

A comparison of the associations between alexithymia and both non-suicidal self-injury and risky drinking: The roles of explicit outcome expectancies and refusal self-efficacy

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Abstract

Both Non-Suicidal Self-Injury (NSSI) and risky drinking are positively associated with alexithymia, a personality trait characterised by difficulties appraising feelings and an externally orientated thinking style. Although researchers have studied the associations between alexithymia and both NSSI and risky drinking, the underlying factors of both associations are rarely compared. Using path analysis, we compared the mediating effects of behaviour-specific outcome expectancies and self-efficacy beliefs on the associations between alexithymia and both NSSI and risky drinking. A sample of 627 university students (76.10% female, $M_{age} = 20.75$, $SD = 1.88$) completed a battery of questionnaires.

Alexithymia exhibited indirect effects on NSSI via affect regulation expectancies, pain expectancies, communication expectancies, and low self-efficacy to resist NSSI. Alexithymia exhibited indirect effects on risky drinking via expectations of increased confidence and negative consequences. However, the indirect effects differed depending on the valance of the emotion the individual had difficulties appraising. Our findings indicate that the underlying factors in the associations between alexithymia and both NSSI and risky drinking could differ. Where individuals who have difficulties appraising negative emotions may engage in NSSI to help regulate negative feelings, they may consume alcohol to gain more confidence in expressing their feelings. Clinical implications are discussed.

Keywords: Alexithymia; Self-Injury; Risky drinking; Outcome expectancies; Refusal self-efficacy.

Non-suicidal self-injury (NSSI) is the deliberate damage of one's body tissue with lack of suicidal intent, for purposes not socially or culturally sanctioned (International Society for the Study of Self-Injury, 2018). Methods of NSSI include, but are not limited to, cutting and burning the skin, and self-battery. Lifetime prevalence rates of NSSI are estimated to be 13.4% for community-based young adults and 20% for young adults attending university (Swannell et al., 2014). People report various motives (e.g. self-punishment, communication) for engaging in self-injury, but emotion regulatory motives are the most consistently endorsed (Taylor et al., 2018). Individuals also frequently endorse emotion regulatory motives of risky drinking (Martins et al., 2018), consuming alcohol in a pattern that heightens a person's risk of negative consequences to themselves and others (World Health Organization, 2014). Like NSSI, the prevalence of risky drinking is higher among university students (40%) compared to community-based young adults (30%; Auerbach et al., 2018; Australian Institute of Health and Welfare, 2016). Students who persistently engage in NSSI or risky drinking during university are at increased risk of negative psychological outcomes (e.g. anxiety and depression) and adverse educational consequences compared to students who do not engage in these behaviours (Ansari et al., 2013; Hamza & Willoughby, 2014; Kiekens et al., 2016; Martens et al., 2008), highlighting the need for additional study in this population.

NSSI and risky drinking have a common emotion regulatory function (Kingston et al., 2010). A person is more likely to engage in NSSI or risky drinking when other emotion regulatory strategies (e.g. going for a walk) are unavailable or unsuccessful (Martins et al., 2018). Further, people may be prone to shifting from NSSI to risky drinking (or vice versa) to regulate their emotions when underlying emotional difficulties are untreated (Duggan & Heath, 2014; Harvey et al., 2004). Regardless of the shared emotion regulatory function, limited research has directly compared NSSI to risky drinking (e.g. Greene et al., 2019;

Hasking, 2017; Kingston et al., 2010). Yet, by taking a transdiagnostic approach to identify and understand shared factors between NSSI and risky drinking, we can target these shared factors in intervention initiatives and possibly reduce the odds of an individual shifting between dysregulated behaviours (Duggan & Heath, 2014).

Alexithymia is one cognitive-emotional variable that is associated with both NSSI and risky drinking (Greene et al., 2020). Alexithymia is a continuous and multifaceted construct encompassing three fundamental aspects of emotional processing: 1) difficulties identifying feelings within the self, 2) difficulties describing feelings to others, and 3) an externally orientated thinking style, a predisposition to place attention on the external environment instead of one's personal emotional states (Bagby et al., 1994). Individuals with high levels of alexithymia tend to confuse bodily sensations with emotions and over report somatic sensations (Lumley et al, 1996). Engaging in NSSI and risky drinking may help draw one's attention away from the emotions they are having difficulties processing, towards bodily sensations (e.g. pain from self-injury or feeling drunk) that the individual can process and understand (Lumley et al., 1996)

Existing work has highlighted the importance of valence-specific alexithymia domains. For example, van der Velde et al. (2013) found that neural correlates of alexithymia were contingent on whether the emotion being appraised was positive or negative. Specifically, during the processing of negative emotional content, alexithymia was related to a decreased response of the amygdala, indicating reduced attention towards the emotional content. Whereas, during the processing of positive emotional content, there was decreased activation of the right insula and precuneus, indicating a reduction in emotional awareness. Further, Preece et al. (2018) found that individuals generally have more difficulties identifying and describing negative emotions than positive emotions. Given these

results, measuring valence-specific alexithymia will give us a more detailed understanding of the role of alexithymia in both self-injury and risky drinking.

The associations between alexithymia and both NSSI and risky drinking are well established (Greene et al., 2020). However, it has been argued that a more complete understanding of the associations between cognitive-emotional variables (e.g. alexithymia) and dysregulated behaviours (NSSI and risky drinking) may be gathered by exploring the roles of core cognitions such as behaviour specific thoughts and beliefs (Cox & Klinger, 1988; Hasking et al., 2016). Exploring the roles of behaviour-specific cognitions in the associations between alexithymia and both NSSI and risky drinking could give us further insight into why people with high levels of alexithymia may choose to engage in these behaviours.

Outcome Expectancies and Self-Efficacy Beliefs

Bandura (1986) proposed through Social Cognitive Theory that behaviours such as NSSI and risky drinking are established and maintained by two key thought processes: outcome expectancies and self-efficacy beliefs. Outcome expectancies are the anticipated consequences of a behaviour; behaviours that are expected to achieve a favourable outcome are engaged in, whilst behaviours expected to result in negative outcomes are avoided (Bandura, 1997). Perceived self-efficacy, an individual's belief in their ability to engage in behaviours successfully, is a strong predictor of behaviour engagement (Bandura, 1986). If a person believes they can successfully perform a specific behaviour to achieve a desired outcome, they are more likely to engage in that behaviour (Bandura, 1986, 1997). An individual's ability to resist engaging in a specific behaviour (e.g. NSSI or risky drinking) in various situations is deemed refusal self-efficacy and is a strong predictor of behaviour engagement (Greenfield et al., 2000; Hasking, 2017).

Behaviour-specific outcome expectancies and self-efficacy beliefs are thought to play significant roles in determining whether an individual engages in NSSI and/or risky drinking (Dawkins et al., 2018; Hasking, 2017; Young et al., 2005). Individuals who expect favourable outcomes from NSSI or risky drinking (e.g. decreased tension) and believe they cannot resist engaging in the behaviour in a specific situation (e.g. in times of high distress) are more likely to engage in the behaviour than individuals who do not hold these beliefs. Conversely, individuals who expect negative outcomes from NSSI and/or risky drinking (e.g. adverse physical or social outcomes) and believe they can resist engaging in self-injury or drinking across various settings (e.g. at a social gathering or when distressed) will be less likely to engage in these behaviours (Hasking, 2017; Young et al., 2005).

The Cognitive Emotional Model (Hasking et al., 2016) of NSSI combines Social Cognitive Theory with emotion regulation theories, to argue the mediating role of cognitions in the associations between predisposing factors (e.g. alexithymia) and NSSI. Recent research has found that NSSI-specific outcome expectancies and self-efficacy beliefs can distinguish between individuals who have and who have not engaged in NSSI (Dawkins et al., 2019; Dawkins et al., 2018; Hasking & Boyes, 2017). Specifically, individuals with a history of NSSI are more likely to believe that engaging in self-injury will result in emotional relief, whereas, individuals who have never engaged in NSSI are more likely to believe that self-injury will result in pain (Dawkins et al., 2019). Further, individuals with a history of NSSI were more likely to believe they could not resist engaging in NSSI in the future compared to individuals with no history of NSSI (Dawkins et al., 2019; Hasking & Rose, 2016).

Similarly, through the motivational model of alcohol use (Cox & Klinger, 1988), researchers (e.g. Cooper et al., 1995) have argued the mediating role of drinking-specific cognitions (e.g. outcome expectancies) in the associations between emotion regulatory factors (e.g. alexithymia) and risky drinking. Decades of research have shown that alcohol-specific

outcome expectancies can reliably distinguish between low-risk and risky drinkers (for a review see Monk & Him, 2013). Specifically, individuals who engage in risky drinking are more likely to believe that drinking will result in increased confidence and emotional relief, whereas, individuals who do not consume alcohol in a risky pattern are more likely to believe that drinking will result in negative consequences (e.g. aggression; Hasking & Oei, 2002, 2004; Hasking et al., 2015). Further, low-risk drinkers are more confident in their ability to resist drinking across various contexts (e.g. social gatherings and when distressed) compared to risky drinkers (Oei & Morawska, 2004; Young & Oei, 2000).

To date, no study has explored the roles of outcome expectancies and self-efficacy beliefs in the association between alexithymia and NSSI. However, Thorberg et al., (2011) examined the mediating roles of alcohol outcome expectancies related to emotional functioning (e.g. affect regulation, assertion) in the association between alexithymia and alcohol dependence. Thorberg et al. (2011) found that the association between alexithymia and alcohol dependence was, in part, explained by drinking expectancies of affective change and assertion. Therefore, individuals with alcohol dependence and high levels of alexithymia may drink in order to experience/regulate emotions and to help them to communicate their emotions in social contexts. However, past research suggests that young adults tend to engage in risky drinking for social reasons (drinking to increase confidence/social facilitation) rather than internal reasons such as emotion regulation (Casswell et al., 2002; Read et al., 2003). Thus, it is plausible that expectations of drinking in risky drinking students with high levels of alexithymia may differ from the expectations of individuals with alcohol dependence. In the current study, we explore the mediating role of behaviour-specific cognitions in the association between alexithymia and both NSSI and risky drinking in the same sample university students. By studying associations between alexithymia and both NSSI and risky

drinking in the same sample it allows us to explore similarities and differences in these behaviours in the context of alexithymia.

Contextually, given that individuals with alexithymia struggle to identify their emotions and have difficulties describing their feelings, an individual with high levels of alexithymia may anticipate that NSSI will help them to regulate their emotions and are, thus, more likely to engage in NSSI. Or perhaps, an individual with high levels of alexithymia may believe that consuming alcohol will help them to be more confident in describing their feelings in social situations, thus, making them more likely to engage in risky drinking. Further, behaviour-specific refusal self-efficacy may strengthen these indirect associations. For example, an individual who believes that engaging in NSSI will result in emotional relief and believes they cannot resist engaging in self-injury might be at higher risk of engaging in NSSI. Similarly, an individual who believes that consuming alcohol will increase their confidence in expressing and describing emotions and believes they cannot resist drinking may be at particularly high risk of engaging in risky drinking.

Sex differences

A recent systematic review and meta-analysis found that the association between alexithymia and NSSI may be stronger for women (Greene et al., 2020) and another study (Greene et al., 2019) found that men who had difficulties describing feelings were more likely to engage in risky drinking than NSSI. It is possible that these sex differences may be explained by different anticipated outcomes of NSSI and risky drinking for men and women. The assessment of outcome expectancies associated with NSSI is a relatively new research area, and sex differences are yet to be explored. However, in the emotion regulation literature, it is noted that the relationship between affect-regulation and NSSI is stronger for women (Claes et al., 2007). This is likely due to the expectation that engaging in NSSI will

reduce intense emotions (Claes et al., 2007). Theoretically, women who experience difficulties with emotion may be more likely than men to believe engaging in NSSI will help regulate these emotions, thus, resulting in a stronger positive relationship between alexithymia and NSSI for women.

Outcome expectancies of drinking also differ across sex with a strong correlation between drinking and positive outcome expectancies (e.g. tension reduction and sexual enhancement) for men, but weaker correlations for women (Kalichman et al., 2007; Kushner et al., 1994). Additionally, women tend to have stronger negative expectancies of alcohol use than men (Nolen-Hoeksema & Hilt, 2006). Combining these findings, men who experience difficulties with emotion may be more likely than women to believe that drinking will help regulate these emotions, thus resulting in a stronger positive relationship between alexithymia and risky drinking for men. In the current study, we explore whether sex moderates the indirect associations between alexithymia and NSSI/risky drinking, via outcome expectancies.

The current study

The aim of this study was to explore whether behaviour-specific outcome expectancies mediate the associations between alexithymia and both NSSI and risky drinking. Further, we examined the moderating roles of behaviour-specific self-efficacy and biological sex (see Figure 1). First, we hypothesise that alexithymia will be indirectly associated with NSSI via NSSI outcome expectancies (e.g. affect regulation, pain expectancies). Second, we anticipate that alexithymia will be indirectly associated with risky drinking via alcohol outcome expectancies (e.g. tension reduction, increased confidence). Third, the direct and indirect associations between alexithymia and both NSSI and risky drinking will be moderated by behaviour-specific refusal self-efficacy and biological sex. Specifically, we

expect the direct and indirect associations from alexithymia to NSSI/risky drinking, via outcome expectancies to be stronger for individuals with lower behaviour-specific refusal self-efficacy. Further, we anticipate the direct and indirect associations between alexithymia and NSSI will be stronger for women, and the direct and indirect associations between alexithymia and risky drinking will be stronger for men.

Method

Participants

Participants were 627 Australian university students aged between 17 and 25 years ($M = 20.75$, $SD = 1.88$). The majority of the students identified as female (76.10%), were born in Australia (74.50%), attended universities in Western Australia (83.40%), and were studying a bachelor's degree (96%). Nine participants (1.44%) identified as Aboriginal or Torres Strait Islander. The majority of the participants (78.01%) identified as heterosexual.

Measures

Inventory of Statements about Self-Injury (ISAS; Klonsky & Glenn, 2009) was used to measure NSSI. Participants were provided with a definition of self-injury (“the deliberate physical self-damage or self-harm that is not accompanied by suicidal intent or ideation”) and asked if they had ever engaged in NSSI. Individuals who answered ‘yes’ to having ever engaged in NSSI were asked if they had engaged in NSSI within the last year. We used these questions to create a three-category ordinal variable (0 = No NSSI; 1 = past NSSI (have engaged in NSSI but not within the last year); 2 = engagement in NSSI within the last year). Further questions assess descriptive (i.e. frequency of 12 forms of NSSI) and contextual factors of self-injury (e.g. age of onset). Klonsky and Olino (2008) report the ISAS to have excellent test-retest reliability ($r = .85$).

The Alcohol Use Disorders Identification Test (AUDIT; Degenhardt et al., 2001) is a 10-item scale that measures typical alcohol consumption (e.g. ‘How often do you have a drink containing alcohol?’) and alcohol-related impediments (e.g. ‘How often during the last year have you had a feeling of guilt or remorse after drinking?’). Participants answer most questions on a 5-point Likert scale ranging from 0-4. Scores range between 0 and 40, with scores indicating higher levels of risky/hazardous drinking. In the current study, we measure risky drinking as a continuous variable. The internal consistency of the AUDIT in the current sample is excellent ($\alpha = .84$).

The Perth Alexithymia Questionnaire (PAQ; Preece et al., 2018) is a 24-item self-report scale designed to measure valence-specific difficulties identifying feelings and difficulties describing feelings, and general externally orientated thinking. Given, power restraints, we chose to use the valence-specific combined subscales for DIF and DDF; Difficulties Appraising Negative Feelings (e.g. ‘When I feel bad I can’t make sense of these feelings’), and Difficulties Appraising Positive Feelings (e.g. ‘When I am feeling good I can’t talk about those feelings in much depth or detail’) and the General Externally Orientated Thinking (e.g. ‘I don’t pay attention to my emotions’) subscale. Each item is rated on a 7-point Likert scale ranging from one (strongly disagree) to seven (strongly agree). Scores on all three subscales range between 8 and 56, and larger scores indicate higher levels of alexithymia. All three subscales and the total score have excellent internal consistency in the original (N-DAF = .93, P-DAF = .93, G-EOT = .90) and current sample (N-DAF = .95, P-DAF = .94, G-EOT = .92). The PAQ has good concurrent validity with measures of emotion regulation (i.e. expressive suppression; $r = .52$; Preece et al., 2018).

The NSSI Expectancies Questionnaire (NEQ; Hasking & Boyes, 2017) is a 25-item questionnaire developed to measure expectations regarding five possible outcomes of engaging self-injury. The five outcome expectancies measured are: affect regulation

expectancies (e.g. 'I would feel relieved' $\alpha = .86$), anticipated negative social outcomes (e.g. 'My parents would be angry' $\alpha = .78$), expected communicative function of self-injury (e.g. 'I would feel that it would be easier to open up and express my feelings' $\alpha = .71$), anticipated pain (e.g. 'the pain would be intense' $\alpha = .80$) and negative self-beliefs (e.g. 'I would feel a failure' $\alpha = .78$; Hasking & Boyes, 2017). Participants rate each outcome on a 4-point Likert scale ranging from 1 (not likely at all) to 4 (extremely likely). Cronbach alphas in the current student sample were, affect regulation $\alpha = .86$, negative social expectancies, $\alpha = .84$, communication, $\alpha = .75$, pain, $\alpha = .76$, and negative self-beliefs, $\alpha = .71$. Initial validation of the scale supported convergent, and discriminate validity (Hasking & Boyes, 2017). The NEQ can distinguish between individuals who do and individuals who do not engage in NSSI, indicating good criterion validity (Dawkins et al., 2019; Hasking & Boyes, 2017).

The Self-Efficacy to resist NSSI (Czyz et al. 2014; Hasking & Rose, 2016) scale was adapted from Czyz et al's. (2014) six-item 'ability to resist suicidal action scale' to measure an individual's belief in their ability to resist engaging in NSSI (e.g. 'If at some point in the future you had self-injurious thoughts, how certain are you that you could resist self-injury?'). Individuals respond on a six-point Likert scale ranging from 1 (very uncertain) to 6 (very certain). The NSSI version had excellent internal consistency in past research ($\alpha = .92$; Hasking & Rose, 2016) and the current study, $\alpha = .93$.

The Drinking Expectancy Questionnaire-Revised (DEQ-R; Lee et al., 2003) is a 37-item scale developed to measure five possible outcome expectancies of alcohol consumption. Participants respond to each item on a five-point Likert scale ranging from one (strongly disagree) to five (strongly agree), with higher scores indicating stronger outcome expectancies. The five outcome expectancies measured are cognitive enhancement (e.g. 'I am more aware of what I say and do if I'm drinking'), tension reduction (e.g. 'When I am anxious or tense I do not feel the need for alcohol'; reversed scored), increased confidence

(e.g. 'If I'm drinking, it's easier to express my feelings'), sexual enhancement (e.g. 'I tend to avoid sex if I've been drinking'; reverse scored) and negative consequences for drinking (e.g. 'Drinking makes me bad-tempered'). The DEQ-R has good psychometric properties and has been widely used in student, community, and clinical samples (Lee et al., 2003). In the current sample, Cronbach alphas are as follows: cognitive enhancement $\alpha = .61$, tension reduction $\alpha = .60$, increased confidence $\alpha = .92$, sexual enhancement $\alpha = .80$, and negative consequences of drinking $\alpha = .90$. The DEQ can distinguish between low-risk social drinkers and individuals who consume alcohol at risky levels (Oei & Morawska, 2004).

The Drinking Refusal Self-Efficacy Questionnaire-Revised (DRSEQ-R; Oei et al. 2005) is a 19-item measure of an individual's belief in their ability to resist consuming alcohol. Participants respond to each item on a six-point Likert scale ranging from one (I am very sure I would drink) to 5 (I am very sure I would not drink), with higher scores representing a stronger belief in one's ability to resist drinking. The DRSEQ has good psychometric properties in various samples including student, community and clinical (Oei et al., 2005). In the current sample, the internal consistency of the DEQ was excellent, $\alpha = .95$. Initial validation of the DRSEQ-R supported concurrent, convergent, and discriminate validity (Oei et al., 2005). The DRSEQ can distinguish between individuals who are social drinkers and individuals who consume alcohol at risky levels (Oei & Morawska, 2004).

Procedure

Upon gaining approval from the University's ethics committee, participants were recruited through an online undergraduate participant pool, posters, and various online platforms (e.g. Reddit, Facebook). Students could complete the questionnaire for course credits or be placed in a draw to win an iPad or 1 of 10 \$50 gift cards. After giving informed consent, participants completed a series of questionnaires, taking between 45 minutes and an

hour. Students were given access to NSSI and alcohol-related information sheets, counselling numbers, and mental health websites at the beginning and end of the questionnaire.

Data Analysis

Data were analysed using Mplus 8 (Muthen & Muthen, 2017). We ran two models; one with NSSI as the primary outcome and one with risky drinking as the primary outcome. For both models, difficulties appraising negative feelings, difficulties appraising positive feelings, and general externally orientated thinking were entered as correlated independent variables. The NSSI model had the following outcome expectancies as mediators: affect regulation, negative social expectancies, communication, pain, and negative self-beliefs, and self-efficacy to resist NSSI and biological sex as moderators along the mediator-outcome path (Figure 1). Risky drinking was entered as a covariate variable in the model predicting NSSI. Similarly, the risky drinking model had the following outcome expectancies as mediators: cognitive enhancement, tension reduction, increased confidence, sexual enhancement, negative consequences of drinking, and drinking-refusal self-efficacy and biological sex as moderators along the mediator-outcome path (Figure 1). NSSI was included as a covariate in the model predicting risky drinking.

Given the categorical nature of our NSSI variable, we tested direct, indirect, and moderation effects using Weighted Least-Squares Mean and variance adjusted estimation with 5000 bootstrap resamples. Given we measured risky drinking using a continuous scale we tested direct, indirect, and moderation effects using Maximum Likelihood estimation with 5000 bootstrap resamples. We accepted a model to have a good fit if it's Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) were equal to or above .90 and had a root mean square error of approximation (RMSEA) value below .06 (Hu & Bentler, 1999).

Results

Preliminary Results

Across all variables of interest, less than 5% of data was missing. As data was missing completely at random ($\chi^2(22031) = 19113.68, p > .05$), we used expectation maximisation to impute missing data. Two-hundred and fifty-four (40.50%) participants reported having engaged in NSSI in their lifetime, of whom 145 (57.08%) reported engaging in NSSI within the last 12 months. Individuals reported having started engaging in NSSI between the ages of 4 and 23 ($M = 13.79, SD = 2.98$). The most frequently endorsed form of self-injury was cutting (75.20%) followed by self-battery (64.17%) and severe scratching (53.94%). Two-hundred and fifty-six (40.83%) participants reported engaging in risky drinking (AUDIT score > 7 ; Roche and Watt, 1999), of whom 77 (30.08%) could be classified as hazardous drinkers (AUDIT score > 15).

Women were more likely to have engaged in NSSI (41.39%) than men (21.27%), $\chi^2(2) = 21.81, p < .001$. Biological sex was not associated with risky drinking, spearman's rho = $-.08, p = .06$. Table 1 shows means and standard deviations across the alexithymia and NSSI specific variables for the three NSSI groups (no history, past NSSI, recent NSSI). Correlations between risky drinking (continuous) and alcohol-specific variables and correlations between all variables of interest can be found in Table 2.

NSSI Model

The hypothesised model had poor fit, CFI = .87, TFI = .75, RMSEA = .06. Modification indices suggested that self-efficacy to resist NSSI may be better suited as a mediator than a moderator. Also, as sex did not moderate any associations it was entered just as a covariate in the alternative model. Entering sex as a covariate and including self-efficacy to resist NSSI as a mediator instead of a moderator created a fully saturated model. In the unconstrained model, direct effects between all three aspects of alexithymia and NSSI were

non-significant: difficulties appraising positive feelings ($\beta = 0.04$, $SE = .05$, $p = .510$), difficulties appraising negative feelings ($\beta = 0.01$, $SE = .06$, $p = .932$), and externally orientated thinking ($\beta = -0.06$, $SE = .05$, $p = .260$). Constraining these effects and other non-significant paths resulted in a model (Figure 2) that fit the data well, $CFI = 0.97$, $TFI = 0.95$, $RMSEA = .04$.

Women were more likely to report stronger affect regulation expectancies ($\beta = 0.12$, $SE = .04$, $p = .009$) and negative self-belief expectancies ($\beta = .13$, $SE = .04$, $p = .003$). Men were more likely to hold stronger communication expectancies of NSSI ($\beta = -0.19$, $SE = .04$, $p < .001$) and stronger beliefs in their ability to resist NSSI ($\beta = -0.13$, $SE = .04$, $p = .002$). Difficulties appraising positive feelings was related to stronger expectancies of pain. Difficulties appraising negative feelings was related to stronger expectations of affect regulation, negative self-beliefs, and negative social outcomes, and weaker expectations of communication and self-efficacy to resist-NSSI (Figure 2). Stronger expectations of affect regulation and weaker expectations of pain, communication, and self-efficacy to resist NSSI were directly related to engagement in NSSI. Indirect effects differed across the three facets of alexithymia. Difficulties appraising positive feelings had an indirect effect on NSSI via the expectation that engaging in NSSI would cause pain ($\beta = 0.03$, $SE = .01$, $p = .012$). Difficulties appraising negative feelings had indirect effects on NSSI via affect regulation expectancies ($\beta = 0.12$, $SE = .02$, $p < .001$), communication expectancies ($\beta = 0.03$, $SE = .01$, $p = .045$), and self-efficacy to resist NSSI ($\beta = 0.10$, $SE = .02$, $p < .001$). There were no significant indirect effects between externally orientated thinking and NSSI. Overall, the model explained 62% of the variability in NSSI.

Risky Drinking Models

The hypothesised model had poor fit, CFI = .82, TFI = .64, RMSEA = .11. Again, modification indices suggested that drinking-refusal self-efficacy may be better suited as a mediator than a moderator. Also, as sex did not moderate any associations it was entered just as a covariate in the alternative model. In the unconstrained alternative model, the direct associations between both difficulties appraising positive feelings ($\beta = -0.06$, SE = .04, $p = .164$) and difficulties appraising negative feelings ($\beta = -0.07$, SE = .04, $p = .103$) and risky drinking were non-significant. However, there was a significant direct positive association between externally orientated thinking and risky drinking ($\beta = 0.12$, SE = .05, $p = .008$). Constraining non-significant paths resulted in a model (Figure 3) that fit the data well, CFI = .97, TFI = .94, RMSEA = .04). Figure 3 illustrates the standardised path regression coefficients of the alternative model, with non-significant pathways removed.

Biological sex was not directly associated with drinking refusal self-efficacy or any of the outcome expectancies. Difficulties appraising positive feelings was related to stronger expectations of cognitive enhancement and negative consequences of drinking, and weaker expectations of sexual enhancement (Figure 3). Difficulties appraising negative feelings was related to stronger expectations of confidence. Stronger expectations of sexual enhancement, increased confidence, tension reduction, and negative consequences of drinking, were directly associated with risky drinking. Weaker beliefs about one's ability to resist drinking were negatively associated with risky drinking (Figure 3). The indirect associations between alexithymia and risky drinking via alcohol outcome expectancies were subscale dependent. Difficulties appraising positive feelings had an indirect effect on risky drinking via the expectation of negative consequences from drinking ($\beta = 0.04$, SE = .01, $p < .001$) and sexual enhancement expectancies ($\beta = -0.02$, SE = .01, $p = .010$). Difficulties appraising negative feelings only had an indirect effect on risky drinking via the expectation that consuming alcohol will increase confidence ($\beta = 0.04$, SE = .01, $p = .010$). There were no significant

indirect effects between externally orientated thinking and risky drinking. Overall, the model explained 42% of the variability in alcohol consumption.

Discussion

University students are a group characterised by elevated levels of both NSSI (Swannell et al., 2014) and risky drinking (AIHW, 2016). Engagement in both behaviours is associated with adverse psychological, physical, and educational outcomes, emphasising the need to identify potential underlying mechanisms of both behaviours (Ansari et al., 2013; Hamza & Willoughby, 2014; Kiekens et al., 2016; Martens et al., 2008). In the present study, we aimed to expand on work testing the relationships between alexithymia and both NSSI and risky drinking by exploring the roles of behaviour-specific outcome expectancies and self-efficacy beliefs, and biological sex. Alexithymia exhibited indirect effects on NSSI via affect regulation expectancies, pain expectancies, communication expectancies, and low self-efficacy to resist NSSI. Alexithymia exhibited indirect effects on risky drinking via expectations of increased confidence, and negative consequences. However, in both cases, the indirect effects differed depending on the valence of the emotion the individual had difficulties appraising. Biological sex did not significantly moderate any association. Clinically, these results may be beneficial in developing intervention initiatives that focus on challenging behaviour-specific outcome expectancies and self-efficacy beliefs for individuals with high levels of alexithymia.

Comparing NSSI and risky drinking

Valence played an important role in indirect associations between alexithymia and both NSSI and risky drinking. As anticipated, the association between difficulties appraising negative feelings and NSSI was explained by the expectation that engaging in NSSI will help to relieve adverse feelings. Yet, students who had difficulties appraising negative feelings

tended to believe that consuming alcohol would help them to be more confident in communicating/expressing their feelings, which in turn predicted engagement in risky drinking. In contrast, individuals who had difficulties appraising negative feelings believed that engaging in NSSI would not help them to communicate their emotions to others. Thus, students who have difficulties appraising negative emotions may be using the disinhibiting effects of alcohol to compensate for difficulties related to limited emotional awareness and communication of emotions but may be engaging in NSSI to help relieve or escape from negative feelings.

Further, the association between difficulties appraising negative feelings and NSSI was not moderated, but mediated, by weaker beliefs in one's ability to resist NSSI. It is probable that individuals with high levels of alexithymia may feel they are unable to resist engaging in NSSI in situations that require them to pay attention to and appraise their emotions (e.g. when experiencing high levels of emotional adversity or in social situations where they are expected to describe their feelings to others). However, due to the cross-sectional nature of the current study, the temporal sequences between behaviour-specific self-efficacy and NSSI requires prospective testing. Low self-efficacy to resist NSSI may be an outcome of not being able to resist engaging in self-injury in the past and play little role in predicting future engagement in self-injury.

Individuals who had difficulties appraising positive feelings tended to believe that engaging in NSSI would not be painful, which in turn predicted an increased likelihood of engaging in NSSI. It is possible that individuals who struggle with positive emotions may not perceive the bodily sensation associated with self-injury as painful but as a distraction from emotions they find difficult to appraise. When engaging in NSSI an individual's focus may be turned from internal thoughts and feeling onto physical sensations that individuals with high levels of alexithymia tend to find easier to identify and describe (Lumley et al., 1996).

Focusing on drinking behaviour, we found that individuals who had difficulties appraising positive feelings believed drinking would lead to negative consequences, which in turn predicted higher levels of risky drinking. Again, it is possible that individuals who have difficulties appraising positive feelings could engage in risky drinking because they perceive the negative consequences associated with alcohol (i.e. becoming violent/aggressive/bad-tempered, hangovers) as a distraction away from the positive emotions they find difficult to appraise. When engaging in risky drinking an individual's focus may be turned from internal thoughts and feeling onto physical behaviours (violence, aggression) and sensations (hangovers) that individuals with high levels of alexithymia may find easier to appraise (Lumley et al., 1996). Alternatively, this association could be explained by the cross-sectional nature of the data. Specifically, individuals who drink in a risky pattern have likely experienced negative outcomes of drinking, thus, they are more likely to report expecting negative outcomes (Hasking & Oei, 2007). In summary, it is possible students who have difficulties appraising positive feelings could be using the consequences of NSSI/risky drinking as a distraction away from the feelings they are having difficulties processing on to physical sensations. However, the cross-sectional data means this explanation is speculative and longitudinal research is warranted.

Consistent with a recent meta-analysis (Greene et al., 2020) externally orientated thinking was related to risky drinking but not NSSI. However, the association between externally orientated thinking and risky drinking was not explained by alcohol expectancies or self-efficacy beliefs. Due to their tendency to focus on the external world, individuals with externally orientated thinking styles tend to lack insight into their intrapersonal thoughts and feelings (Preece et al., 2017). The current study relies on self-report measures of explicit outcome expectancies, which tap into an individual's direct and controlled thoughts about NSSI/risky drinking. Self-report measures require a certain degree of insight, and particularly

among individuals with externally orientated thinking styles, this form of measurement may be biased by a lack of insight (Marissen et al., 2005). Future research could replicate the current study using implicit measures of outcome expectancies, such as an implicit associations test (Greenwald et al., 1998) or a response-timed sentence completion task (Wardell et al., 2011).

Implications

The current findings suggest that behaviour-specific outcome expectancies and self-efficacy beliefs could play an important role in predicting engagement in NSSI and/or risky drinking for individuals with high levels of alexithymia. Alongside other therapies such as Dialectical Behaviour Therapy (DBT; Linehan, 2014) that are often implemented to help individuals with high levels of alexithymia to process their emotions, clinicians may also want to challenge outcome expectancies (Labbe & Maisto, 2011). A clinician could challenge expectancies by devaluing short-term positive expectancies of the specific behaviour whilst highlighting long and short-term negative outcomes. Specifically, for NSSI, a clinician could challenge affect regulation expectancies by acknowledging the short-term emotional relief but emphasising the long term increases in negative affect. Similarly, for alcohol use, a clinician could challenge increased confidence expectancies, by acknowledging the short-term increase in confidence and ability to express emotions but emphasising the negative short-term outcomes (e.g. hangovers) and long term increases in negative affect and negative physical outcomes (e.g. liver damage). Further, the results indicate a salient role for behaviour-refusal self-efficacy in the associations between alexithymia and NSSI. Strengthening an individual's belief in their ability to resist engaging in NSSI could effectively reduce future engagement in self-injury. The clinician could implement this by emphasising past situations where the individual has resisted the urge to self-injure, so they can recognise that they are capable of resisting engagement in NSSI.

The current results suggest that students with high levels of alexithymia who also engage in risky drinking are doing so to heighten their confidence in social settings (i.e. feel more outgoing and have more confidence in expressing their feelings). Thus, interventions that focus on helping individuals regulate unwanted feelings, may not be as effective for this specific group of students. Instead, it may be beneficial to not only focus on awareness of emotions but also build skills in confidence and assertiveness.

Further, given the significant role of outcome expectancies in predicting engagement in NSSI and risky drinking in students, university-based education workshops that focus on challenging commonly held NSSI/drinking expectancies could be beneficial. For example, an educator could acknowledge that some individuals engage in NSSI to regulate their emotions but emphasize long term increases in negative affect. Similarly, an educator may acknowledge that many individuals feel more confident after drinking alcohol but emphasise negative short-term and long-term outcomes of risky drinking. Education-based workshops could be implemented during the first semester of university to potentially reduce the likelihood of an individual developing strong positive expectancies of NSSI or risky drinking.

Limitations

The results of the current study should be interpreted with some limitations in mind. Specifically, the data is cross-sectional which means we cannot determine how alexithymia, and beliefs about NSSI and risky drinking could change over time, and therefore we can make no claims regarding causality and temporal ordering. Whilst behaviour-specific expectancies and self-efficacy beliefs are related to engagement in NSSI and risky drinking, we cannot be certain that these beliefs are predictive of future behaviour engagement. A longitudinal study that measures alexithymia and NSSI/alcohol expectancies and self-efficacy beliefs (and changes in these) from onset to cessation of these behaviours would give us a

better understanding of how changes in these beliefs are associated with behaviour over time. Furthermore, a study using ecological momentary assessment with a range of individuals who score across the alexithymia spectrum could provide insight into specific thoughts and beliefs held in mind prior to engagement in and urges to self-injure/consume alcohol. This could provide insight into differences in thoughts and feelings about self-injury/risky drinking across individuals with varying levels of alexithymia when they experience the urge to self-injure or consume alcohol.

Conclusion

Our findings indicate that the underlying factors in the relationships between alexithymia and both NSSI and risky drinking may differ across behaviour and valence in university students. Where individuals who have difficulties appraising negative emotions appear to engage in NSSI to help relieve negative feelings, they may be consuming alcohol to help them to express their feelings and gain more confidence in social situations. While students who have difficulties appraising positive emotions may engage in NSSI and/or risky drinking to draw their attention away from feelings they are having difficulties processing onto the physical consequences of these behaviours. These differences highlight the importance of valence-specific alexithymia domains in research investigating NSSI and risky drinking. Further, these findings support interventions for individuals with high levels of alexithymia that focus on developing confidence and challenging behaviour specific outcome expectancies and self-efficacy beliefs.

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Table 1.

Comparison of means across NSSI groups on variables of interest.

	No history of NSSI (n = 392)		Past NSSI (n = 90)		Recent NSSI (n = 145)		<i>F</i>	η^2
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Difficulties appraising negative feelings	26.64	11.74	27.41	12.00	33.68	13.33	18.09***	.05
Difficulties appraising positive feelings	22.28	9.85	23.17	10.33	27.59	11.97	13.79***	.04
Externally orientated thinking	23.94	10.58	23.55	9.11	27.32	11.62	5.93**	.02
Affect regulation	8.22	3.16	11.14	3.12	12.81	3.23	121.76***	.30
Negative social expectancies	12.78	4.00	13.77	3.67	13.46	4.08	3.16*	.01
Communication expectancies	10.33	3.07	9.11	3.06	8.49	3.06	21.25***	.06
Pain expectancies	17.10	2.86	15.11	2.86	14.99	2.80	38.90***	.11
Negative self-beliefs	14.49	3.13	14.09	3.20	14.14	3.36	.98	.00
Self-efficacy to resist NSSI	30.40	7.10	27.41	5.94	18.04	7.34	155.81***	.33

Note. * $p < .05$ ** $p < .01$ *** $p < .001$.

Table 2. Correlation between all model variables

	2	3	4 ^a	5	6	7	8	9	10	11	12	13	14	15	16	17
1. DANF	.68**	.68**	.22**	.10*	.25**	.23**	-.11*	-.19**	.15**	-.29**	.16**	.09*	.14**	-.19**	.25**	-.11*
2. DAPF	1	.62**	.20**	.04	.23**	.16**	-.07	-.22**	.06	-.23**	.21**	.12*	.05	-.19*	.29**	-.09*
3. EOT		1	.12*	.14**	.19**	.19**	-.04	-.19**	.10*	-.16**	.15**	.11*	.10*	-.19**	.21**	-.14**
4. NSSI ^a			1	.07	.53**	.08*	-.25**	-.32**	-.05	-.56**	.10**	.08*	.12**	-.08*	.18**	-.12**
5. Risky Drinking				1	.07	.09*	-.03	-.08*	.09*	-.14**	.10*	.32**	.51**	.03	.24**	-.50**
6. Affect regulation					1	.18**	.10**	-.39**	.03	-.44**	.16**	.16**	.12**	-.06	.19**	-.17**
7. Negative Social						1	.08	.09*	.43**	-.14**	.06	.08*	.14**	-.04	.13**	-.10*
8. Communication							1	.06	.13**	.11**	.12**	-.00	.01	-.02	.06	-.07
9. Pain								1	.23**	.22**	-.17**	-.15**	.01	.05	-.21**	.11**
10. Negative self-beliefs									1	-.01	-.03	-.05	.18**	-.02	.05	-.05
11. NSSI self-efficacy										1	-.14**	-.11**	-.17**	.15**	-.27**	.19**
12. Cognitive enhancement											1	.04	.16**	-.38**	.47**	-.19**
13. Tension Reduction												1	.11**	.12**	.07	-.44**
14. Increased confidence													1	-.05	.17**	-.32**
15. Sexual enhancement														1	-.38**	.04
16. Negative consequences															1	-.17**
17. Drinking self-efficacy																1

Note. DANF = Difficulties Appraising Negative Feelings; DAPF = Difficulties Appraising Positive Feelings; ^aspearman correlations * $p < .05$; ** $p < .01$.

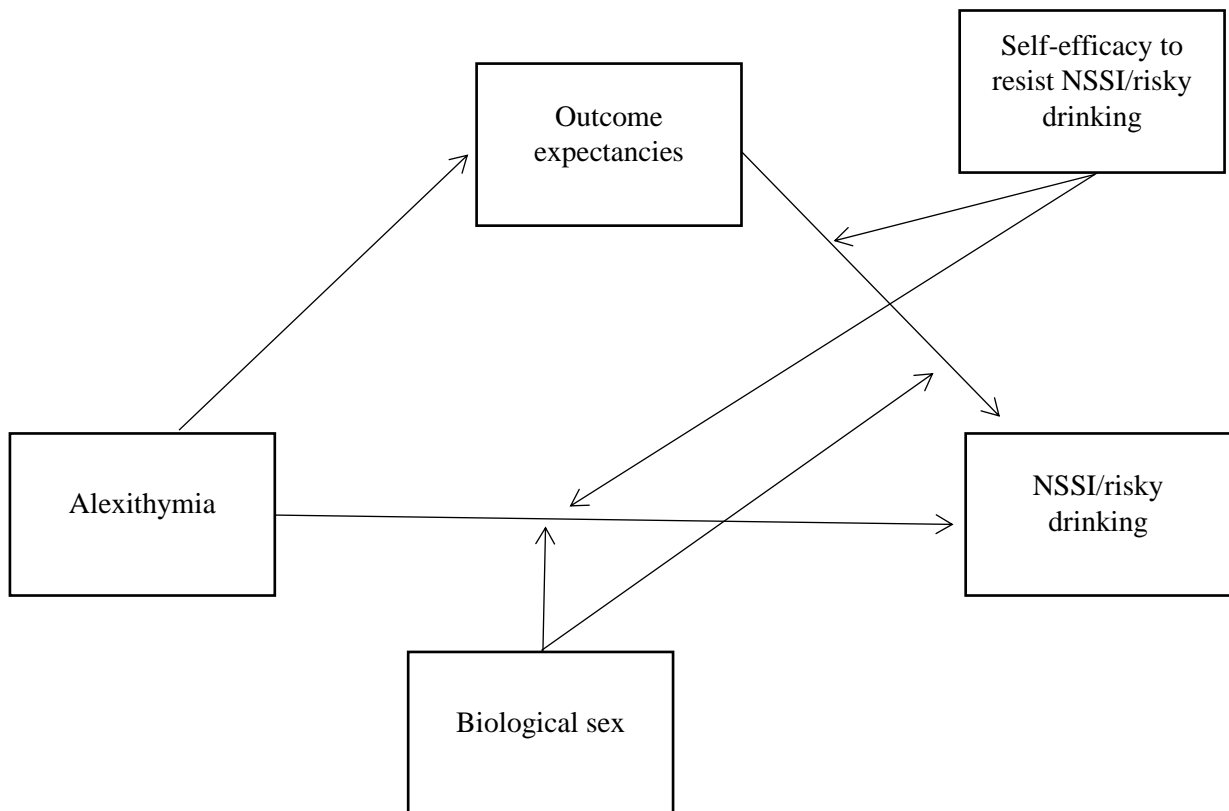


Figure 1. Hypothesised path models for the associations between alexithymia and both NSSI and risky drinking.

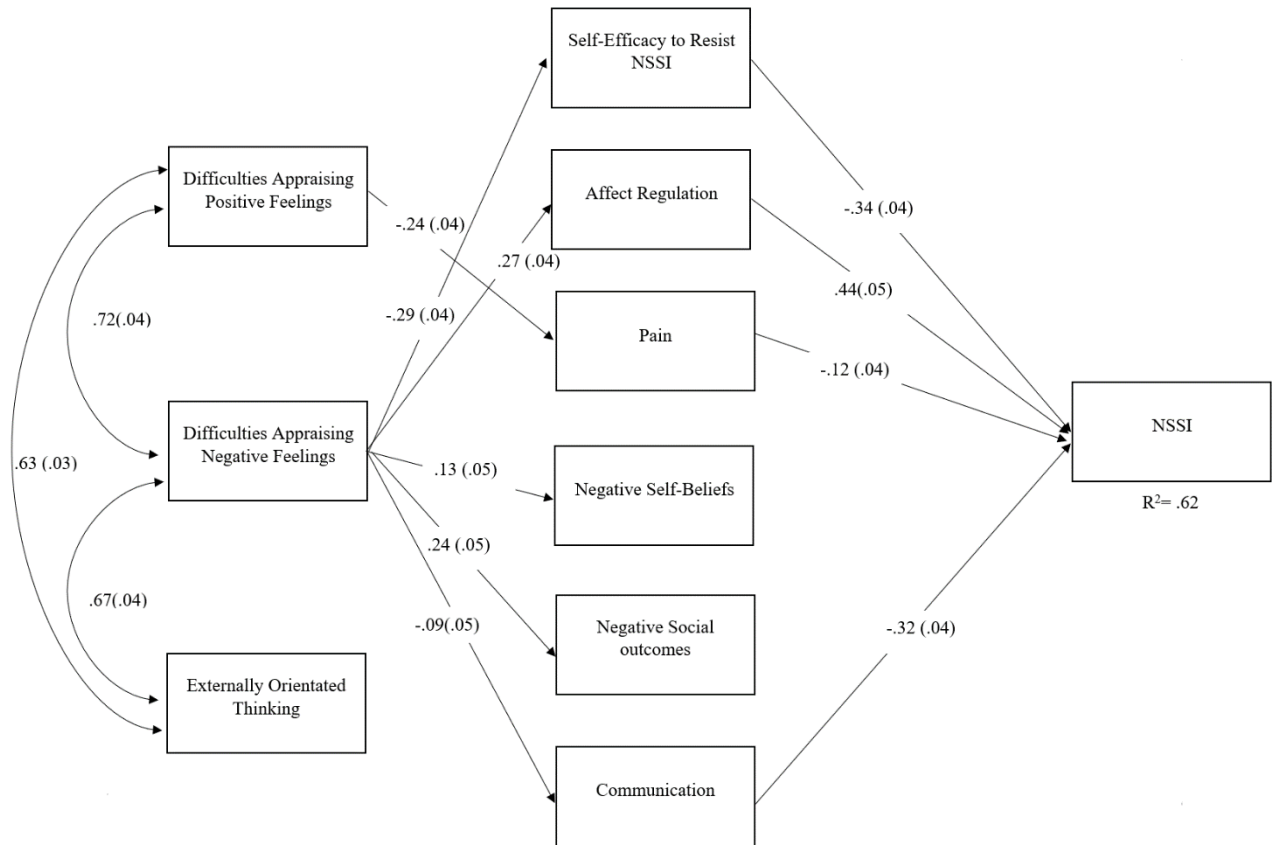


Figure 2. Alternative path model of the association between alexithymia and NSSI via behaviour-specific outcome expectancies and self-efficacy beliefs. Path values represent standardised path regression weights with standard errors in parenthesis. Non-significant paths removed.

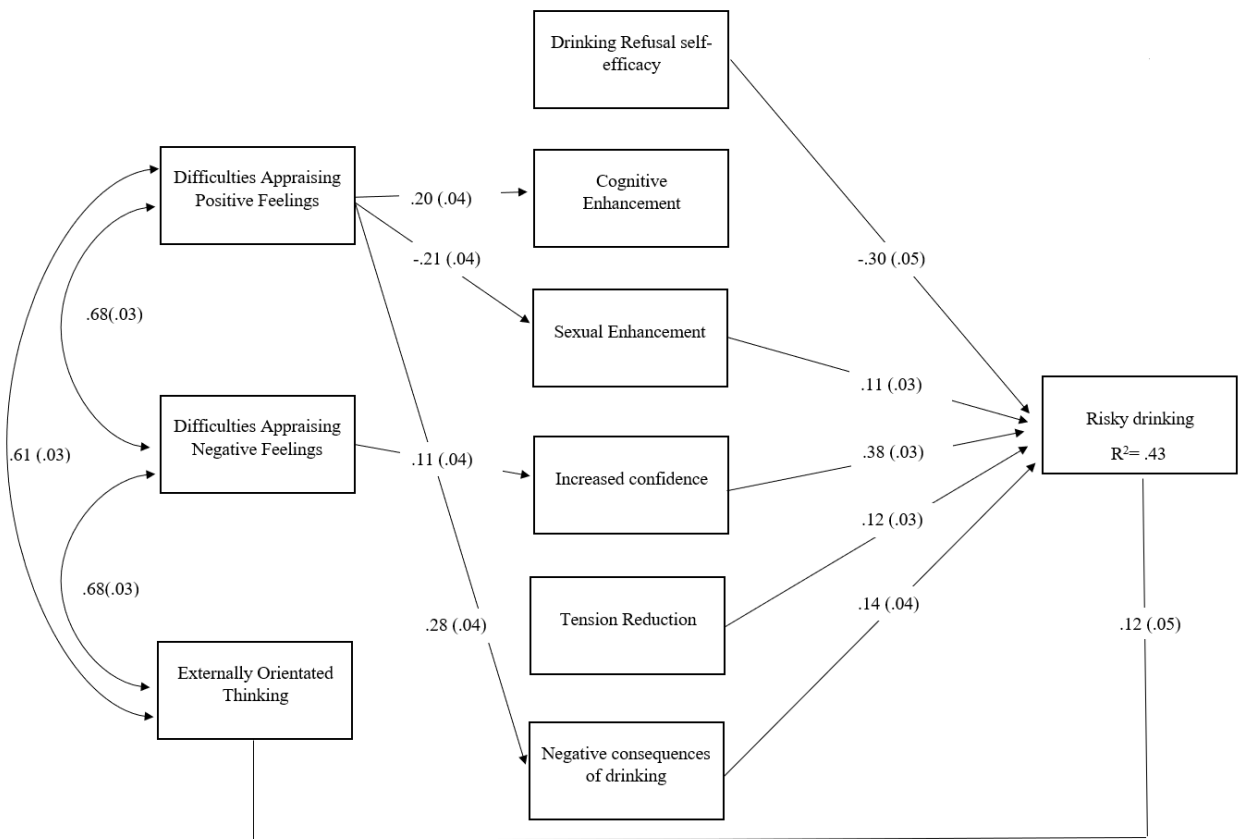


Figure 3. Alternative path model of the association between alexithymia and risky drinking via behaviour-specific outcome expectancies and self-efficacy beliefs. Path values represent standardised path regression weights with standard errors in parenthesis. Non-significant paths removed.