years, and those aged 26-34 years. The young adults aged 18-25 years were found to engage in sensation seeking and risky behaviours significantly more than those 26-34 years old. Additionally, the 18-25 year olds perceived risky events as less harmful than the 26-34 year olds. However, Todesco found no significant differences in the participants' level of unrealistic optimism in relation to their age group (18-25 years or 26-34 years), level of risk taking (high – low), or their sensation seeking (high-low).

Anderson and Galinski (2006) investigated the role of perceived personal power in optimism and risk-taking. They found that optimistic risk perceptions acted as a mediator by increasing the effects of perceived personal power on risk-taking. This is relevant to the current project, since the positive TAF construct refers to belief in positive outcomes from positive thoughts, thus suggesting a form of personal power and an optimistic bias about risk. Additionally, Anderson and Galinski found that a sense of responsibility for others' outcomes moderated the participants' risk proclivity. Consequently, the personal responsibility associated with TAF would probably influence the relationship between positive TAF likelihood-others and risk through harm avoidance. These would reflect the items from the Positive TAF harm avoidance subscales (e.g., "If I think of a friend/relative avoiding a car accident, this decreases the chance that they will have a car accident"). This emphasizes the need to assess both gain and harm-reduction dimensions of the likelihood-self and likelihood-other subscales for positive TAF when examining it in relation to risky behaviours.

The Current Study

The current project contributes information to the literature about a phenomenon that has never been studied as a distinct cognitive bias. Positive thought-action fusion may help explain the pervasiveness of some risk-taking behaviour, such as that witnessed with pathological gambling. In addition to the hypothesized relationship between positive thought-action fusion and risk-taking behaviour, some additional analyses were also included in Study 2, including further analysis of the positive TAF construct and the Positive TAF Scale. Age and gender relationships were also examined to help guide

future studies. There are several research questions being addressed in this study. These questions are:

- 1) Is positive thought-action fusion associated with risk-taking in young adulthood, and if so, how is it related?
- 2) Are the harm-avoidance subscales from the Positive TAF scale related to cognitive distortions previously associated with obsessive-compulsive disorder?
- 3) Is positive thought-action fusion related to perceptions of risk and risky behaviour?
- 4) Does positive thought-action fusion explain variance in risk-taking behaviour above that explained by conceptually similar variables, such as belief in good luck?

Hypotheses

H1: Higher scores on the Positive TAF scale will be associated with more past and expected future involvement in academic risk-taking behaviours.

H2: Higher scores on the Positive TAF scale will be associated with more past and expected future involvement in gambling behaviour.

H3: Higher scores on the Positive TAF scale will be associated with more past and expected future involvement in risky sexual behaviour.

H4: Higher scores on the Positive TAF scale will be associated with more past and expected future involvement in alcohol and drug use.

H5: The positive gain subscales (self and other) of the Positive TAF scale will share the strongest relationship with past and expected future involvement in risky behaviour.

H6: The harm-avoidance subscales (self and other) will be associated with impaired control over mental activities similar to the impaired control found with obsessive-compulsive disorder.

H7: Positive TAF will be inversely related to the participants' perception of possible negative risk.

H8: Positive TAF will be positively related to the participants' perception of possible positive consequences.

H9: Positive TAF will contribute to risk-taking behaviour above the participants' belief in good luck, magical thinking, and spirituality.

Method

Participants

A sample of 273 students between the ages of 16 and 25 was obtained through the Psychology participant pool ($n = 261$) and through a snowball recruitment procedure ($n = 12$). The use of a student sample is considered appropriate for the current research despite concerns that have been raised about student research populations (e.g., Henry, 2008), since cheating and other violations of academic integrity are best assessed in a population from an academic setting. Furthermore, since youth and young adults are overrepresented among those with risky behaviours (Todesco, 2005), they were the target age group for

the current research project, and the predominant age range of the students in the participant pool is representative of youth and young adults.

Exclusionary criteria for participant recruitment included age, as a sample between the ages of 16 and 25 was preferred for this study. Participants must also have been enrolled in a post-secondary institution in the Windsor-Essex County region to be eligible for this study. These criteria for inclusion were meant to avoid the recruitment of subsamples that are too small for analyses.

In addition to the advertisement through the Psychology participant pool, recruitment included poster distribution around campus, as well as snowball recruitment. Those recruited from the participant pool received 0.5 bonus points towards an eligible Psychology course, and those recruited outside of the participant pool were compensated with an opportunity to be entered into a draw for a one hundred dollar MasterCard[®] gift card. The snowball recruitment was an attempt to increase the number of male participants, since risk is more prevalent among males than females (Byrnes, Miller, & Schafer, 1999), and the Psychology participant pool generally has a low proportion of male volunteers.

Despite the efforts to increase male participation, the majority of participants in Study 2 were female (females = 83.3%; males = 16.3%). There was a fairly diverse ethnic representation of the student population (White / European = 72%, Black / African / Caribbean = 3%, Latin / South American = 1.5%, East Asian / Chinese / Japanese = 4.5%, South Asian / Indian / Pakistan = 4.9%, Aboriginal / Métis / First Nations = 1.1%, Middle Eastern = 7.2%, Multiracial = 2.7%, Other = 2.7%).

Measures

Positive Thought-Action Fusion Scale (P -TAF). This is a 26-item measure that was developed for the current project. The validity of this measure was tested during Study 1, which indicated internal reliability (Cronbach's alpha) values that ranged from acceptable to excellent ($\alpha = .71$ to $.91$). This scale is used to assess the positive dimension of the thought-action fusion phenomenon on a seven-point scale that ranges from "strongly disagree" to "strongly agree." The P - TAF currently consists of five subscales: Moral TAF, Likelihood-Others-Positive-Gain TAF, Likelihood-Self-Positive-Gain TAF, Likelihood-Others-Harm-Avoidance TAF, and Likelihood-Self-Harm-Avoidance TAF (Please see Appendix A).

Gambling Behaviour Survey. This survey contains questions to assess the frequency of participants' past gambling behaviours and expected future gambling behaviours. Some of the items for this survey were taken from the Canadian Adolescent Gambling Inventory (CAGI; Trembay, Weibe, Stinchfield, & Wynne, 2010), with adjustments made to reflect gambling behaviours found in young adult populations. The authors of the CAGI reported good internal consistency, as measured by Cronbach's alpha ($\alpha = .83$ to $\alpha = .90$). The gambling behaviours of interest for this study include scratch tickets, lottery tickets, casino games, and internet gambling (Please see Appendices M and N).

Cognitive Appraisal of Risky Events. Fromme, Katz, and Rivet (1997) developed the Cognitive Appraisal of Risky Events Scale (CARE) to measure both perceived risk and the participants' expected involvement in risk behaviours. The authors were able to

demonstrate content, construct, and criterion validity. The measure uses a seven-point scale that ranges from “not at all likely” to “extremely likely.” Fromme and her colleagues based the development of this scale on the idea that a risky activity is something that could result in either a positive or negative consequence. For example, missing class may have the expected benefit of having more time to work on assignments, which could result in a higher grade. However, skipping class may also have the expected risk of missing information that is required for the exam, which could result in a lower grade. Fromme and her colleagues found that the expectation of possible positive consequences was positively and reliably associated with the participants’ involvement in risky activities. For this reason, the CARE measurement includes three scales, which are (1) Expected Risk, (2) Expected Benefit, and (3) Expected Involvement. Each of these three scales is subdivided into risk domains, resulting in six Expected Risk subscales, six Expected Benefit subscales, and six Expected Involvement subscales. In the current study, only the subscales that assess risk perception and behaviour in the domains of drug use, alcohol use, risky sexual behaviour, and risky academic behaviours were of interest, so the subscales assessing aggressive / illegal behaviours and high-risk sports were removed prior to testing.

To gain an accurate measure of the participants’ risky behaviour, an additional scale was added to measure past involvement. This scale used the same items from the Expected Risk, Expected Benefit, and Expected Involvement scales for the of drug use, alcohol use, risky sexual behaviour, and risky academic behaviour subscales. The only changes were that the prompt read “How often have you engaged in this activity in the past year?” and it was scored on a 7-point scale that included Never, Once, Twice, Three

times, Four times, Five times, and Six or more times. Please see Appendices O, P, Q, and R for all CARE measures.

Padua Inventory. Sanavio (1988a) developed the 60-item Padua inventory as an assessment of obsessive-compulsive disorder. The measure has four factors that assess various obsessive-compulsive thought patterns and tendencies; however, the current study only employed Factor 1 (impaired control over mental activities), since this factor has been associated with magical ideation and thought-action fusion in previous literature (Einstein & Menzies, 2004). Factor 1 contains 17 items, such as “Unpleasant thoughts come into my mind against my will and I cannot get rid of them.” Only the items from Factor 1 were measured for this project, as the remaining 43 items are not required for the current study, and would have produced unnecessary fatigue effects for the participants.

Illusory Beliefs Inventory (IBI). (Kingdon, Egan, & Rees, 2012). The IBI is a 24-item measure that assesses magical beliefs on a five-point scale ranging from “strongly disagree” to “strongly agree”. The IBI has a three-factor structure including (1) magical beliefs, (2) spirituality, and (3) internal state and thought-action fusion. Kingdon and her colleagues reported that the IBI demonstrated excellent internal consistency reliability for the overall scale ($\alpha = .93$), and acceptable internal reliability for the subscales (Magical Beliefs, $\alpha = .84$; Spirituality, $\alpha = .87$; Internal State, $\alpha = .75$). Examples of items include “I avoid unlucky numbers” from the Magical Beliefs subscale, “There is an invisible force guiding us all” from the Spirituality subscale, and “Sometimes I get a feeling that something is going to happen, before it happens” from the Internal State subscale.

Spirituality/Religiosity Scale. This instrument was developed by Good, Willoughby, and Busseri (2011). It is an eight-item measure that assesses religiosity and spirituality. Four questions use a five-point rating scale ranging from 1 (never) to 5 (every day), and three items use a five-point scale from 1 (strongly disagree) to 5 (strongly agree). One question uses a four-point scale from 1 (I never enjoy these activities) to 4 (I usually enjoy these activities). To facilitate analysis, this item was scored on a five-point scale in the current study by the addition of 5 (I always enjoy these activities). The Spirituality / Religiosity Scale contains such items as “In the past month, how often have you prayed?”

Belief in Good Luck Scale (BIGL). This instrument was developed by Darke and Freedman (1997). It is a 15-item scale that measures the participants’ beliefs about good luck on a six-point scale, with items such as “Some people are consistently lucky, and others are unlucky,” and “I tend to win at games of chance.” The authors reported a good internal consistency ($\alpha = .85$), and provided evidence of convergent validity, discriminant validity, and test-retest reliability.

Demographic Questionnaire. This demographic measure is for the purpose of collecting information about the participants’ gender, age, SES, ethnicity, major, and year of study. It was included for gender and age analyses, and for the purpose of describing the sample.

Procedure

The study was administered online through FluidSurveys. It took approximately 20 - 25 minutes to complete the survey. The questions within each individual measure

were presented in a randomized order. The participants completed the Positive TAF Scale, followed by the Gambling Behaviour Survey (with items from CAGI; Trembay, Weibe, Stinchfield, & Wynne, 2010), the Cognitive Appraisal of Risky Events Scale (Fromme, Katz, & Rivet, 1997), the Padua Inventory (Factor 1; Sanavio, 1988a), the Illusory Beliefs Inventory (Kingdon, Egan, & Rees, 2012), The Spirituality / Religiosity Scale (Good, Willoughby, & Busseri, 2011), the Belief in Good Luck Scale (Darke & Freedman, 1997), and the Demographic Questionnaire.

Results

Data Analysis

Complete or partially complete data were obtained from participants using the Psychology participant pool ($n = 261$), and a snowball recruitment method ($n = 12$), for a total of 273 participants. One case was missing too much data to be useful for any analyses, so it was removed. Some of the remaining cases ($n = 11$) had only completed the first few scales; however, since the Positive TAF Scale was the first scale presented, their data were complete for that scale, and were therefore retained for use in the exploratory factor analysis (EFA). Some other cases ($n = 25$) were missing one random item on the Positive TAF Scale. Where there was any data missing at random, a multiple imputation method was used to fill in the missing data. No significant differences were found between the participants drawn from the Psychology participant pool and those obtained using the snowball method for the individual items from the Positive TAF Scale. Therefore, the participants were pooled for use in the EFA, resulting in a sample of 272 participants.

The data were then examined for use in the remaining analyses. There were eight additional cases that were removed because they were missing information for at least 25% of the items. This resulted in 264 cases available for analyses.

The Belief in Good Luck Scale (BIGL) had two items that required reverse coding (items 9 and 15), and the Illusory Beliefs Inventory (IBI) had seven items that were reverse scored (items 7, 8, 11, 13, 15, 17, and 19). Scale scores were calculated for all measures, and subscale scores were calculated for the CARE Scale and the IBI.

In addition, the CARE Alcohol Use and Drug Use subscales were combined into one scale (Drinking and Drug use) by summing each of the two corresponding subscale values. For example, expected future involvement for alcohol use was added to the expected future involvement for drug use to result in the subscale labeled, Expected Future Involvement Drinking and Drug Use. Subsequently, the Expected Future Involvement subscales were combined with the Past Involvement subscales for all risk behaviours (Gambling, Drinking and Drugs, Sexual, and Academic) to create total behaviour subscales.

Exploratory Factor Analysis

The assumptions for factor analysis are an adequate sample size, absence of influential data points, normality, and absence of multicollinearity or singularity. Normality was assessed using a combination of histograms and Q – Q plots, as well as skew and kurtosis values. The histograms and Q – Q plots suggested that the data approached normal, and the skew and kurtosis values were all within the acceptable range (skew between -2 and 2; kurtosis between -3 and 3). To assess for influential data points,

standardized z-scores were saved into the data file. Twelve of the z-scores (range = 3.39 to 4.18) exceeded Tabachnick and Fidell's (2007) suggested cut-off z-score of 3.29, so these twelve cases were removed. The remaining sample size for Study 2 ($N = 260$) met the estimated requirement of ten cases per variable. Multicollinearity and singularity were assessed using bivariate correlations, which showed significant correlations between most items (please see Appendix D). The highest of the correlations ($r = .77$) was not high enough to suggest singularity, but there was enough correlation between items (range $r = .09$ to $r = .77$) to enable factor analysis.

Velicer's Minimum Average Partial (MAP) test suggested the retention of three factors. Examination of the SCREE plot suggested the retention of five factors. The Kaiser Guttman rule (eigenvalue >1) suggested the retention of four factors. The cumulative percentage of variance accounted for increased from three factors (56.04%) to four factors (60.70%) and five factors (64.08%), and then slowed, only reaching the desired 80% at eleven factors. The decision was made to analyze the data for five factors as suggested by the SCREE plot, since these factors allowed for a fair amount of variance accounted for, while still maintaining parsimony.

The exploratory factor analysis was performed using principal axis as the method for factor extraction. A promax rotation was then used to account for the correlation between items, while maximizing the interpretability of the factors. There were no cross-loaded items present (please see Appendix E). The five factors that were produced were different from those that had been hypothesized, but the new subscales did appear conceptually relevant (please see Appendix F). Cronbach's alpha was used to assess the internal reliability of the five factors, which resulted in Factor 1, Others ($\alpha = .91$); Factor

2, Self ($\alpha = .84$); Factor 3, Financial Gain ($\alpha = .86$); Factor 4, Moral ($\alpha = .75$); and Factor 5, Ethical / Global Concern ($\alpha = .76$). The internal reliability of the total scale was also assessed using Cronbach's alpha ($\alpha = .94$). Item-level analyses indicated that the reliability of either the total scale or the individual subscales would not be appreciably increased by the removal of any specific items.

Independent Samples T-Tests

Gender and age differences were assessed using independent samples t tests. Age was divided into categorical variables for the analyses, with the groups being defined as older adolescents (16 – 19 years) and young adults (20 – 24 years). There was no significant difference in the degree of positive thought-action fusion between adolescents ($n = 79$, $M = 66.96$, $SD = 23.50$) and young adults ($n = 181$, $M = 69.83$, $SD = 27.76$); $t(258) = -.801$, $p = .424$. There was also no significant difference in the degree of positive thought-action fusion between males ($n = 43$, $M = 71.58$, $SD = 30.19$) and females ($n = 220$, $M = 68.50$, $SD = 25.56$); $t(261) = .702$, $p = .483$.

A statistically significant difference was found in risk-taking behaviour between adolescents ($n = 79$, $M = 114.61$, $SD = 35.82$) and young adults ($n = 181$, $M = 127.17$, $SD = 46.92$); $t(191.923) = -2.356$, $p = .019$. There was also a significant difference in risk-taking behaviour between males ($n = 43$, $M = 147.58$, $SD = 62.61$) and females ($n = 220$, $M = 118.53$, $SD = 37.85$); $t(48.167) = 2.939$, $p = .005$, with young adults and males reporting higher levels of risk-taking behaviour.

Correlational Analyses

Positive TAF and risk-taking behaviour. The assumption of linearity was assessed by examination of bivariate scatterplots, which all suggested linear relationships between the various forms of risk and the Positive TAF scale and subscales. Two participants were removed, as they were identified as influential outliers. The assumption of approximated normal distributions was supported by both normality plots and skew and kurtosis values for all variables except the sexual behaviour subscale. The sexual behaviour subscale was transformed, which corrected the normality violation (skew = 1.64, kurtosis = 1.82). Please see Table 2 for descriptive statistics and Table 3 for correlational results.

The results from the correlational analyses indicate that there is a statistically significant positive relationship between positive thought-action fusion and gambling, as well as between positive thought-action fusion and sexual risk-taking behaviour. These results provide support for Hypothesis 2 and Hypothesis 3. However, Hypothesis 1 and Hypothesis 4 were not supported in this study, as there were no significant relationships between positive TAF and academic risk or alcohol / drug use.

Table 2 *Descriptive Statistics for Study 2*

	<i>N</i>	<i>M</i>	<i>SD</i>	Cronbach's α
P-TAF Total Scale	262	68.50	25.84	.94
P-TAF Other Subscale	262	22.34	11.07	.91
P-TAF Self Subscale	262	22.58	8.25	.84
P-TAF Financial Gain Subscale	262	8.07	4.93	.86
P-TAF Moral Subscale	262	7.76	3.88	.75
P-TAF Ethical/Global Concern Subscale	262	7.76	4.19	.76
Gambling Behaviour	262	42.98	18.83	.89
Academic Risk	262	30.22	13.11	.89
Sexual Risk	262	16.53	8.27	.75
Drinking and Drug Behaviour	262	33.00	19.02	.92
Total Risk Behaviour	262	122.73	42.70	.92
Perceived Academic Consequences	263	26.39	6.84	.88
Perceived Sexual Consequences	263	35.11	8.06	.90
Perceived Alcohol / Drug Consequences	263	29.69	8.98	.88
Perceived Academic Benefits	263	8.01	3.95	.81
Perceived Sexual Benefits	263	9.66	5.62	.86
Perceived Alcohol / Drug Benefits	263	13.52	7.91	.89
Padua Factor 1	261	36.55	12.30	.91

Table 3 *Correlations between P-TAF and Risk Variables*

	1	2	3	4	5	6	7	8	9	10	11
1. P-TAF Other	-										
2. P-TAF Self	.48**	-									
3. P-TAF Financial Gain	.72**	.40**	-								
4. P-TAF Moral	.51**	.38**	.49**	-							
5. P-TAF Ethical/Global	.66**	.42**	.69**	.56**	-						
6. P-TAF Total	.90**	.73**	.81**	.68**	.79**	-					
7. Gambling	.18**	.18**	.28**	.15*	.23**	.25**	-				
8. Academic	-.03	.02	.05	-.01	.08	.01	.23**	-			
9. Alcohol-Drugs	-.01	.09	.04	-.01	.09	.04	.39**	.36**	-		
10. Sexual Risk	.16*	.16*	.26**	.20**	.24**	.24**	.36**	.20**	.50**	-	
11. Total Risk	.10	.15*	.20**	.10	.21**	.18**	.75**	.61**	.82**	.63**	-

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Note:

Gambling = Participants' past and expected future gambling behaviour

Academic = Participants' past and expected future academic risk-taking behaviour

Alcohol-Drugs = Participants' past and expected future drug and alcohol use

Sexual Risk = Participants' past and expected future sexual risk-taking behaviour

Total Risk = Total participants' past and expected future risk-taking behaviour

Positive TAF and risk perception. Bivariate scatterplots suggested linear relationships between the P -TAF scale and all forms (academic, sexual, and drinking / drugs) of negative and positive risk perception. One case was removed after being identified as an influential outlier. Please refer back to Table 2 for descriptive statistics. Normality plots and skew and kurtosis values indicated that the distributions approached normality for all variables except those involving the positive and negative perceptions of sexual risk. These variables were transformed, which corrected the normality violation for positive perceptions of sexual risk (skew = 1.15, kurtosis = 0.14), but not for the negative perceptions of sexual risk (skew = 3.39, kurtosis = 12.54). Therefore, Spearman's rho was used for analyses involving the negative perception of sexual risk, as it converts the variables to ranked data and is robust to violations of normality.

No statistically significant relationships were found between positive TAF and perceptions of academic consequences, negative sexual consequences, or alcohol / drug consequences. Therefore, this study did not support Hypothesis 7, which had proposed that positive TAF would be inversely related to the participants' perception of possible negative risk. Similarly, no statistically significant relationships were found between positive TAF and academic benefits, sexual benefits, or alcohol / drug benefits. Therefore, Hypothesis 8 was also not supported, as it had proposed that positive TAF would be positively related to the participants' perception of possible positive consequences. Please see Table 4 for all correlational results between positive TAF and perceptions of risk.

Table 4 *Correlations between P-TAF and Perceived Risk*

	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>
1. P-TAF Total Scale	-						
2. Perceived Academic Consequences	-.11	-					
3. Perceived Sexual Consequences	-.04	.51**	-				
4. Perceived Alcohol / Drug Consequences	-.03	.63**	.71**	-			
5. Perceived Academic Benefits	.11	-.30**	-.15*	-.10	-		
6. Perceived Sexual Benefits	.06	-.11	-.52**	-.29**	.45**	-	
7. Perceived Alcohol / Drug Benefits	.02	-.13*	-.38**	-.44**	.40**	.75**	-

** Correlation is significant at the .01 level (2 tailed)

* Correlation is significant at the .05 level (2 tailed)

Bolded values are Spearman's rho correlational values

Positive TAF and impaired control over mental activities. The assumption of linear relationships was supported by bivariate scatterplots of the Padua Inventory Factor 1 Scale with the Positive TAF scale and all P-TAF subscales. Three cases were removed after being identified as influential outliers. The assumption of normal distributions was supported by both normality plots and skew and kurtosis values for all variables. Please refer back to Table 2 for descriptive statistics.

Correlations between the Padua Inventory Factor 1 and Positive TAF are shown in Table 5. There were statistically significant relationships between the Padua Inventory Factor 1 subscale and the Positive TAF scale, as well as between the Padua Inventory Factor 1 subscale and each of the P-TAF subscales. Hypothesis 6 had proposed a relationship between the Padua subscale and the P-TAF Harm Avoidance subscales, but the exploratory factor analysis conducted earlier in the study did not support the existence of P-TAF Harm Avoidance subscales. Even though these results could not support Hypothesis 6 directly, they did indicate that a statistically significant relationship exists between the impaired control of mental activities and positive TAF.

Table 5 *Correlations between P-TAF and Impaired Control over Mental Activities*

	1	2	3	4	5	6	7
1. Padua Factor 1	-						
2. P-TAF Total Scale	.24**	-					
3. P-TAF Other subscale	.21**	.90**	-				
4. P-TAF Self subscale	.19**	.72**	.48**	-			
5. P-TAF Financial Gain subscale	.17**	.81**	.72**	.40**	-		
6. P-TAF Moral subscale	.18**	.67**	.51**	.37**	.49**	-	
7. P-TAF Ethical/Global Concern	.22**	.80**	.66**	.42**	.69**	.56**	-

** Correlation is significant at the .01 level (2 tailed)

Hierarchical Regression Analysis

All forms of risk-taking behaviour from this study (gambling behaviour, academic risk-taking, alcohol / drug use, and sexual risk-taking behaviour) were combined to provide a total risk-taking score for use in the hierarchical regression analysis. A composite outcome measure was used because running separate regression analyses for each outcome measure did not yield parsimonious solutions that explained sufficient variance. The predictor variables (belief in good luck, magical thinking, and spirituality) were chosen for the hierarchical regression analyses based on the strength of their relationships to positive TAF in Study 1. However, correlational analyses in Study 2 revealed that magical thinking (as measured by the illusory beliefs inventory) was not significantly related to the outcome variable, risk-taking behaviour. Therefore, it was removed from the analysis. Please see Table 6 for the correlational relationships between the variables.

Plotting of the standardized predicted Y on the standardized residuals indicated that the assumption of linearity was not violated. A slight fanning pattern on the plot indicated a minimal amount of heteroscedasticity, and the distribution also indicated a violation of normality. Bootstrapping (1000 samples) was used to correct the violation of normality, which once corrected, rendered the test robust to heteroscedasticity. The Durbin-Watson value (Durbin-Watson = 1.851) was within the required range, indicating independence of errors. Both tolerance and VIF indicated the absence of multicollinearity and singularity (tolerance > .1; VIF < 10). Six outliers on X were identified (standardized residuals > 2.5), and five outliers on Y (Mahalanobis distance > 13.277) were also identified. Three of these cases were found to be influential

observations (COOKS >1; DFFIT >2). The decision was made to remove all outliers / influential observations prior to analysis. The final sample size ($N = 255$) was larger than the required ($N = 60$) sample size for this analysis.

The Spirituality / Religiosity Scale score ($M = 17.55$, $SD = 5.44$), and Belief in Good Luck Scale score ($M = 42.61$, $SD = 10.26$) were entered in the first block. The Positive TAF Scale score ($M = 67.80$, $SD = 25.18$) was entered as the second block.

The first step in the model was significant for spirituality and religiosity, and belief in good luck, $R^2 = .10$, $F(2, 251) = 14.12$, $p < .001$. There was also a statistically significant change when positive TAF was entered into the model, $R^2 = .13$, $\Delta R^2 = .03$, $\Delta F(1, 250) = 7.15$, $p = .008$. Please see Table 7 for further details from the analysis. These results support Hypothesis 9, in that positive TAF did contribute to risk-taking behaviour above the participants' belief in good luck and their spirituality.

Table 6 *Correlations between all Variables Considered for use in Hierarchical Analyses*

	1	2	3	4	5
1. Total Positive TAF	-				
2. Total IBI Scale	.49**	-			
3. Spirituality and Religiosity Scale	.27**	.57**	-		
4. Belief in Good Luck Scale	.41**	.54**	.15*	-	
5. Total Risk	.13*	-.11	-.27**	.13*	-

** Correlation is significant at the .01 level (2 tailed)

* Correlation is significant at the .05 level (2 tailed)

Table 7 Hierarchical Regression Analysis Summary for Cognitive Predictors of Total Risk Behaviour

N = 254

	<i>B</i>	<i>SE B</i>	β	<i>R</i> ²	ΔR^2
Step 1					
Spirituality/Religiosity	-.24	.45	-.33	.10	.10
Belief in Good Luck	.42	.25	.11		
Step 2					
Positive TAF	.28	.11	.18	.13	.03

Study 2 Discussion

To expand on the psychometric analyses from Study 1, the subscale structure of the Positive TAF Scale was examined using an exploratory factor analysis. The hypothesized subscale structure was not fully supported by the analysis, even though it maintained the existence of five subscales. The internal consistency values for the new subscales (1-Self; 2-Others; 3-Financial Gain; 4-Moral; 5-Ethical / Global) ranged from good ($.7 \leq \alpha < .9$) to excellent ($.9 \leq \alpha$), supporting the new subscale structure.

Following the factor analysis, the Moral subscale retained the same items from the hypothesized Moral subscale, and remained unchanged. However, the Self and Others subscales did not retain their separate personal-gain and harm-avoidance features that had been present in the hypothesized structure, with Others Gain, Others Harm-Avoidance, Self – Gain, and Self Harm-Avoidance each classifying a separate subscale. Instead, the new Self and Others subscales contain a number of items that collectively represent both gain and avoidance. The items that did not factor into the new Self and Others subscales formed two subscales that had not been present in the hypothesized subscale structure. These new subscales were the Financial Gain subscale, and the Ethical / Global Concern subscale. The Financial Gain subscale contains items that describe situations that would financially benefit a person, such as winning the lottery or becoming a millionaire. The Ethical / Global Concern subscale contains items such as “If I think of myself getting away with cheating, this increases the chance that I will get away with cheating,” and “When I hear news reports of peace talks, I know that it is because I thought about world peace.”

Further psychometric evaluation investigated the relationship between impaired control of mental activities and the harm-avoidance subscales (self and other). There was some difficulty in testing this hypothesis (Hypothesis 6), since harm-avoidance subscales were not supported by the exploratory factor analysis. Even though the hypothesis could not be tested as stated, statistically significant relationships were found between impaired control of mental activities and the total P-TAF Scale, as well as with all five of the new subscales. In describing his cognitive theory of obsessions, Rachman (1977) defines obsessions as being the result of catastrophic misinterpretations of the significance of personal thoughts. The Padua Inventory Factor 1 Subscale was designed expressly to measure the impaired control of mental activities that is associated with obsessive-compulsive disorder (Sanavio, 1988b). It follows that the relationship of positive TAF to the Padua Factor 1 subscale highlights the cognitive distortions involved in positive TAF, which indicates that positive TAF may have a possible relationship with obsessive-compulsive tendencies, or even with obsessive-compulsive disorder.

The gender and age of the participants was analyzed to help guide future research. The gender of the participants was not related to their level of positive thought-action fusion, but it was found to be related to their risk-taking behaviour, with males reporting more risk-taking behaviour than females. This relationship between gender and risk-taking is consistent with the research reported by Byrnes, Miller, and Schafer (1999). These authors conducted a meta-analysis of 150 studies, and concluded that males were much more likely to engage in risk-taking behaviours; particularly, risky behaviours that were intellectual or physical in nature.

Similarly, the age of the participants was not related to their level of positive thought-action fusion, but it was found to be related to their risk-taking behaviour, with older adolescents reporting more risk-taking behaviour than young adults. This relationship between age and risky behaviour is consistent with past research (Todesco, 2005), which found that risk-taking behaviours in this age range are highest in adolescence and decrease into young adulthood.

If age and gender were involved in mediating the relationship between positive TAF and risk, a relationship would be expected between positive TAF and these variables. The findings from Study 2 suggest that age and gender are not involved in mediation, but rather that they influence risk-taking behaviour independently of the positive TAF construct.

Correlational analyses were used to test Hypotheses 1 through 4, which looked at the association between positive TAF and the various forms of risk that were examined in this study. The results only supported two of these hypotheses (H_2 and H_3), in that positive TAF was significantly related to gambling behaviour and risky sexual behaviour, but not to academic risk-taking or alcohol / drug use. The relationship between gambling and positive TAF is consistent with the past research by Barrault and Varescon (2012), who found that people with irrational beliefs had a propensity to overestimate their control over the outcome of gambling events, and that pathological gamblers had a higher prevalence of cognitive distortions. However, the overall results from this study, which indicate a relationship between positive TAF with some forms of risk-taking but not others, were unexpected. Since gambling is, by definition, risk-taking, a positive association between positive TAF and gambling behaviour would suggest an association

between positive TAF and other forms of risk-taking behaviour. It is possible that mediating factors are involved for these other forms of risk-taking that were not addressed in the current study. For example, the participants' personalities and affect are possible mediating factors that may influence the relationship between positive TAF and risky behaviour. As detailed earlier, there is a great deal of variability in the extent to which these forms of behaviour (gambling, alcohol / drug use, sexual activity, and academic behaviours) can be participated in, while still avoiding the associated risk. The participants' personalities and affect may influence the relationship between positive TAF and the degree to which they are motivated to engage in these activities.

Hypothesis 5 examined the relationship between risky behaviours and the Positive Gain subscales (self and other). This hypothesis could not be tested, since the exploratory factor analysis did not support the existence of positive gain or harm avoidance subscales. However, the analyses did indicate that gambling behaviour shared the highest relationships with the Financial Gain subscale and the total P-TAF scale, followed closely by the Ethical / Global Concern subscale. The relationship between gambling and the Financial Gain subscale is expected, since this subscale includes items such as, "If I think of myself winning while scratching lottery tickets, it will increase the chance of winning," and "If I think of myself winning the lottery, this increases my chance of winning the lottery." The relationship between gambling and the Total P-TAF Scale was also expected, since the scale indicates a general belief that personal thoughts can influence positive outcomes. However, a strong relationship between gambling and the Ethical / Global Concern subscale was not expected. This scale includes items such as, "When I hear news of peace talks, I know that it is because I thought about world

peace.” It is possible that the relationship between gambling and ethical / global concern comes from the positive TAF bias being generalized to a variety of thought processes. Further investigation will be needed to delineate this relationship.

Risky sexual behaviour shared the strongest relationships with the total P-TAF scale and the Ethical / Global concern subscale, followed by the Financial Gain subscale and Self subscale. Similar to the findings with gambling behaviour, the strong relationship between risky sexual behaviour and the Total Positive TAF scale could be expected, due to the associated cognitive bias in which people believe that their thoughts can positively influence outcomes. A strong relationship between risky sexual behaviour and the Self subscale could also be expected, as this scale includes items such as, “If I think about being attractive, it will make my desired partner more attracted to me.” The strong relationships involving risky sexual behaviour with the Ethical / Global Concern subscale and the Financial Gain subscale were not expected. As with the relationship between gambling and ethical / global concern, it is possible that the positive TAF bias has generalized to various thought processes, influencing the relationships between risky sexual behaviour and ethical / global concern and financial gain.

Correlational analyses were also used to test the relationship between positive TAF and risk perception (H₇ and H₈). Perceptions of the risks and benefits associated with gambling were not investigated in the current study, but there were no statistically significant relationships found between positive TAF and the participants’ perceptions of the risks or benefits associated with academic risk, sexual risk, or alcohol and drug use. It is possible that people who experience the positive TAF bias perceive the same amount

of inherent risk in activities as people without cognitive bias; yet, they feel that the risks will not affect them, because their thoughts will overrule the inherent risks.

Hierarchical regression analyses were used to investigate (H_9) whether positive TAF contributed to risk-taking behaviour above some of the constructs that were shown to be closely related to Positive TAF in Study 1 (belief in good luck and spirituality). All forms of risk behaviour (gambling, sexual risk-taking, academic risk-taking, and alcohol / drug use) from this study were summed to produce one total risk value to be used as the outcome variable for these analyses. Approximately 3% of the risk-taking behaviour from this sample could be attributed to positive TAF after belief in good luck and spirituality were accounted for. Although 3% is not a large percentage, it shows that positive TAF does account for some of the risk-taking behaviour in a university sample. Past work by Barrault and Varescon (2012) indicated that cognitive distortions are more common among pathological gamblers. Future investigations into positive TAF could assess clinical populations, such as pathological gamblers, to examine if the positive TAF contributes equally to risk-taking behaviours in clinical populations.

Chapter Three

General Discussion

Positive thought-action fusion was investigated in this project as a distinct cognitive bias. Past investigations with the thought-action fusion construct had maintained a focus on the belief that negative outcomes could occur as a result of personal thoughts. Alternatively, the positive TAF construct focuses on the belief that positive outcomes can occur as a result of personal thoughts. These two cognitive biases are related, but conceptually distinct. Where the thought-action fusion bias is implicated in the individual's obsessive desire to avoid the negative outcomes believed to result from their thoughts, the positive TAF bias is hypothesized to increase personal desire to obtain the positive outcomes that they believe result from their thoughts.

The P-TAF Scale was designed to fundamentally emulate Shafran, Thordarson, and Rachman's TAF-R Scale (1996b), in order to maintain the focus on measuring cognitive bias. The relationship between the P-TAF and the TAF-R helps to provide evidence for construct validity of the P-TAF Scale. However, evidence was also gained to show that the cognitive bias that is measured by the P-TAF is distinct from the cognitive bias measured by the TAF-R, due to the P-TAF focus on positive outcomes.

The P-TAF gained support for convergent validity in Study 1 through its relationships with several conceptually similar phenomena. Yet, none of these relationships were strong enough to suggest that positive TAF was not a distinct construct. The P-TAF scale was refined in Study 2 after a factor analysis revealed a five-

factor subscale structure that included a Self subscale, Other subscale, Financial Gain subscale, Moral subscale, and Ethical / Global Concern subscale.

In Study 2, the P-TAF was employed to measure positive TAF's relationship to perceptions of risk, risky behaviours, and impaired control of mental activities. While there were no statistically significant findings to support a relationship between positive TAF and perceptions of risk, there was evidence gained in support of the hypothesized relationship between positive TAF and some forms of risky behaviours, and there was support for a relationship between positive TAF and impaired mental control.

Young people's engagement in risk-taking behaviours can alter their life trajectory. In some cases, these life-changing risks could be beneficial, such as in the case of a person quitting a steady job to pursue an interest that turns out to be far more enjoyable and profitable than the original job. However, in other circumstances, the person's life trajectory could change for the worse, such as when participation in gambling becomes an addiction. The identification of positive TAF and its relationship to some forms of risk-taking behaviour could lead to enhanced understanding of these behaviours, which could lead to improved intervention strategies.

Limitations

The current project involved two studies, which were designed to act as merely the starting point for investigations into the positive thought-action fusion phenomenon. Since the current project represents the first stage of research for this cognitive bias, investigation was limited to psychometric exploration of the scale, and the exploration of a limited number of risky behaviours. Therefore, the sample represented only two age

groups, which were drawn completely from post-secondary institutions in one geographic area, which may not provide a sample that represents the general population (Sears, 1986). Furthermore, the participation rate of males was disproportionately low. This may have increased the possibility of Type II errors in Study 2, since both current and past research (Byrnes, Miller, & Schafer, 1999) have identified gender differences in risk-taking behaviour. Another limitation that was specific to Study 2 is that it did not explore the participants' perceptions of the risks and benefits associated with gambling behaviour, since gambling was not included in the forms of risky behaviour assessed by the CARE Scale. Despite these limitations, this research was successful in demonstrating that positive thought-action fusion is a distinct cognitive bias, and that we have a valid scale with which to measure it. It has also provided evidence that this cognitive bias contributes to some forms of risk-taking behaviours and impaired mental control.

Applications and Future Directions

At the onset of this project, it was theorized that positive TAF would be implicated in social phenomena, rather than in the clinical disorders that have been associated with Rachman's thought-action fusion bias (1993). However, the results from these studies, particularly, the relationship between positive TAF and the impaired control of mental activities, suggest that positive TAF may also be implicated in some clinical disorders, such as obsessive-compulsive disorder and anxiety.

The relationship between positive thought-action fusion and impaired control of mental activities (as measured by Factor 1 of the Padua Inventory) suggests that positive TAF may also be related to obsessive-compulsive tendencies, since the Padua Inventory

was developed specifically for the assessment of OCD (Sanavio, 1988b). Further indication of a possible relationship between positive TAF and OCD is suggested by the fact that the relationship between OCD and the original TAF construct has been well documented (e.g., Berle & Starcevic, 2005), and positive TAF was found to be correlated with the original thought-action fusion bias in Study 1.

MacLeod and Mathews (2012) discuss how various cognitive models of anxiety generally share the premise that cognitive biases play a central causal role in people's vulnerability to experience unduly intense anxiety symptoms. The current project revealed that positive TAF is related to the original thought-action fusion construct, as well as impaired control of mental abilities, both of which have been associated with some people's tendency to assume exaggerated responsibility for their personal thoughts (Rachman, 1993). This tendency toward exaggerated responsibility has been associated with anxiety in past literature (see Berle & Starcevic, 2005). Taken together, these relationships suggest that there may be a possible link between positive TAF and anxiety. Future research could include samples drawn from clinical populations to investigate the true relationship between positive TAF and anxiety, OCD, gambling addictions, and other disorders.

Cognitive bias modification (CBM) is often used as an intervention strategy to help people who display symptoms associated with cognitive biases. Unlike cognitive-behaviour therapy (CBT), which seeks to alter the way that individuals respond to anxiety-provoking thoughts, Cognitive bias modification (CBM) seeks to change individual cognitive patterns to stop the anxiety-provoking thoughts from occurring. MacLeod and Mathews (2012) state that most research regarding CBM has focused on

attentional bias and interpretative bias, but that the principles underlying the CBM approach could be extended to other types of cognitive biases, as well. Since interventions have already been developed for other cognitive biases, future research could investigate whether these same interventions could be extended to help people who are distressed by positive TAF.

Other directions for future research include expanding on current findings, such as exploring the relationship between positive TAF and risk-taking behaviour further by investigating possible mediating factors, such as personality and affect. Another possible mediating factor is motivational state. Differences in people's motivation to participate in certain activities may influence the relationship between the positive TAF bias and actual participation in risky behaviours. For example, although participation in some forms of risky behaviour may provide an immediate benefit, such as financial gain from gambling, some people may not be motivated to participate in gambling because they are more focused on long-term goals. Information about possible mediating factors will help to delineate the differences found in the associations between positive TAF and the various forms of risk-taking behaviour.

Another avenue for future research is the investigation of positive TAF in relation to various forms of positive risk-taking behaviour, such as the personal risk involved in many heroic acts, or the financial risk involved in developing innovations. Research on resilience factors may also benefit from future investigations of the positive TAF construct; particularly, if a relationship is found between positive TAF and positive risk-taking behaviour. Any increase in the propensity for people to take positive risks, may increase their resilience through a decreased feeling of helplessness. Additionally,

spirituality and religion have been associated with resilience in past studies (e.g., Resnick, Harris & Blum, 1993), and this association may be influenced by the relationship between positive TAF and spirituality.

The field of Military Psychology may also benefit from further research on the relationship between positive TAF and positive risk-taking behaviour, as well as its possible association with resilience. Military work requires a significant amount of personal risk-taking, and the relationship between positive TAF and positive risk-taking behaviour may contribute to the knowledge base of factors involved in taking these personal risks. In addition, Wooten (2012) found that the relationship between stressors and post-traumatic stress symptoms was fully mediated by resilience factors.

Future research could also pursue further analyses of the relationship between positive thought-action fusion and risk perception. Although Study 2 did not produce any significant findings concerning the quantity of risk perceptions by the participants, it is possible that risks are perceived qualitatively different by people who experience the positive TAF cognitive distortion. Study 2 only investigated whether people with positive TAF perceived more or less risk than others. However, it is possible that people with the positive TAF bias perceive risk differently. A qualitative study may be able to identify specific differences in the way that people perceive the risks associated with various activities. The identification of key components from the positive TAF bias, such as qualitative differences in risk perception, can be used to refine the development of risk interventions. It is only through further investigation of factors that contribute to risky decision-making that we can hope to prevent the negative outcomes that can result from some forms of risk-taking behaviour.

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APPENDICES

Appendix A Positive Thought-Action Fusion Scale (Craig, J. C., 2013)

Please indicate the extent that you agree with the following statements

	Strongly Disagree	Somewhat Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Somewhat Agree	Strongly Agree
If I think of a sick relative / friend getting better, this increases the chance that they will get well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think of myself winning a competition, it increases the chance that I will win.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think of myself winning the lottery, this increases my chance of winning the lottery.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think of my car running well, it decreases the chance that my car will break down.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think of myself getting away with cheating, this increases the chance that I will get away with cheating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think of a relative/friend finding a new job, this increases the chance that they will get a new job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think about my pet staying healthy, it increases the chance that they will stay healthy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thinking of someone else being successful increases the chance that they will be successful.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Disagree	Somewhat Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Somewhat Agree	Strongly Agree
If I think about winning, it decreases the chance of me losing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think of a friend/relative winning the lottery, this increases the chance that they will win the lottery.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think of myself in a higher position at work, it increases the chance that I will get a promotion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think of myself as being popular, it will make me have more friends.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thinking about helping someone else is almost the same as actually helping someone.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think of my friend / relative winning an award, it increases the chance that they will win an award.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I have a kind thought about someone else, it is almost as good as paying them a compliment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think about the end of global warming, it will increase the chance that global warming will end.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I am sick, if I think about getting better, it increases the chance that I will get better.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think of being a millionaire, there is a better chance that I will get a million dollars	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think of a friend/relative avoiding a car accident, this decreases the chance that they will have a car accident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Disagree	Somewhat Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Somewhat Agree	Strongly Agree
If I think about animals being friendly, it decreases the chance that I will be attacked by an animal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think of myself winning while scratching lottery tickets, it will increase the chance of winning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I hear news reports of peace talks, I know that it is because I thought about world peace.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think of a friend/relative getting home safely, this increases the likelihood that they will get home safely.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think about being attractive, it will make my desired partner more attracted to me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having an honourable thought is almost as good as doing an honourable deed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I think that I won't get caught speeding, it increases the chance that I will get away with speeding.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix B *Descriptive Information of Study 1 Measures*

Scale (<i>N</i> = 198)	Range min.	Range max.	Mean	SD	Skew	Kurtosis
APNI positive subscale	16	56	43.52	7.821	-1.022	1.431
APNI negative subscale	14	55	39.96	7.822	-.622	.456
APNI total scale (pos minus neg)	-35	40	3.55	11.275	-.252	2.322
Belief in Good Luck Scale	20	76	46.86	10.748	-.420	.038
Hope Pathways subscale	6	16	12.20	1.788	-.362	.943
Hope Agency subscale	5	16	12.15	2.119	-.427	.899
Hope Scale Total	14	32	24.35	3.471	-.220	.686
IBI magical beliefs subscale	10	48	24.00	6.609	.088	.215
IBI spirituality subscale	9	44	28.33	6.883	-.242	-.141
IBI Internal State and TAF subscale	5	25	14.28	4.170	-.223	-.207
IBI Total scale	31	100	66.61	14.316	-.460	-.055
Magical Ideation Scale Total	0	24	8.14	5.369	.788	.240
Positivity Scale Total	16	36	28.82	3.801	-1.020	1.501
Positive TAF moral subscale	3	21	9.71	3.924	.304	-.452
Positive TAF Likelihood Others Positive Gain subscale	5	35	13.15	6.896	.681	-.359
Positive TAF Likelihood Others Harm Avoidance subscale	5	35	11.68	5.936	.904	.730
Positive TAF Likelihood Self Positive Gain subscale	8	56	27.35	9.691	.001	-.272
Positive TAF Likelihood Self Harm Avoidance subscale	5	35	13.42	5.878	.661	.439
Positive Thought-Action Fusion Total	26	182	75.32	28.588	.479	.271
Spirituality and Religiosity Scale	8	36	19.01	6.558	.394	-.432
TAF moral subscale	12	60	33.74	11.117	.008	-.337
TAF Likelihood Others subscale	3	20	7.72	3.331	.809	.564
TAF Likelihood Self subscale	3	15	6.81	2.823	.336	-.596
Thought-Action Fusion Total	19	95	48.28	14.707	-.072	.058

Appendix C Correlations of Positive Thought-Action Fusion with Conceptually Similar Constructs

		Positive TAF Scale	Moral Subscale	Other Gain Subscale	Other Harm - Avoidance Subscale	Self Gain Subscale	Self Harm- Avoidance Subscale
Hope	<i>r</i>	.119	.031	.033	.081	.197**	.114
	<i>p</i>	.094	.666	.642	.255	.005	.111
Hope Agency	<i>r</i>	.068	.025	-.018	.050	.147*	.039
	<i>p</i>	.343	.724	.803	.483	.038	.581
Hope Pathways	<i>r</i>	.152*	.030	.086	.098	.209**	.174*
	<i>p</i>	.033	.674	.230	.168	.003	.014
BIGL	<i>r</i>	.419**	.321**	.392**	.401**	.350**	.382**
	<i>p</i>	.000	.000	.000	.000	.000	.000
Religiosity	<i>r</i>	.360**	.300**	.295**	.320**	.349**	.307**
	<i>p</i>	.000	.000	.000	.000	.000	.000
Positivity	<i>r</i>	.025	.015	-.003	.030	.025	.044
	<i>p</i>	.725	.831	.970	.676	.727	.538
MIS	<i>r</i>	.505**	.348**	.462**	.462**	.436**	.498**
	<i>p</i>	.000	.000	.000	.000	.000	.000
TAF – R Total	<i>r</i>	.574**	.432**	.492**	.543**	.527**	.509**
	<i>p</i>	.000	.000	.000	.000	.000	.000
TAF – R Moral	<i>r</i>	.430**	.343**	.353**	.397**	.411**	.370**
	<i>p</i>	.000	.000	.000	.000	.000	.000
TAF – R Others	<i>r</i>	.567**	.392**	.560**	.590**	.437**	.520**
	<i>p</i>	.000	.000	.000	.000	.000	.000
TAF – R Self	<i>r</i>	.627**	.434**	.511**	.566**	.611**	.581**
	<i>p</i>	.000	.000	.000	.000	.000	.000
IBI Total	<i>r</i>	.529**	.391**	.474**	.451**	.491**	.488**
	<i>p</i>	.000	.000	.000	.000	.000	.000
IBI Internal State	<i>r</i>	.572**	.406**	.506**	.489**	.515**	.576**
	<i>p</i>	.000	.000	.000	.000	.000	.000
IBI Spirituality	<i>r</i>	.266**	.223**	.244**	.189**	.297**	.175*
	<i>p</i>	.000	.002	.001	.008	.000	.014
IBI Magical	<i>r</i>	.507**	.358**	.452**	.473**	.430**	.512**
	<i>p</i>	.000	.000	.000	.000	.000	.000
APNI Total	<i>r</i>	.032	-.045	.015	-.005	.086	.032
	<i>p</i>	.653	.533	.833	.944	.231	.651
APNI Positive	<i>r</i>	.116	.003	.093	.093	.156*	.101
	<i>p</i>	.104	.970	.191	.191	.028	.158
APNI Negative	<i>r</i>	.070	.067	.071	.101	.033	.054
	<i>p</i>	.330	.348	.317	.159	.646	.449

Appendix D *Bivariate Correlations of items from the Positive TAF Scale*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
1	1																										
2	.50*	1																									
3	.58*	.42*	1																								
4	.35*	.42*	.37*	1																							
5	.32*	.36*	.32*	.66*	1																						
6	.37*	.48*	.39*	.70*	.52*	1																					
7	.36*	.42*	.36*	.68*	.59*	.69*	1																				
8	.29*	.41*	.33*	.61*	.59*	.52*	.62*	1																			
9	.35*	.35*	.32*	.62*	.62*	.55*	.56*	.50*	1																		
10	.36*	.48*	.34*	.43*	.42*	.51*	.49*	.40*	.44*	1																	
11	.34*	.37*	.33*	.67*	.68*	.54*	.62*	.55*	.68*	.42*	1																
12	.36*	.46*	.32*	.42*	.43*	.60*	.51*	.43*	.45*	.53*	.38*	1															
13	.37*	.30*	.28*	.53*	.61*	.50*	.60*	.49*	.50*	.44*	.54*	.46*	1														
14	.31*	.42*	.31*	.57*	.51*	.73*	.59*	.44*	.52*	.47*	.50*	.53*	.44*	1													
15	.29*	.19*	.28*	.34*	.34*	.25*	.34*	.38*	.17*	.27*	.22*	.30*	.38*	.24*	1												
16	.22*	.16*	.23*	.28*	.35*	.24*	.28*	.27*	.14	.21*	.23*	.24*	.32*	.23*	.57*	1											
17	.28*	.28*	.30*	.27*	.32*	.20*	.27*	.29*	.20*	.27*	.23*	.33*	.33*	.21*	.49*	.47*	1										
18	.26*	.18*	.24*	.22*	.38*	.13	.24*	.30*	.09	.11	.22*	.20*	.35*	.18*	.49*	.55*	.44*	1									
19	.34*	.32*	.33*	.43*	.35*	.53*	.45*	.35*	.32*	.42*	.29*	.46*	.39*	.47*	.41*	.33*	.37*	.23*	1								
20	.26*	.43*	.32*	.63*	.55*	.75*	.60*	.45*	.49*	.47*	.53*	.53*	.50*	.77*	.28*	.26*	.20*	.22*	.49*	1							
21	.19*	.21*	.29*	.26*	.21*	.18*	.21*	.23*	.12	.20*	.16*	.17*	.26*	.19*	.44*	.48*	.52*	.41*	.37*	.23*	1						
22	.27*	.33*	.26*	.32*	.25*	.37*	.31*	.26*	.25*	.34*	.20*	.37*	.39*	.32*	.31*	.28*	.34*	.23*	.40*	.35*	.24*	1					
23	.33*	.46*	.33*	.60*	.55*	.59*	.66*	.50*	.56*	.43*	.52*	.50*	.56*	.55*	.29*	.23*	.27*	.19*	.48*	.60*	.20*	.43*	1				
24	.36*	.46*	.35*	.48*	.43*	.52*	.46*	.40*	.47*	.45*	.39*	.46*	.39*	.50*	.24*	.21*	.25*	.17*	.38*	.54*	.16*	.52*	.53*	1			
25	.27*	.29*	.28*	.40*	.39*	.33*	.40*	.36*	.30*	.23*	.30*	.30*	.37*	.32*	.46*	.57*	.34*	.44*	.32*	.34*	.38*	.35*	.34*	.27*	1		
26	.24*	.26*	.33*	.43*	.45*	.35*	.39*	.37*	.37*	.43*	.41*	.34*	.42*	.31*	.38*	.32*	.42*	.32*	.29*	.33*	.33*	.29*	.33*	.29*	.31*	.29*	1

*Significant at .01

Appendix E Factor Loadings for Positive TAF Scale

Variable	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Communality Estimates
P-TAF 4	.672	.060	.266	.046	-.147	.710
P-TAF 5	.904	.122	-.096	-.087	-.047	.632
P-TAF 7	.577	.041	.236	.047	-.025	.653
P-TAF 8	.609	.129	.027	.073	-.057	.519
P-TAF 9	.817	-.227	-.024	.003	.109	.618
P-TAF 11	.927	-.062	.006	.045	-.177	.649
P-TAF 13	.578	.148	-.064	-.073	.210	.536
P-TAF 23	.420	-.044	.200	-.084	.335	.607
P-TAF 26	.339	.278	-.087	.053	.106	.380
P-TAF 16	-.012	.814	.068	-.076	-.042	.553
P-TAF 21	-.190	.699	.163	.045	-.057	.423
P-TAF 15	.040	.689	-.026	.004	.063	.502
P-TAF 18	.104	.688	-.111	.032	-.056	.486
P-TAF 17	-.012	.570	-.180	.086	.234	.463
P-TAF 25	.155	.523	.073	-.015	.015	.457
P-TAF 20	.103	.059	.821	-.141	.013	.691
P-TAF 6	.138	-.049	.794	.096	-.072	.744
P-TAF 14	.105	-.061	.755	-.055	.093	.689
P-TAF 19	-.129	.259	.331	.035	.282	.424
P-TAF 1	.050	-.012	-.199	.842	.016	.478
P-TAF 2	-.027	-.055	.159	.533	.154	.502
P-TAF 3	-.018	.130	.081	.690	-.154	.423
P-TAF 22	-.150	.132	-.023	-.078	.793	.449
P-TAF 10	.165	-.070	.131	.215	.320	.498
P-TAF 12	.050	-.014	.255	.121	.374	.491
P-TAF 24	.155	-.108	.091	.013	.603	.527
Total Communality Estimate						14.104
Variance (%) explained by each factor	40.014	10.330	5.694	4.666	3.371	
Hyperplane Count	7	11	12	20	12	(47.69 %)

Appendix F *Subscale Structure of the Positive TAF Scale*

Factor 1: TAF Others

4. If I think of a relative/friend finding a new job, this increases the chance that they will get a new job.
5. If I think of a sick relative/friend getting better, this increases the chance that they will get well.
7. If I think of my friend/relative winning an award, it increases the chance that they will win an award.
8. Thinking of someone else being successful increases the chance that they will be successful.
9. If I think of a friend/relative avoiding a car accident, this decreases the chance that they will have a car accident
11. If I think of a friend/relative getting home safely, this increases the likelihood that they will get home safely.
13. If I think about my pet staying healthy, it increases the chance that they will stay healthy.
23. If I think of my car running well, it decreases the chance that my car will break down.
26. If I think about animals being friendly, it decreases the chance that I will be attacked by an animal

Factor 2: TAF Self

16. If I think of myself winning a competition, it increases the chance that I will win.
21. If I think about being attractive, it will make my desired partner more attracted to me
15. If I think of myself in a higher position at work, it increases the chance that I will get a promotion.
18. When I am sick, if I think about getting better, it increases the chance that I will get better.
17. If I think of myself as being popular, it will make me have more friends.
25. If I think about winning, it decreases the chance of me losing

Factor 3: TAF Financial Gain

20. If I think of myself winning while scratching lottery tickets, it will increase the chance of winning
6. If I think of a friend/relative winning the lottery, this increases the chance that they will win the lottery.
14. If I think of myself winning the lottery, this increases my chance of winning the lottery.
19. If I think of being a millionaire, there is a better chance that I will get a million dollars

Factor 4: TAF Moral

1. Having an honourable thought is almost as good as doing an honourable deed.
2. Thinking about helping someone else is almost the same as actually helping someone.
3. When I have a kind thought about someone else, it is almost as good as paying them a compliment.

Factor 5: TAF Ethical / Global Concern

22. If I think of myself getting away with cheating, this increases the chance that I will get away with cheating
10. When I hear news reports of peace talks, I know that it is because I thought about world peace.
12. If I think about the end of global warming, it will increase the chance that global warming will end.
24. If I think that I won't get caught speeding, it increases the chance that I will get away with speeding.

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