Final Report Submitted to the World Anti-Doping Agency

Development and Validation of the Adolescent Sport Drug Inventory (ASDI) and Factors that Influence Attitudes among Adolescent Athletes

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Executive Summary

The primary aim of this three year project was to develop and then validate a theoretically grounded questionnaire (i.e., the Adolescent Sport Doping Inventory; ASDI) to assess the psycho-social factors related to doping among adolescent athletes, and then use the ASDI to assess psychological constructs that might be associated with doping attitudes and susceptibility towards doping. We recruited both coaches and athletes from four continents (e.g., the United Kingdom, Australia, the United States, and Hong Kong). To achieve these aims, the project was divided into three distinct phases. In Phase 1, we wanted to understand more about coaches' opinions of doping attitudes and susceptibility among adolescent athletes, in order to help develop the ASDI. This facilitated the development of items and then validation among adolescent athletes from different cultures (UK, US, Hong Kong, and Australia; Phase 2). Finally, we assessed factors that might influence attitudes and susceptibility of adolescents using the ASDI (Phase 3). In Phase 1, Eleven coaches (*M* = 10) who resided in four countries (Australia, Hong Kong, United Kingdom, United States of America) and worked across seven different sports (athletics, basketball, kayaking, racquetball, rowing, rugby league, and rugby union) took part in semi-structured interviews. The interviews were guided by the Sport Drug Control Model (SDCM, Donovan et al., 2002 and previous research such as Gucciardi et al. 2011). All interviews were transcribed and then using a three-stage coding process, which involved: (1) summarizing individual interviews to identify important issues, (2) Creating a narrative for each theme, and (3) Structuring thematic groupings around stanzas. We found some support for the SDCM. In particular, coaches felt that

adolescents' attitudes towards doping were influenced by perceptions of threat and benefit appraisals, morality, self-esteem, legitimacy, and reference group opinion. We also identified additional factors not reported in the SDCM. These included age/maturation, sport level, stress, country of residence, and ethnicity. Our findings indicate that there may be some factors that might specifically influence attitudes and susceptibility towards doping among adolescent athletes. Worryingly, the coaches in our sample suggested that positive attitudes towards doping within lower level sport due to a lack of doping education and testing. As such, it could be argued that more testing is required across all levels of participation. Phase 1 of this research program will contribute to Phase 2 by helping develop items for the ASDI.

The primary aim of Phase 2 was to develop and validate the Adolescent Sport Drug Inventory (ASDI) among adolescent athletes from different cultures (UK, US, Hong Kong, and Australia). We assessed factors that influenced attitudes and susceptibility of adolescents to doping using the ASDI (Phase 3). This report summarized Phase 2 of the research program, and comprised of four distinct processes. Content validity involved four experts reviewing our proposed questions (Study 1), Construction and Initial Validation of the ASDI (Study 2), construct and convergent validity (Study 3), and test and re-test reliability (Study 4). Based on the findings from Phase 1 of this project (see Year 1 report), we developed a series of questions that were rated by four experts in Study 1. These experts rated each question in terms of relevance, clarity, simplicity, and ambiguity. Following this process, we removed a number of questions and re-worded other questions, which resulted in a 104-item ASDI that contained 11-factors. The 104-item and 11-factor ASDI was subjected to Confirmatory Factor Analysis (CFA) in Study 2, with a sample of 600 adolescent athletes. These athletes were aged between 12 and 18 years of

age and resided in the United Kingdom (*n* = 375), Australia (*n* = 121), Hong Kong (*n* = 83), or the United States (*n* = 21). Study 2 involved an iterative analysis process, in which we examined model fit, standardized parameter estimates (loadings), and modification indices. In total, 19 different models were examined, resulting in a 9-factor, 43-item ASDI. The purpose of Study 3 was to assess how scores on the ASDI were associated with other questionnaires that we expected to be related to scores on the ASDI. In Study 3, 423 adolescent athletes, who resided in the United Kingdom (*n* = 113), Australia (*n* = 137), Hong Kong (*n* = 69), or the United States (*n* = 74) completed the ASDI, Performance Enhancement Attitude Scale (PEAS; Petroczi & Aidman, 2009), a 4-item measure of situational temptation (Lazarus, Barkoukis, Rodafinos, & Tzorbatzoudis, 2010), a 10-item measure of honesty and humility (Ashton and Lee, 2009), and a 4-item measure of social desirability (Petrides, 2009). In terms of the ASDI, CFA revealed a good model fit without the need for any modification; $\chi^2(824) = 1528.33$, $p < .001$, CFI = .931, TLI = .924, SRMR = .050, RMSEA = .047 (90% CI = .043, .050). The loadings clearly support the factor structure of the ASDI in the independent cluster model (ICM). The ESEM model with geomin rotation allowed all items to load on all subscales. Model fit was again good; $\chi^2(552) = 1079.89$, $p < .001$, CFI = .948, TLI = .915, SRMR = .019, RMSEA = .049 (90% CI = .045, .054). The priority however, was to check that all items loaded onto their intended scale sufficiently and that cross-loadings were not substantive. The factor loadings indicated that all items load substantively onto their own factors and no cross-loadings on any factor were greater than .25. This supports the factor structure but also the independence of each scale within the ASDI. Score on the PEAS score were positively associated with attitude, benefit, cheating, reference group, stress, and susceptibility, as measured by the ASDI. Conversely

PEAS was negatively correlated with legitimacy. Situational temptation was a significant predictor of all doping scales. Notably, there was a large positively path estimate to susceptibility (β = .61, $p < .001$, 95% CI = .47, .75), cheating (β = .57, $p < .001$, 95% CI = .42, .71), and reference group (β = .52, $p < .001$, 95% CI = .38, .65). Significant positive paths from situational temptation were also present to attitude, benefit, and stress. Negative paths to esteem and legitimacy were also significant. The results support the convergent and divergent validity of the ASDI, but it is also supported by the similar effect of the positive path form situational temptation to PEAS (β = .49, $p < .001$, 95% CI = .36, .62). Overall, the results from Study 3 support the ASDI as a measure of assessing constructs that are likely to be associated with doping among adolescent athletes. We examined the extent to which the ASDI was resistant to change, which is a vital component for psychometric validation (Kline, 2005) in Study 4. Ninety-two adolescent athletes, who resided in the United Kingdom, completed the ASDI on two separate occasions, one week apart. Only three of the 43 items produced a statistically significant *t*-value, as did one of the six subscales (reference group). The percentage of responses (±1) for each item ranged from 77.17% to 95.65% for all items and 80.43% to 95.65% for subscales. To determine the magnitude of the difference in legitimacy, we calculated Cohen's *d* as $t/\sqrt{N}$. Ferguson (2009) suggests that the recommended minimum practical effect size for Cohen's *d* is .41. Here, $d = .23$. As such, the effect size is small to negligible in the only subscale that reported any effect at all. As such, the results support the test and re-test reliability of the ASDI. Overall, these findings support the use of the ASDI to measure attitudes to doping and factors that might predict doping behaviour among adolescent athletes who reside in the United Kingdom, Australia, Hong Kong, or the United States.

The aim of Phase 3 was to identify factors associated with doping attitudes and susceptibility among adolescent athletes. Phase 3 contained three distinct studies. We examined the relationship between maturation and doping attitudes in Study 1 among athletes from the UK, Australia, U.S., and Hong Kong. We found that emotional maturity and cognitive-social maturity were associated with doping attitudes. We examined the relationship between doping factors and stress appraisals, achievement goals, and coping in Study 2 of Phase 3. Adolescent athlete were recruited from athletes from the UK, Australia, U.S., and Hong Kong. Challenge appraisals were negatively linked to doping attitudes, whereas threat appraisals were positively linked to favorable doping attitudes. Mastery-approach goals were negatively to doping, as was disengagement-oriented coping. Task-oriented coping, however, was negatively associated with doping attitudes. In Study 3 of Phase 3, we examined the relationship between motivational climate, the coach-athlete relationship, and coach behavior. Only one element of the motivational climate, controlling coaching, was linked to doping attitudes. Neither the coach-athlete relationship nor coach behavior was associated with doping attitudes among young athletes. There was a link between these three constructs and another construct that predicts doping prevalence, which was doping susceptibility. Caring motivational climates, strong coach-athlete relationships, and positive coach behaviors were linked with athletes being less susceptible towards doping. It should be noted, however, that the correlation values across all three studies of Phase 3 were low. We posit that doping is a construct that is associated with a variety of different constructs, so it is plausible that many constructs can make a small contribution.

We developed a theory guided and valid questionnaire to assess doping factors among adolescent athletes in this program of research. We also identified constructs that were associated with either doping attitudes or doping susceptibility that were not previously linked to doping. Understanding more about the factors that are associated with doping is important for the development of more effective education programs.

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Introduction

The World Anti-Doping Agency's (WADA) defined doping as the occurrence of at least one or more rule violations (ADRV). Accordingly, there are 10 different ADRVs: (1) the presence of prohibited substances, its metabolites, or markers within an athlete's sample; (2) use (or attempted use) of a banned substance, (3) evading, failing, or refusing to provide a sample, (4) missing three tests within 12 months, (5) tampering (or attempting to tamper) with samples, (6) possessing a banned substance or method, (7) trafficking or attempt to traffic banned substances or methods, (8) administering banned substances or attempting to administer banned substances to athletes, (9) assisting or encouraging others to take banned substances, and (10) associating with individuals who are currently banned.

In recent years there has been an increase in the number of studies that have examined the risk factors that may predict doping in sport. Two risk factors that have received substantial attention are attitudes and susceptibility. Attitudes have been defined as person's tendency to act or react either positively or negatively to an object (Eagly & Chaiken, 1993). Gucciardi et al., (2010) described susceptibility to doping as "the absence of a firm resolve not to engage in doping activities or to give any consideration at all to an offer to do so" (p. 481). It appears that attitudes may be the key to understanding more about doping, given that Ntoumanis et al. (2014) found that positive attitudes towards doping correlated strongly with doping intentions and behaviors. Research regarding adolescent athletes' attitudes towards doping is lacking. This is somewhat surprising, given that attitudes are formed during this period of a person's life (Cieciuch et al., 2016; Döring et al., 2015; Kjellström et

al., 2017; Hartan & Latane, 1997). Further, empirical evidence also indicates that adolescent athletes are at risk of doping (Schirlin et al., 2009). In order to understand why some athletes dope, whereas others chose not to, scholars developed theoretical models.

Theoretical Models of Doping

In their recent meta-analysis, Ntoumanis et al. (2014) called for theoretically guided doping research. There are four recognized conceptual models of doping, (1) Drugs in Sport Deterrence Model (DSDM; Strelan & Boekmann, 2003), (2) SDCM (Donvan et al., 2002), (3) The Life Cycle Model of Performance Enhancement (Petroczi & Aidman, 2008), and (4) a model by Stewart and Smith (2008).

The Drugs in Sport Deterrence Model (DSDM; Strelan & Boekmann, 2003) utilized criminal deterrence theory. A key premise of this model is that decisions to dope are related to an athlete's appraisal of deterrents (self-imposed sanctions, social, and legal) and the benefits of doping (internal, material, and social). There is some support for this model. Strelan and Boekmann (2006) found that deterrents aided decisions to engage in doping behaviors. However, it should be noted that this study was hypothetically based, so the findings might not be represent accurate findings.

The Sport Drug Control Model (SDCM; Donovan et al., 2002) contains six constructs that influence an athlete's attitudes and susceptibility towards taking performance enhancing drugs (PEDS), along with the two "market factors" affordability and availability that inhibit or facilitate the transformation of attitudes into behaviors

(Jellah et al., 2014). These six constructs that influence attitudes include personality traits and five non-personality traits: perceived threat of being caught, perceived benefits of doping, what significant others (e.g., parents, coaches, friends, spouse etc) think about doping, morality, and the perceived legitimacy of organizations that monitor doping. Two studies have tested the SDCM (Gucciardi et al., 2011; Jalleh et al., 2014) and found support for the SDCM, although results were inconsistent. These authors, however, did not assess the personality traits of the athletes, despite personality being a key aspect of the SDCM, and both samples comprised exclusively of elite Australian athletes. Jalleh et al. (2014) stated that athletes of different levels should be assessed in future research to provide a more accurate assessment regarding how valid the SDCM is.

The Life Cycle Model of Performance Enhancement (Petroczi & Aidman, 2008) utilizes goal-directed theory as an explanation of why athletes dope. Petroczi and Aidman argue that decisions to dope are tradeoff between goal achievement (i.e., performance and self-esteem) and vulnerability (i.e., risk taking) an athlete is inhibited (i.e., social norms and health concerns). However, there is no empirical support for this model, to date.

Stewart and Smith (2008) proposed a is slightly different model from the other three models, because it lists variables that might influence doping, based upon empirical evidence from many domains such as sports management, policy, and sociology. The model does not indicate how these variables interact, which make translating

this model for interventions difficult (Mazanov & Huybers, 2010). A limitation of the aforementioned models is that they are not adolescent specific.

In light of the other models not being adolescent specific, Nicholls et al. (2015) developed the Sport Drug Control Model for Adolescent Athletes (SDCM-AA), which is grounded in Donovan's et al.'s (2002) SDCM, except it is specific to adolescent athletes. This model has many similarities to the SDCM, but there are appear subtle differences between adult and adolescent athletes. In accordance with the SDCM, the coaches believed that adolescents' attitudes towards doping were influenced by perceptions of threat and benefit appraisals, morality, self-esteem, legitimacy, and reference group opinion. The SDCM-AA also identified age/maturation, sport level, pressure, country of residence, and ethnicity as additional factors that may influence doping attitudes.

Doping Attitudes among Adolescent Athletes

A WADA funded review by Backhouse et al., (2007) included eight studies that had examined adolescents' attitudes towards doping. One of these studies, by Laure, Thouvenin, and Lecerf (2004), reported that seven percent of boys did not view PEDs as being dangerous to their health. Further, 68% of the entire sample thought doping would enhance their sports performance. Finally, 21% of the sample believed that their chances of being successful would be limited if they did not take PEDs. In another older study, Melia, Pipe, and Greenberg (1996) reported that 29% PED users did not think they were damaging their health, compared to 6% of non PED

users. Backhouse et al. (2007) concluded that the majority of adolescent athletes have a negative attitude towards PEDs and that most adolescents believe that doping would be dangerous to their health.

Since Backhouse et al.'s (2007) report, more contemporary studies have explored doping attitudes among adolescent athletes, with some studies supporting their overall conclusion, whereas other authors have found more alarming results. In agreement with Backhouse et al.'s conclusion regarding adolescent athlete's attitudes towards doping, Bloodworth et al. (2012) also found that the majority of athletes had a negative attitude towards doping. Nevertheless, other scholars have found that adolescent athletes may be ambivalent towards PEDs (Dodge & Jaccard, 2008). Other researchers have shown that young athletes have favorable attitudes to PEDs (e.g., Lucidi et al., 2008; Zelli, Mallia, & Lucidi, 2010a; Zelli, Lucidi, & Mallia, 2010b). As such, attitudes to doping warrants further investigation, especially because doping represents a significant problem to sport (Johnson, 2012).

Lucidi et al. (2008) found that doping intentions increased when adolescent athletes had favorable attitudes towards doping, along with possessing a stronger belief that others around them would approve with their decision to dope, and also believed they could justify doping. Zelli et al. (2010a) examined whether doping beliefs or attitudes to doping along with intentions to take PEDs among adolescents who play sport. Zelli and colleagues reported that doping attitudes accounted for 50% in the variance of the athletes' intention to dope. Further, intentions to dope accounted for 75% of the variance in doping behavior. Additionally, Zelli et al. (2010b) examined the association between muscularity, attitudes towards doping, drive for thinness, and intentions to dope. Drive for thinness and muscularity were

positively associated with doping intentions.

Measuring Doping Attitudes among Adolescents

Many of the published measures of doping attitudes have been criticized for being atheoretical (Backhouse et al., 2007; Gucciardi et al., 2011). This criticism applies to one of the most widely used questionnaires in doping research - the Performance Enhancement Attitude Scale (PEAS; Petroczi & Aidman, 2009). The PEAS is a 19-item unidimensional item. Nicholls et al. (2017a) examined the model fit of the PEAS among a sample of adult and adolescent athletes. Although the 8-item PEAS provided a good fit for adults, no model exhibited a good fit for adolescent athletes. Although results from data collected using the PEAS has increased the knowledge base, it fails to examine constructs that have been identified as shaping doping attitudes within theoretical models that have attempted to explain doping and it does not appear suitable for assessing doping attitudes among adolescent athletes. As such, it could be argued that a theory grounded scale, which accurately assesses doping attitudes among adolescents is required in order to advance the field.

Other Factors that Predict Doping among Adolescent Athletes

Although attitudes appear to be one factor that influences doping (see Ntoumanis et al., 2014), a recent systematic review by Nicholls et al. (2017b) identified nine factors that predict doping. Of these nine factors, attitudes towards doping were just one of 22 psychological constructs that predicted doping. Other than psychological constructs, the other eight factors were: gender; age; sports participation; sport type; psychological variables; entourage; ethnicity; nutritional supplements; and health

harming behaviors. As such, there are a number of factors that predict whether an athlete will dope or not.

Aims of Research Program

- Develop and validate a questionnaire to assess doping attitudes, susceptibility, and other factors associated with doping among adolescents from different countries.
- Use the questionnaire to assess factors that might predict doping (e.g., coach-athlete relationship, maturation, or achievement goals) among adolescent athletes from different countries.

Structure of Research Program

This program of work will be presented as three phases:

Phase 1: Understanding coaches' perspectives on what predicts doping among adolescent athletes from different countries to inform the development of the Adolescent Sport Doping Inventory.

Phase 2: Development and validation of the Adolescent Sport Doping Inventory

Phase 3: Using the Adolescent Sport Doping Inventory to assess factors that might be associated with doping among adolescent athletes from different countries.

Phase 1

Aim of Phase 1

The overreaching aim of Phase 1 of this research program was to understand more about the factors that might influence doping attitudes and doping susceptibility among adolescent athletes. As we adopted the SDCM (Donovan et al., 2002), a secondary aim was to explore the applicability of the SDCM among adolescent athletes from different countries and who participated in different sports. Although scholars has quantitatively tested this model with elite Australian athletes (e.g., Gucciardi et al., 2011; Jalleh et al., 2014), a different approach was adopted in Phase 1, because we selected a qualitative methodology. This approach was selected because we wanted to explore which parts of the SDCM were relevant to adolescent athletes, whether the SDCM needed modifying (Ntoumanis et al., 2014).

To achieve our aim of understanding more about adolescent athletes' attitudes towards doping and doping susceptibility and guide the development of the ASDI, we deemed qualitative methodology appropriate. Further, we decided to explore the model with coaches who resided in different continents, thus providing cross-cultural perspectives. Finally, we interviewed coaches rather than adolescent athletes themselves despite wanting to know more about adolescent athletes' attitudes towards doping. This is because Gucciardi et al. (2010) found that self-report doping data may be vulnerable to social desirability (Gucciardi et al., 2010).

Method

Participants

Eleven coaches (10 males and 1 female), who had experience of coaching adolescent athletes of different abilities took part in Phase 1 of this research program. The participants were aged between 34 and 76 years of age (*M* = 47.45 years, *SD* = 12.33). The coaches experience ranged from 10 to 43 years (*M* = 19 years, *SD* = 10.44) and held a variety of positions. These included international coach (*n* = 5), academy director (*n* = 1), regional coach (*n* = 2), national team manager (*n* = 1), state development officer (*n* = 1), and a national performance director (*n* = 1). The participants resided in the United Kingdom (*n* = 6), the United States (*n* = 2), Hong Kong (*n* = 2), or Australia (*n* = 1). Sports such as rugby union (*n* = 4), rugby league (*n* = 2), basketball (*n* = 1), racquetball (*n* = 1), track and field (*n* = 1), rowing (*n* = 1), and kayaking (*n* = 1) were coached by our participants. Pseudonyms are used in this report to protect the anonymity of each participant.

Procedure

The Department of Sport, Health and Exercise ethics committee of the University of Hull granted ethical approval for Phase 1 of this research program. Following ethical approval, coaches were contacted via members of the research team. The research team members provided information on the nature of the research and requirements for each participant. Coaches who expressed a willingness to participate in Phase 1 were sent an information letter that detailed the nature of the research. Coaches

provided written informed consent if they wanted to take part, before participating in the research.

Due to the logistics of conducting research with time-pressured coaches, who have extremely busy lives, one-shot interviews were conducted. This approach has previously been utilized with performance directors (Cruickshank, Collins, & Minten, 2014). The one-shot interviews were conducted via video telecommunications, because the participants were spread across four continents. In line with existing recommendations, data collection concluded when saturation was achieved (Coté, Samela, Baria, & Russell, 1993).

Interview Guide

Interviews followed a semi-structured format, which was based upon the SDCM (Donovan et al., 2002) and relevant research (e.g., Gucciardi et al., 2011; Jellah et al., 2014; see Appendix A). We wanted the coaches to divulge their experiences and opinions from their entire coaching career. As such, we developed a semi-structured interview along with probing questions. This enabled the research assistant to probe the participants about the SDCM, in addition to exploring other areas of perceived importance (Sparkes & Smith, 2014). The conversational and open-ended approach with semi-structured interviews facilitates the identification of new themes. This is important when assessing the suitability of models that have not been tested with specific populations (Potter & Hepburn, 2005).

The interviews lasted 50 minutes on average (*SD* = 9.14) and started with assurances of confidentiality, the nature of the topic, and a definition of doping. After this, more information about each participant's background in coaching was

explored. The remaining interview questions related to the key predictors of doping attitudes identified by Donovan et al. (2002). These included challenge appraisals, threat appraisals, personal morality, legitimacy, reference group opinion, and self-esteem. Furthermore, because Gucciardi et al. (2011) identified a relationship between doping attitudes and susceptibility, we also questions about this topic in the final part of the interview.

Pilot Study

The interview guide was developed by the principal author of the research grant and then reviewed by two members of the research team. Minor changes were made after this initial review. The interview guide was presented to two different coaches, who had experience of coaching adolescent athletes. Changes were made to the phrasing of three questions. Following these minor changes, a pilot interview was conducted with another coach who had experience of coaching adolescent athletes for over 15 years. Four questions were altered. Probing questions were created to tease out new themes, which were specific to adolescent athletes. It should be noted that the pilot interview was not transcribed. Further, it was not included in the final analyses.

Data Analysis

Three authors of the research grant were actively involved in the analysis of the data. These authors also provided critical evaluation throughout the data analysis process. The interviews were conducted by a research assistant, so the principal author familiarized himself with the content of the transcribed interviews through in-dwelling (Maykut & Morehouse, 1994). This involved reading each interview transcript three times, which enabled concepts and themes to develop.

In accordance with recent doping research by Erickson et al., (2015), our data

was analyzed using the three-stage coding process recommended by Smith et al. (2010). This process involved summarizing individual interviews so that the most important issues could be identified, pooling evidence to create a narrative for each theme, and structuring thematic groupings around stanzas. Sentences from the interview transcripts were segmented into phrases. These phrases encompassed the participants' opinions regarding adolescents' attitudes towards doping and susceptibility. This resulted in a narrative for each participant, which was then pooled with the other narratives to reveal themes among the sample. These pooled commonalities were deductively linked to the SDCM and new themes were inductively categorized.

Establishing Trustworthiness

According to Carlson (2010), trustworthiness refers to how much trust can be given that the data was appropriately and ethically collected, analyzed, and reported. Trustworthiness is often used interchangeably with goodness, credibility, and authenticity (Carlson). Two techniques were employed to enhance trustworthiness. Peer-debriefing occurred throughout the data analysis procedure by three of the authors (Cresswell & Miller, 2000). They provided guidance, critical evaluation, and challenged the principal author's opinions and ideas. This process involved meetings between the principal author and another co-author, or in one instance between all three members present. Peer debriefing also occurred via e-mails. Lastly, a critical friend, who was not involved in the research, provided feedback about the results and cast a critical eye.

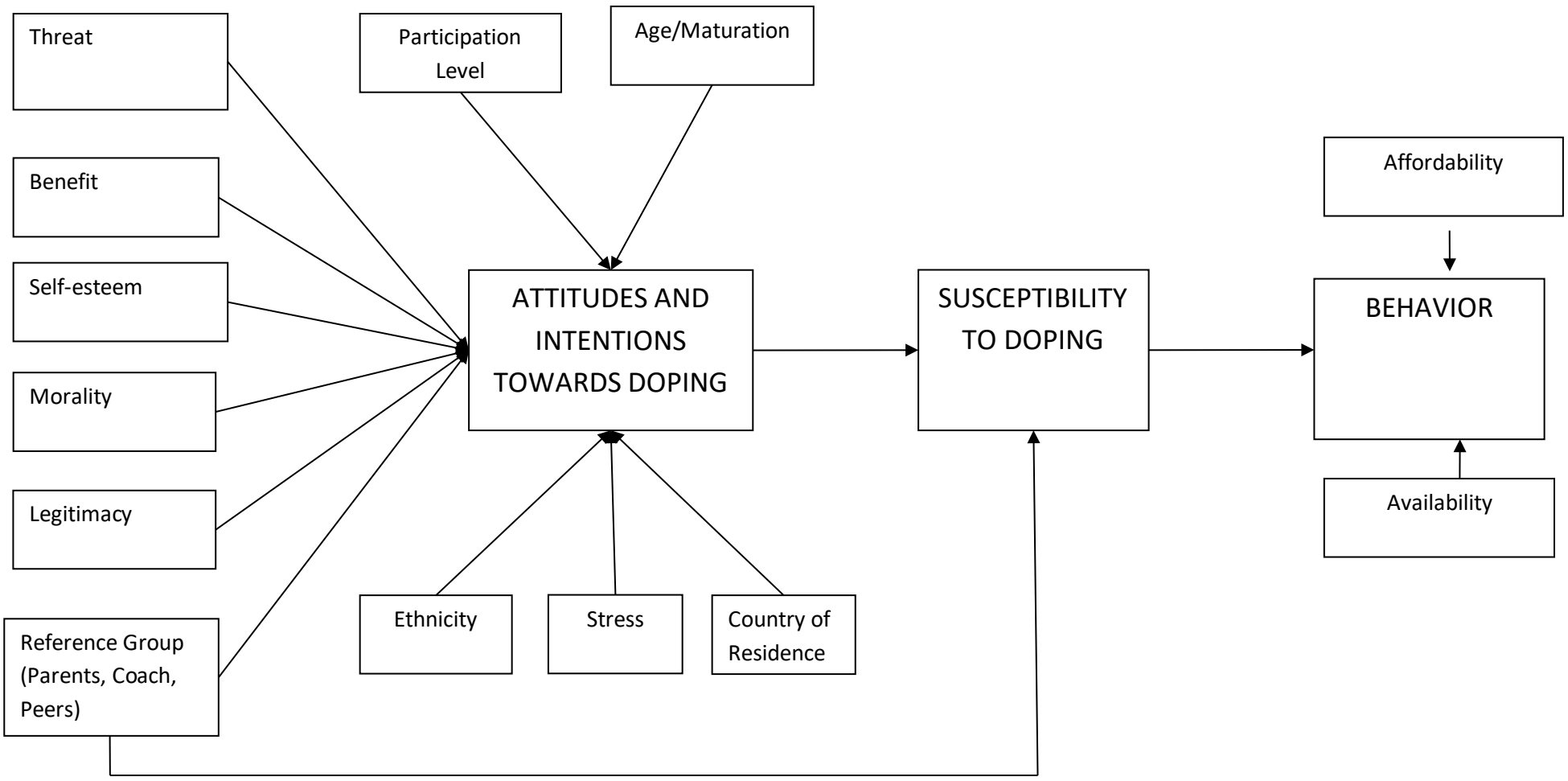
Results and Discussion

We identified twelve distinct themes, which are depicted in direct quotations and stanzas from our participants. All of these themes were thought to influence an adolescent athlete's attitudes and susceptibility towards doping. We also created a model that depicted these themes (see Figure 1). In sum, there was much support Donovan et al.'s (2002) SDCM model. There were, however, some subtle differences that appear specific to adolescent athletes that were not included within the SDCM. Threat, benefit, self-esteem, morality, legitimacy, and reference group opinion, which were part of the SDCM, were thought to influence doping attitudes among adolescent athletes. In addition to these constructs, we also identified participation level, age/maturation, ethnicity, stress, and country of residence as factors that influence doping attitudes. Three themes emerged that were thought to influence doping susceptibility: i) coaches, iii) family, and iii) friends and family. Finally, the coaches believed that doping behaviors were influenced by both availability and affordability. All of the themes are presented with an emphasis on how it impacted and influenced attitudes and susceptibility towards doping among adolescent athletes (Erickson et al., 2015).

Attitudes towards Doping

Threat. Donovan et al. (2002) purported that the threat of enforcement from drug testing authorities and the potential negative health consequences served as a doping deterrent. There was mixed support for this theme from the coaches we interviewed. Incidentally, this finding mirrors the conflicting findings of Gucciardi et al. (2011) who found a positive and significant path from threat to doping attitudes. Alternatively, Jalleh et al. (2014) found an insignificant path between these two

Figure 1. *Sport Drug Control Model for Adolescent Athletes (SDCM-AA)*



constructs. It is noted, however, that Gucciardi et al. explored only the threat of enforcement and not negative health consequences. Jalleh and colleagues explored both of the threat of enforcement and health consequences. Surprisingly, only the minority of coaches thought that both enforcement and health consequences were strong deterrents. Some even argued that both of these threat appraisals were less applicable to adolescent athletes that adult athletes. The coaches suggested that the threat of testing among adolescent athletes is somewhat limited due to a lack of testing and that adolescents believe that any negative consequences of doping were over exaggerated. One coach said: “I simply don’t think they would be overly aware of what possible consequences could materialize with doping” (Rob, rugby union). Another coach said: “There is a bit of a myth that there is health risks associated with doping, and they think it is a little over-exaggerated” (Matt, rugby union). There was a feeling among coaches that adolescent athletes believed that any negative health consequences would not happen to them. For instance, one coach stated that: “The outlook of young people, which is 'it won't happen to me', or ‘it’ll happen to me further down the line, so there’s a risk to come [but] it doesn’t bother me [now]'” (George, rugby league). However, other coaches believed that players have a general awareness of the negative health consequences: “They’re probably aware of 'yeah it’s, look its not good for you,' but I wouldn’t have said they would know how severe it would be and the long term effects they could suffer” (Ron, rugby union). Our findings suggest that those reported in Melia et al. (1996) and Laure et al. (2004) may have even underestimated adolescent athletes’ knowledge of the potential negative effects that PEDs can cause, certainly based on the evidence obtained from these coaches. This is particularly

worrying and could suggest that more and better education is required to adolescent athletes, across all participation levels.

With regards to the threat of enforcement, one coach argued that there is less testing among adolescent athletes: “A kid is not going to get tested in the off season as much as potentially as a senior level who’s on y’know a WADA list.” He commented further that adolescent athletes think “the chances of getting caught are small” (Ed, kayaking). However, the threat levels may vary depending on the nature of season and the competitions the players are participating in: [in the] “Last Junior World Trophy, we had boys tested for every game…but at other smaller competitions that are throughout Asia, there is no actual testing done” (Matt, rugby union). Interestingly, these coaches thought that threat levels may change throughout the year, depending on whether the adolescent athlete is in the competitive or off season. As such, it would appear that longitudinal research that monitors threat levels is warranted. This will enable scholars to identify when threat levels increase and dissipate. Such information may help identify the periods in which athletes might be more likely to dope.

Benefit. There was a belief among some of the coaches that adolescent athletes were aware of the benefits of doping. This was thought to influence doping attitudes, and thus supports Gucciardi et al. (2011) finding. It is contrary to Jalleh et al., (2014), who did not find a significant relationship. One coach said: “The youngsters that are in a club environment now, fourteen fifteen, sixteen, seventeen, eighteen are more aware of the benefits of [doping].” This coach added that players aware of how doping could lead to changes in body size, and has regularly heard players saying “‘He’s gotta be on growth [hormones], he was never that big last year’” (George, rugby league).

Another coach revealed that adolescent players might have a more favorable attitude when they are striving for a professional contract or have sustained an injury and are worried about falling behind other players: "'It's almost like a short-term fix to get me back to where I need to be' and I and in my experience they talk about that a lot" (Phil, rugby league). Despite the health risks and threat of being caught doping, one reason why athletes still might have a positive attitudes to doping is because adolescents tend to focus on the benefits of risky behavior rather than the costs of such behavior (Gardner & Steinberg, 2005).

Self-Esteem. All of the coaches stated that low self-esteem among adolescent athletes would be reason why they might develop a more favorable attitudes towards doping. This provides support for Schirlin et al.'s (2009) earlier findings. One of the coaches said that self-esteem is the most important factor that influences doping attitudes, and thus whether am adolescent athlete "Ignore(s) the deterrents and go for it or whether they think 'you know what, this isn't for me because I don't wanna go down that road'" (Mike, rugby union).

Another coach thought that doping could be seen as short-term fix for low self-esteem when performance is going poorly: "Performance enhancing drugs might give them that performance boost what will or could in their eyes get them out of that like low self-esteem" (Christine, racquetball). Schirlin et al., (2009) identified physical self-esteem as a risk factor for doping, but our results indicate that self-esteem in general is a risk factor. This provides support for Donovan et al.'s SDCM. Gucciardi et al. (2011) did not find a significant path between doping attitudes and self-esteem. However,

perhaps self-esteem is more of a risk factor for doping attitudes among adolescent athletes. Quantitative research is required to assess this assertion.

Morality. Gucciardi et al. (2011) and Jalleh et al. (2014) reported the strongest paths of those within the SDCM between morality and doping. According to these studies, it could be argued that morality has the most important influence on doping attitudes. Most of the coaches in our sample felt that adolescent athletes would dope if they knew they would not test positively. Indeed, one coach often asked his players whether they would dope if they could guarantee they would be at the top of their sport for three years, but not be able to play again, and he said that: “About fifty percent [would dope]. We're talking about fifteen, sixteen year old kids here” (George, rugby league).

Another coach agreed with this sentiment: “There’s athletes out there who have winning at all costs [attitude], I don’t think they would hesitate to dope if they knew they weren’t gonna get caught” (Rob, rugby union). Interestingly, Lucidi et al. (2008) also found a significant relationship between moral disengagement regarding doping and a positive attitude towards doping use. Other coaches, however, thought that adolescent athletes would not dope, even if they knew they would not test positive: “There was just no way I was going down that road, so I chose to accept that I wasn't gonna perform at a certain level in my sport” (Ed, rugby union). Overall though, it appears that morality is a key factor in influencing the attitudes of adolescent athletes. In accordance with Donovan et al. (2002), the influence of morality can be both negative and positive in relation to doping attitudes.

Legitimacy. In support of Donovan et al.'s (2002) SDCM, there was a strong belief among the coaches that adolescent athletes feel doping organizations are legitimate and that the testing procedures were fair. Indeed one coach questioned the number of adolescents tested, but commented: "I don't think any of them would be worrying that there was going to be tampering or anything like that" (Christine, racquetball). One coach commented on an anti-doping education program he attended with adolescent players: "A tester has explained it to them and shown them the kit. The players are then left in no doubt that this is a very secure, sterile procedure" (Phil, rugby league).

Another coach said: "They're still always nervous and they're always [worried] that things can happen, but I think they're happy in the process that it's safe" (Jos, rowing). These findings are in agreement with Jalleh et al. (2014) who also found a significant path between legitimacy and doping attitudes. This represents an important finding because it illustrates that adolescents are aware of the thoroughness of testing procedures, which is likely to influence compliance to anti-doping rules. Whether this finding occurs across all levels of adolescent sport is another matter, particularly among athletes not exposed to anti-doping education programs.

Reference Group Opinion. The coaches believed that the opinions of those close to the athletes such as coaches, parents, and friends influenced doping attitudes. The influence could be positive or negative, and thus we found support for Donovan et al. (2002), who also suggested this. One coach stated that "A parent's view would act as deterrent to that [doping], but I've also known y'know where a parent has allegedly given his lad banned substances" (Phil, rugby league). However, another coach thought

it acted as a deterrent, because an athlete would not want to be known to cheat among his friends: “I don’t think any of the lads would want to be perceived as a cheat. The whole stigma around drug use in sport is a deterrent” (Ron, rugby union). Jalleh et al. (2014) found support for this factor of the SDCM. Interestingly, peers might be particularly important, among adolescents, because peer influence is thought to play a more significant role in determining behavior among adolescents than it does adults (Gardner & Steinberg, 2005).

Age and Maturation. Although not identified in the SDCM (Donovan et al., 2002), the findings from our interviews indicate that the age and maturity level of an adolescent athlete may influence their attitude towards doping. Some of the coaches suggested that late developers might be more likely to have a favorable attitude towards doping: “Some kids are trying to gain more weight quicker, cos they need to otherwise they’re going to get hurt or they won’t get selected as a result [be]cause they’re too small” (Matt, rugby union).

Alternatively, if an early developer gets over taken by his peers when they start puberty he or she might be more likely to have a favorable attitude towards doping: “A prodigy kid at fourteen fifteen sixteen, and then, your buddies hit puberty and then they start beating you and you’re not winning anymore” (Ed, kayaking). Although the relationship between doping and maturation has not been examined within the literature, researchers have examined the relationship between substance abuse and puberty. A recent systematic review by Hummel, Shelton, Heron, Moore, and van den Bree (2012) revealed that early developers are more likely to use substances than late developers. Scholarly activity is required to address the relationship between early and

late developers and whether this influences doping attitudes among adolescent athletes.

Participation Level. Participation level was not listed as factor that influences doping attitudes within the SDCM (Donovan et al., 2002). The coaches in Phase 1 of our research program identified it as factor that might influence an athlete's attitudes towards doping. In particular, the coaches felt that adolescent athletes who participated at lower levels would have more favorable attitudes to doping due to the lack of education and testing at lower levels: "At the sub-elite level in the community game, I think that there could be a bigger problem there, because the chances are that they could get away with it" (Phil, rugby league).

Indeed another coach thought that positive attitudes were more prevalent among amateur adolescent athletes than professionals. "There's an innate risk with junior [amateur] players, because they're taking lots of supplements to get themselves an advantage and they're not getting tested" (George, rugby league). Previous research has identified that adult supplement users are more likely to have a positive attitude towards doping (Backhouse, Whitaker, & Petróczi, 2013). This relationship may extend to adolescent athletes too. Participation level has not previously been considered as a factor that might influence doping attitudes among adolescent athletes. Indeed, there are many studies that have focused upon elite or high-level athletes (e.g., Bloodworth et al., 2012; Gucciardi et al., 2011; Jalleh et al., 2014), but perhaps doping and positive attitudes to doping might be more prevalant within lower level sport.

Ethnicity and Country of Residence. The coaches suggested that an athlete's ethnicity may also influence their attitude towards doping. One coach said that athletes

of particular ethnicities might have a natural advantage over athletes of other ethnicities. This in turn may influence doping attitudes: “I come from a New Zealand background where the Polynesians are very big people, and through all that age group, y’know they’re predominately a lot larger than your average Caucasian young man.” This natural size advantage helps these players according to the coach: “they seem to get through to the representative teams a lot more because coaches are looking for size more than skill at that young age” (Matt, rugby union). Another coach suggested some players have an advantage, which might make others want to dope: “In the southern hemisphere with the Polynesians versus particularly the Australians. There are players running around that at thirteen and fourteen are eighty-seven kilograms. I think maybe there’s an impact there” (George, rugby league).

Although some coaches thought that athletes might be tempted to dope in order to deal with disadvantages from being a smaller race, one coach said that the beliefs of a particular ethnic group might be a deterrent against doping, because athletes do not want to bring shame upon their family name: “Shaming your own name is such a big thing over here” (Rob, rugby union). The relationship between doping attitudes and ethnicity has not been explored among adolescent athletes and requires further attention.

One coach experienced different doping attitudes within different countries: “In my experience of junior rugby in South Africa, there’s more pressure and a higher incidence of use of PEDs... than what goes on in the UK.” This coach commented that “It was very common for sixteen or eighteen year old schoolboys to take steroids” (Mike, rugby union). There is a lack of research involving athletes from different countries in

relation to doping among adolescent athletes. There are studies that contain large samples of adolescent athletes (e.g., Laure et al., 2004; Melia et al., 1996), but these contain athletes from the same country. Nonetheless, these findings indicate that doping is a worldwide problem, but understanding any differences in doping attitudes among athletes from different countries and possible reasons for such differences may help increase compliance levels.

Stress. Coaches mentioned that stress or pressure levels influenced attitudes towards doping. Indeed one coach argued that stress influenced such attitudes: “At the eighteen level, within the course of a season, it can become quite strenuous. I would argue that they would maybe look to other forms of support and the dangers of doping increase” (Dan, basketball). Indeed, another coach associated higher stress levels with positive doping attitudes: “The higher expectations with bigger events may create the circumstances whereby a youngster makes a poor decision about what they're taking” (Mike, rugby union). Researchers have failed to specifically examine the relationship between stress and doping attitudes among adolescent athletes. Researchers from the sport psychology literature have suggested that decision-making is impaired during stressful incidents that are appraised as threatening within the Theory of Challenge and Threat States in Athletes (TCTSA; Jones, Meijen, McCarthy, and Sheffield, 2009). In support of this theory, our findings indicate that adolescent athletes might use PEDs when athletes experience threat within stressful encounters, because decision making is influenced. Understanding more about the relationship between doping attitudes and threat states might enable researchers and practitioners to identify periods of seasons or competition cycles when athletes are more likely to dope.

Susceptibility towards Doping

The coaches identified three main sources that were related to an adolescent's susceptibility towards doping. These were: i) coaches, ii) parents, and iii) peers. These were cited as influencing attitudes to doping too, so will be touched upon briefly, but in relation to doping susceptibility.

Coaches. Many of the coaches felt very strongly that coaches influence an adolescent athlete's susceptibility towards doping: "I think the coach has an absolutely massive part to play in that. At an adolescent age, at a younger age, coaches or people in authority have a lot of sway." The coach commented further: "These guys will listen to what we say and if we're actively encouraging that [doping], and we put pressure on the players to dope, I believe on the whole, they would probably respond by doing what the coach wants them to" (Rob, rugby union).

This sentiment was echoed by another coach, who felt that coaches can exert even more influence. He said that adolescent athletes: "Would do whatever you tell them to do because they believe in you and trust you." He said that some coaches will not initially tell the athlete what they [are] doing, but will then say 'well, you're getting the results.' I think a coach has a huge influence" (Jos, rowing). This finding is in agreement with Diacin et al. (2003) and Erickson et al. (2015) who reported that the coach was very powerful in determining whether athletes take a PED. In addition to adolescent athletes being more susceptible to peer influences (e.g., Gardner & Steingberg, 2005), it appears that they might also be more susceptible than adult athletes to coach influences.

Parents. As previously documented in the attitudes to doping section of this report, parents influenced susceptibility to doping. This influence could be positive or negative, which is in partial agreement with previous research among adult athletes. Erickson et al. (2015) reported that parents could have a positive impact on attitudes towards doping. Some coaches, however, thought that parents could increase susceptibility to doping, particularly in countries where the stakes were high for adolescent athletes and parents. Indeed, one coach believed that adolescent athletes who are close to getting a full scholarship within the United States may be susceptible to doping, and could be influenced by their parents: “Parents see it as a way of getting a scholarship to university which is a massive expense here. I think parents would enable that to happen.” Furthermore, this coach also thought that parents know that if their child gets a scholarship and that he or she gets “Super good at either baseball, basketball or football, then if they make it to the program, then y’know – you’re in the big time” (Ed, kayaking).

Peers. Peers were also thought to influence doping susceptibility: “If other people in the squad have been doping and they’ve seen success, I think it becomes a lot easier to go 'oh I'll have a little dabble as well, why not?’ If it’s helped them, why can't it help me?' This particular coach also said that “Temptation will certainly be heightened if members of the squad or team or friends are doping” (Rob, rugby).

These sentiments were also echoed by another coach: “‘He hasn’t been touched, he hasn’t been in trouble or anything, he’s looking in great shape, I should give it a shot.’ There’s definitely going to be those temptations of course.” This particular coach suggested that “vanity becomes an issue at that young age, trying to impress the ladies”

(Matt, rugby union). These findings are in agreement with Gardener and Steinberg (2005) who found that peer influence is strongest during adolescence, in comparison to adulthood.

Availability and Affordability

Although the main purpose of Phase 1 of this research program was to explore the coaches' perceptions of attitudes and susceptibility towards doping, rather than doping behavior per se, the coaches did address some of the factors that they thought influenced actual doping. Jalleh et al. (2014) did not report significant paths between affordability and availability with doping behavior, but we found support for Donovan et al.'s (2002) SDCM. The coaches in Phase 1 of our research program felt that availability and affordability were key factors in influencing behavior. Worryingly, many of the coaches thought PEDs were widely available to adolescent athletes: "I am aware of certain junior players being sent home from the club that have been supported afterwards [be]cause they've taken something that's had a an adverse reaction" (George, rugby league). Another coach believes that PEDs are "widely available here. If someone wants them, especially with the internet, it's not difficult to get hold of" (Mike, rugby union).

Some of the coaches thought that adolescents would be able to afford PEDs too: "They have a lot more disposable income, which opens up doors to be able to buy whatever they would be buying" (Rob, rugby union). One coach even thought that an athlete: "From a wealthier background may also be more likely to dope because they just have the resources to be able to afford such drugs" (Ron, rugby union). Despite the

findings by Jalleh et al. (2014), the coaches believed that PEDs were both available and affordable to many adolescent athletes.

Conclusions

In Phase 1 of this research program we qualitatively explored coaches' perceptions of performance enhancement during adolescence and in relation to the factors identified within the SDCM (Donovan et al., 2002), to inform the development of the ASDI. On the whole, we found support for the SDCM and therefore suggest that it is relevant to adolescent athletes from different continents, along with a few minor amendments to the model. Based on the interviews with the coaches, we believe that adding age/maturation, participation level, stress, ethnicity, and country of residence makes the model more applicable to adolescent athletes. The coaches who were interviewed all thought that other coaches, parents, and peers influenced doping susceptibility among adolescent athletes. This in turn was thought to impact upon doping behavior among this group of athletes. A strength of the data collection technique we employed may mean our findings are less vulnerable to social desirability, which has been previously found to influence self-reported data on doping (Gucciardi et al., 2010). With this in mind, we are aware that we to assess social desirability in Phases 2 and 3 of the research program.

Based upon our findings, it appears that there might be some factors that influenced doping attitudes, which have not been previously considered. It could be argued that additional research is required to understand more about doping attitudes, especially among adolescent athletes. For example, age/maturation, participation level, stress, ethnicity, and country of residence are not factors that have previously been considered in relation to doping, but required further attention. The coaches in our study suggested that these are factors that might influence attitudes among adolescent

athletes. Building upon Phase 1, researchers could quantitatively assess the relationship between these constructs and attitudes to doping. Understanding more about the determinants of doping attitudes will enable at risk athletes to be targeted with doping education programs. Overall, the findings of Phase 1 of this research program echo findings from scholars within other domains, who have advocated that adolescents should not be treated as mini-adults. Further, it has also been suggested that his population needs to be considered in their own right with models specifically designed with the population in mind (e.g., Compas et al., 2001).

In testing the SDCM, Gucciardi et al. (2011) did not report a significant path between self-esteem and attitudes to doping. In this study, however, all of the coaches thought that self-esteem was highly related to attitudes towards doping. This is in agreement with Schirlin et al.'s (2009) findings. Furthermore, there might also be some subtle differences among adolescents and adults in relation to threat appraisals. Many of the coaches felt that adolescent athletes may disregard any negative health effects of PEDs. It is apparent that more research is required in order to address doping attitudes among adolescents, because far less is known about this age group. This is surprising, given that adolescence is the time in which attitudes are formed (Backhouse et al., 2012; Hartan & Latane, 1997).

There might be other subtle differences between adolescent and adult athletes in regards to doping susceptibility. Gardener and Steinberg (2005) reported that

adolescents were more likely to engage in risky behaviors and to fall under the influence of their peers than adults. As such, adolescent athletes may also be more susceptible to any other negative influences than adult athletes.

Practical Implications of Findings

The coaches in our study identified coaches, parents, and peers as influencing doping susceptibility. It is therefore important that coaches are aware of the influence of other peers, but also how they themselves may influence adolescent athletes. Indeed, this information could be portrayed within coach education programs so that coaches themselves have increased awareness of doping and the role that they and significant others may play in influencing attitudes and susceptibility.

A number of worrying findings have emerged from Phase 1 of this research program, specifically in regards to adolescent athletes that policy makers and national governing bodies could be made aware of. Firstly, other than adolescent athletes participating at elite levels there appears to be very little or no doping education. This represents a significant concern, especially as some of the coaches suggested that doping may be much more prevalent at non-elite levels. As such, it could be argued that all adolescent athletes should receive doping education. It is acknowledged that this would be very expensive, so an alternative approach would be include doping education training to coaches at all levels and encourage coaches to provide education themselves.

Another potential issue relates to the lack of testing of adolescent athletes, even those participating at higher levels. It was stated by one coach that other than when athletes participate in a world championship, no adolescent athletes are ever tested on their continent. Theoretically, an athlete could have taken a PED in the build up to a competition, which would have cleared his or her body by the time testing took place. It could therefore be argued that more testing is required among adolescent athletes.

Limitations

Although we found support for the SDCM (Donovan et al., 2002) and suggested additional constructs that might influence an adolescent's attitude towards doping, it is important to note the potential limitations of this study. Firstly, Phase 1 of this research program adopted a qualitative methodology and contained only 11 participants. This sample is much smaller than both Gucciardi et al. (2011) and Jalleh et al. (2014), who used quantitative techniques with larger participant sizes to assess the SDCM.

Similar to previous research (e.g., Erickson et al., 2015), we did not employ member-checking and verify our findings with the participants. This does not necessarily mean the data is less trustworthy than studies that employed this technique. Lincoln and Guba (1981) even suggested that member-checking may threaten validity and not enhance it. Taken as whole analytical process, Morse, Barrett, Mayan, Olson, and Spiers (2000) argued that data analysis involves synthesizing, decontextualizing, and abstracting data across participants. Accordingly, Morse et al. (2000) stated that there is no reason for

participants to recognize themselves or experiences. In order for researchers to address the concerns of participants, they may be forced to present the results at a very descriptive level, which could invalidate the work of the researcher and keeps the level of analysis very close to the data. As such, Hagens, Dobrow, and Chow (2009) argued that member-checking adds very little to the accuracy of the transcript and the disadvantages of this procedure can outweigh the advantages. As such, Morse et al. called for researchers to focus on strategies that ensure validity and reliability during the actual during the data collection phase rather than trying to establish trustworthiness once data collection has finished.

Phase 2

Aim of Phase 2 of the Research Program

The overreaching aim of Phase 2 of this research program was to develop and validate the ASDI, based upon the findings from Phase 1, among a sample of athletes from multiple countries. In order to achieve this aim, four distinct studies are reported: Content validity (Study 1), Construction and Initial Validation (Study 2), Test and re-test (Study 3), construct convergent and discriminatory validity (Study 4).

Study 1: Content Validity

Content validity is the extent to which the items in a scale are representative of the domain (Kerlinger, 1986; Messick, 1975, 1980). Though clearly important, item-level analysis is seldom reported in studies (Yaghmale, 2003). Yaghmale identifies two distinct stages to assessing content validity; development and judgement. Content validity is often derived from a combination of reviewing literature, gaining representative samples from populations and from expert review (Burns & Grove, 1993). Once items have been developed using some or all of these sources, the content validity can be judged. One such method that provides appropriate rigour was presented by Waltz and Bausell (1983). Specifically, the authors developed the four-point content validity index (CVI). In this, a panel of experts judge each item on a scale of one to four for relevance, clarity, simplicity, and ambiguity. A proportion of agreement is then calculated, with scores ≥ .75 generally considered strong.

The use of experts to obtain content validity can also be achieved through more qualitative methods. Several measures (e.g., Carolina Sport Confidence Inventory, Manzo, Ilva, & Mink, 2001) have used trained colleagues who understand the concept to overlook the items in the scale and give opinions or concerns. It has also been suggested that the participants who the measure is given to for assessing the validity should be asked about any specific nuances (Vealey et al., 1998; Litwin, 1995).

Method

Participants

Three sport psychologists and one coach (4 males), who were aged between 24 and 55 years of age took part in this study. The sport psychologists' experience ranged between 2 and 19 years and the coach had 18 years' experience as a coach. The participants resided in the United Kingdom (*n* = 3) or Australia (*n* = 1).

Procedure

The Department of Sport, Health and Exercise ethics committee of the University of Hull granted ethical approval for this study. Following ethical approval, sport psychologists and coaches were contacted via members of the research team. The research team members provided information on the nature of the research and requirements for each participant. Coaches who expressed a willingness to participate in this study were sent an information letter that detailed the nature of the research. Coaches provided written informed consent if they wanted to take part, before participating in the research.

Adolescent Sport Doping Inventory

Based on the findings from Phase 1 of this project, the research team created a series of questions, based upon the key factors that were thought to influence attitudes towards doping, which would form the basis of the ASDI. This resulted in questions on attitudes towards doping (*n* = 13), threat (*n* = 10), benefit (*n* = 10), self-esteem (*n* = 12), cheating (*n* = 9), legitimacy (*n* = 9), reference group opinion (*n* = 8), age/maturation (*n* = 8), stress (*n* = 12), doping susceptibility (*n* = 7), and affordability/availability (*n* = 8).

Content Validity

To enhance content validity, each psychologist and coach rated items on a 4-point content validity index (CVI; Waltz & Bausell, 1983). The criteria used can be found in Table 1. Each panel member rated each item according to the criteria and CVI was calculated by summing the amount of responses for each item of 3 or 4. This was divided by the total items to be expressed as a fractional proportion. All items that had a CVI over 0.75 were retained.

Table 1. Criteria for assessing content validity

1. Relevance
1 = not relevant
2 = item needs some revision
3 = clear but very minor revision
4 = very relevant
2. Clarity
1 = not clear
2 = item needs some revision
3 = clear but minor revision needed
4 = very clear
3. Simplicity
1 = not simple
2 = item needs some revision
3 = simple but minor revision needed
4 = very simple
4. Ambiguity
1 = doubtful
2 = item needs some revision
3 = no doubt but minor revision needed
4 = meaning is clear

Results

Mean CVI scores by item for relevance, clarity, simplicity, and ambiguity are presented

in Table 2 with item CVI and subscale CVI. In total, seven items presented a CVI below .75. The removal of one items from the attitudes subscale lead to a subscale CVI of .90. Four items were removed from the threat subscale, which improved subscale CVI from .77 to .93. One item was removed from the cheating subscale to yield a CVI of .90. Finally, one item was removed from the age and maturation subscale, providing a CVI of .86. All other subscale CVI values were greater than this.

Table 2. Mean CVI by item

Item	R	C	S	A	CVI	*Item*	R	C	S	A	CVI
Subscale: Attitudes = .88						*Subscale: Legitimacy = .89*					
1	1.00	.80	.80	.80	.85	1	1.00	.80	.80	.80	.85
2	1.00	1.00	1.00	1.00	1.00	2	1.00	1.00	1.00	.80	.95
3	1.00	.60	.80	.60	.75	3	1.00	1.00	.80	.80	.90
4	1.00	1.00	1.00	.80	.95	4	.80	1.00	1.00	1.00	.95
5	.60	.80	.60	.40	.60	5	.80	.80	.80	.80	.80
6	1.00	1.00	1.00	.80	.95	6	.80	.80	.80	.80	.80
7	.80	.80	.80	.60	.75	7	.80	.80	.80	.80	.80
8	1.00	1.00	1.00	1.00	1.00	8	1.00	1.00	1.00	1.00	1.00
9	1.00	1.00	1.00	.80	.95	9	1.00	1.00	1.00	1.00	1.00
10	1.00	.80	.80	.80	.85	*Subscale: Reference Group = .92*					
11	1.00	1.00	1.00	1.00	1.00	1	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00	2	1.00	1.00	1.00	1.00	1.00
13	1.00	.80	.80	.60	.80	3	.80	1.00	1.00	1.00	.95
Subscale: Threat = .77						4	.80	.80	.80	.80	.80
1	.80	.20	.40	.20	.40	5	1.00	1.00	1.00	1.00	1.00
2	.80	.80	.80	.80	.80	6	1.00	1.00	1.00	1.00	1.00
3	.80	.40	.60	.60	.60	7	.80	.80	.80	.80	.80
4	1.00	1.00	1.00	.80	.95	8	.80	.80	.80	.80	.80
5	.80	.40	.40	.20	.45	*Subscale: Age/Maturation = .84*					
6	1.00	1.00	1.00	1.00	1.00	1	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	1.00	1.00	2	.80	1.00	1.00	1.00	.95
8	.80	.80	.80	.40	.70	3	.80	.80	.80	.80	.80
9	.80	.80	.80	.80	.80	4	.80	.80	.80	.80	.80
10	1.00	1.00	1.00	1.00	1.00	5	.60	.80	.80	.80	.75
Subscale: Benefit = .95						6	1.00	1.00	1.00	1.00	1.00
1	1.00	1.00	1.00	1.00	1.00	7	.80	.80	.80	.80	.80
2	1.00	1.00	1.00	1.00	1.00	8	.80	.60	.80	.60	.70
3	1.00	1.00	1.00	1.00	1.00	9	.60	1.00	.80	1.00	.85
4	1.00	1.00	1.00	.80	.95	10	.80	.80	.80	.60	.75
5	1.00	1.00	1.00	1.00	1.00	*Subscale: Stress = .91*					
6	.80	1.00	1.00	1.00	.95	1	1.00	1.00	1.00	.80	.95
7	.80	1.00	1.00	1.00	.95	2	.80	1.00	1.00	1.00	.95
8	.80	1.00	1.00	1.00	.95	3	1.00	1.00	1.00	1.00	1.00

9	.60	1.00	1.00	1.00	.90
10	.60	.80	.80	.80	.75
Subscale: Self-esteem = .89					
1	1.00	.60	.80	.80	.80
2	1.00	1.00	1.00	1.00	1.00
3	.80	1.00	1.00	1.00	.95
4	.80	.80	.80	.60	.75
5	.80	.80	.80	.60	.75
6	.60	.80	.80	.80	.75
7	1.00	1.00	1.00	1.00	1.00
8	.80	.80	.80	.80	.80
9	.80	.80	.80	.80	.80
10	1.00	1.00	1.00	1.00	1.00
11	1.00	1.00	1.00	1.00	1.00
12	1.00	1.00	1.00	1.00	1.00
Subscale: Cheating = .87					
1	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00
4	1.00	.80	.80	.80	.85
5	.80	.60	.60	.60	.65
6	.80	.80	.80	.60	.75
7	1.00	1.00	1.00	1.00	1.00
8	.80	.80	.80	.80	.80
9	.80	.80	.80	.80	.80
4	.80	.80	.80	.80	.80
5	.80	.80	.80	.60	.75
6	.80	1.00	1.00	1.00	.95
7	1.00	1.00	1.00	1.00	1.00
8	.80	.80	.80	.80	.80
9	1.00	1.00	1.00	1.00	1.00
10	1.00	.80	1.00	.80	.90
11	1.00	.80	1.00	.80	.90
12	1.00	.08	1.00	.80	.90
Subscale: Susceptibility = .97					
1	1.00	1.00	1.00	1.00	1.00
2	1.00	1.00	1.00	1.00	1.00
3	1.00	1.00	1.00	1.00	1.00
4	1.00	.80	.80	.80	.85
5	1.00	1.00	1.00	1.00	1.00
6	.80	1.00	1.00	1.00	.95
7	1.00	1.00	1.00	1.00	1.00
Subscale: Availability/Availability = .96					
1	1.00	1.00	1.00	.80	.95
2	1.00	1.00	1.00	1.00	1.00
3	1.00	.80	.80	.80	.85
4	1.00	1.00	1.00	1.00	1.00
5	1.00	1.00	1.00	.80	.95
6	1.00	1.00	1.00	1.00	1.00
7	1.00	1.00	1.00	.80	.95
8	.80	.80	1.00	1.00	.95

Note. R = Relevance, C = Clarity, S = Simplicity, A = Ambiguity

Study 2: Construction and Initial Validation

Method

Participants

Six-hundred athletes (male *n* = 362, female *n* = 238), aged between 12 and 18 years of age (M_{age} = 16.29, *SD* = 1.79) participated in Study 2. Our sample resided in the United Kingdom (*n* = 375), Australia (*n* = 121), Hong Kong (*n* = 83), or the United States (*n* = 21). Our sample consisted of North West European (*n* = 401), Oceania (*n* = 110), South East Asian (*n* = 35), North American (*n* = 25), Southern and Eastern European (*n* = 9), North East Asian (*n* = 5), Sub-Saharan African (*n* = 3), Southern and Central Asian (*n* = 2), West African (*n* = 5), Central American (*n* = 1), South American (*n* = 1), and unspecified (*n* = 3) athletes. Athletes in Study 1 competed at beginner (*n* = 37), amateur (*n* = 412), semi-professional (*n* = 35), professional (*n* = 7), county or state (*n* = 61), national (*n* = 34), or international (*n* = 9). Five athletes failed to report their playing level.

Questionnaire

Participants completed the 104-item ASDI, which included 11 factors: attitude, threat, benefit, esteem, cheating, legitimacy, reference group opinion, age/maturity, stress, susceptibility, and affordability and availability.

Data Analysis

CFA performed on initial model, which required the estimation of 367 parameters. Due to the length of the scale, and therefore the amount of free parameters relative to the number of observations, ESEM was not feasible (1203 parameters required). However, factors are anticipated to be relatively independent, which means an independent cluster model (ICM) is appropriate.

Analysis was conducted using an iterative process, examining model fit, standardized parameter estimates (loadings), and modification indices. At the examination of each model, fit indices were assessed broadly employing Hu and Bentler's (1999) recommendations of model fit. That is, that comparative fit index (CFI) and Tucker-Lewis index (TLI) of close to .95 were considered as demonstrating good incremental model fit (that is, compared to a null model), and the standardized root mean-square residual (SRMR) and root mean square error of approximation close to .08 and .05 respectively indicate good absolute model fit. These were used as guidelines rather than golden rules however, as researchers (e.g., Perry, Nicholls, Clough, & Crust, 2015) have demonstrated the fallibilities of strict adherence to such guidelines, particularly in lengthy or complex models. To determine adequate loadings, we used Comrey and Lee's (1992) recommendations of 0.32 (poor), 0.45 (fair), 0.55 (good), 0.63 (very good), and 0.70 (excellent).

Results

The data-analysis resulted in 19 different models, which are presented in this results section. These analyses resulted in the final 9-Factor, 43-item ASDI.

Model 1: 11-Factor and 104 Items ASDI

Table 3. Model 1: 11-Factor and 104 Items ASDI

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
13897.048	5197	.736	.728	.075	.053 (.052, .054)

Table 3.1. Model 1: 11-Factor and 104 Items ASDI Std Loadings

Scale	Items	≥ .32	≥ .45	≥ .55	≥ .63	≥ .70
Attitude	12	12	9	6	3	2
Threat	10	7	4	4	3	1
Benefit	10	10	9	9	9	8
Esteem	12	8	8	6	5	4
Cheating	8	8	8	8	8	8
Legitimacy	9	8	8	8	8	6
Reference Group	8	6	6	6	5	4
Age Maturity	8	4	4	3	2	2
Stress	12	12	9	7	7	5
Susceptibility	7	7	7	7	7	7
Afford Avail	8	5	5	5	3	2

Notes. Some high modification indices (MI) for some benefit, esteem, and stress items. Two from reference group very high (> .90), pointing towards potential redundancy. This is also true of susceptibility. Factors with all excellent loadings must be checked to ensure they have adequate variance. Factor correlations were typically low to moderate, which indicates some independence and therefore, provides support for the examination of the ICM.

Action: Remove all items loading < .32.

Model 2: 11-Factor, 87-item ASDI

Table 4: Model 2: 11-Factor, 87-item Loadings

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
9331.782	3599	.802	.794	.062	.052 (.050, .053)

Table 4.1: Model 2: 11-Factor, 87-items Std Loadings

Scale	Items	≥ .32	≥ .45	≥ .55	≥ .63	≥ .70
Attitude	12	12	9	5	3	2
Threat	7	6	4	4	3	1
Benefit	10	10	9	9	9	8
Esteem	8	8	8	6	5	4
Cheating	8	8	8	8	8	8
Legitimacy	8	8	8	8	8	6
Reference Group	6	6	6	6	5	4
Age Maturity	4	4	3	3	2	2
Stress	12	12	11	7	7	5
Susceptibility	7	7	7	7	7	7
Afford Avail	5	5	5	5	3	3

Notes. Some high modification indices for some benefit, esteem, and stress items. Same concerns regarding variance and redundancy as Model 1. Only one item failed to load ≥ .32. Age and maturity subscale only had three items load ≥ .45.

Action: Remove items loading < .45.

Model 3: 11-Factor, 71 Item ASDI

Table 5: Model 3: 11-Factor, 71 Item ASDI

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
4711.262	2359	.897	.891	.049	.041 (.039, .042)

Table 5.1: Model 3: 11-Factor, 71 Item ASDI Std Loadings

Scale	Items	≥ .32	≥ .45	≥ .55	≥ .63	≥ .70
Attitude	8	8	8	4	3	3
Threat	4	4	4	4	3	1
Benefit	7	7	7	7	7	6
Esteem	6	6	6	5	5	4
Cheating	8	8	8	8	8	8
Legitimacy	7	7	7	7	7	5
Reference Group	6	6	6	6	5	4
Age Maturity	3	3	3	3	2	2
Stress	10	10	8	7	6	3
Susceptibility	7	7	7	7	7	7
Afford Avail	5	5	5	5	3	3

Notes: Some high modification indices for some benefit, esteem, and stress items. Same concerns regarding variance and redundancy as model 1 and 2. All items loaded ≥ .32. Only 3 items loaded < .45 (all stress). Age and maturity small, and only has 2 items load ≥ .63. Four items remain on threat all refer to threat towards health consequences.

Action: Remove items with highest MI for all scales

Items removed: ATT10, BEN3, BEN4, ESTEEM8, ESTEEM12, LEGIT1, and STRESS12.

Model 4: 69-item ASDI

Table 6: Model 4: 69-item ASDI

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
4252.479	2222	.908	.903	.048	.039 (.037, .041)

Table 6.1: Model 4: 69-item ASDI Std Loadings

Scale	Items	≥ .32	≥ .45	≥ .55	≥ .63	≥ .70
Attitude	8	8	8	4	4	3
Threat	4	4	4	4	3	1
Benefit	7	7	7	7	7	6
Esteem	6	6	6	5	5	4
Cheating	8	8	8	8	8	8
Legitimacy	7	7	7	7	7	5
Reference Group	6	6	6	6	5	4
Age Maturity	3	3	3	3	2	2
Stress	8	8	8	7	7	3
Susceptibility	7	7	7	7	7	7
Afford Avail	5	5	5	5	3	3

Notes: Still likely to be some redundancy in larger factors. Correlation between susceptibility and cheating is .73, which is much higher than all others (one is .61, one is .56, all others < .43). As age and maturity scale is very short, internal consistency examined. Alpha = .81, MIC = .59. Although this is good, there are alternative, as arguably better ways to assess biological maturity (e.g., proportion of maximum predicted height). As such, this scale should be removed.

Action: Remove age and maturity scale

Model 5. 10 Factor, 66-item ASDI

Table 7: Model 5: 10 Factor, 66-item ASDI

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
4053.332	2034	.908	.903	.049	.041 (.039, .043)

Table 7.1: Model 5: 10 Factor, 66-item ASDI Std Loadings

Scale	Items	≥ .32	≥ .45	≥ .55	≥ .63	≥ .70
Attitude	8	8	8	4	3	3
Threat	4	4	4	4	3	1
Benefit	7	7	7	7	7	6
Esteem	6	6	6	5	5	4
Cheating	8	8	8	8	8	8
Legitimacy	7	7	7	7	7	5
Reference Group	6	6	6	6	5	4
Stress	8	8	8	8	8	5
Susceptibility	7	7	7	7	7	7
Afford Avail	5	5	5	5	3	3

Notes. Model fit largely unchanged (ever so slightly reduced) but loading of STRESS8 significantly improved.

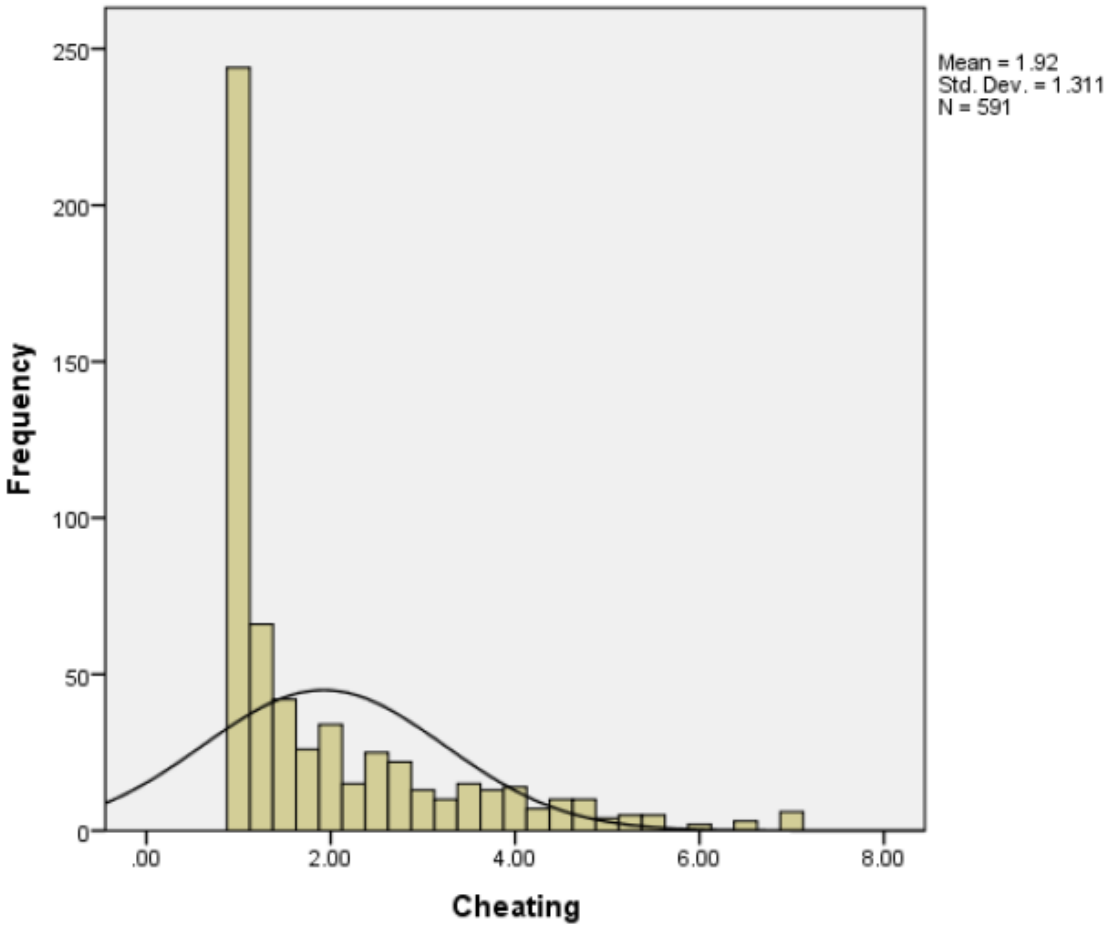
Action: Examine descriptive data of each scale

Table 7.2. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Attitude	572	1.00	6.75	2.3066	1.03863	1.079	1.061	.102	.954	.204
Threat	591	1.00	7.00	4.9074	1.16952	1.368	-.111	.101	-.034	.201
Benefit	595	1.00	7.00	3.5417	1.58924	2.526	.135	.100	-.694	.200
Esteem	580	1.00	7.00	5.3859	1.21510	1.476	-1.063	.101	1.390	.203
Cheating	591	1.00	7.00	1.9232	1.31101	1.719	1.656	.101	2.320	.201
Legitimacy	588	1.00	7.00	4.8834	1.26077	1.590	-.163	.101	-.201	.201
RefGroup	591	1.00	7.00	3.1610	1.70588	2.910	.360	.101	-.863	.201
Stress	574	1.00	7.00	3.4954	1.33609	1.785	.155	.102	-.351	.204
Suscept	592	1.00	7.00	2.0043	1.44326	2.083	1.420	.100	1.184	.201
AffordAvail	581	1.00	7.00	2.7129	1.31466	1.728	.691	.101	.313	.202

There was a very low mean for cheating, which also provided evidence of the departure from normality. To investigate further, a Histogram was plotted (Figure 2).

Figure 2. Cheating Distribution



All cheating items loaded heavily (>.70), so loadings were not used to alter the scale. Rather, the frequency distribution for each item was examined, and in particular the proportion of times that “1” was selected by participants (see Table 6.3).

Table 7.3: Frequency that each number was selected for cheating

Item	1	2	3	4	5	6	7	8
%	59.6	64.4	57.4	56.9	65.5	64.5	62.9	70.3

After removing the three highest proportions, Item 5, Item 6, and Item 8 descriptive statistics indicated lower skewness and kurtosis and an increased mean score above 2, which is closer to other sub-scales and permits discriminant validity better.

Table 7.4. Descriptive Statistics for Cheating

Model fit was examined without Items 5, 6, and 8 from the cheating sub-scale (see Table 6.4)

	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
CheatingNo568	595	1.00	7.00	2.0024	1.35917	1.847	1.488	.100	1.644	.200

Model 6: 10 Factor, 63-item ASDI

Table 8: Model 6: 10 Factor, 63-item ASDI

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
3703.991	1845	.909	.904	.049	.041 (.039, .043)

Table 8.1: Model 6: 10 Factor, 63-item ASDI Std Loadings

Scale	Items	≥ .32	≥ .45	≥ .55	≥ .63	≥ .70
Attitude	8	8	8	4	3	3
Threat	4	4	4	4	3	1
Benefit	7	7	7	7	7	6
Esteem	6	6	6	5	5	4
Cheating	5	5	5	5	5	5
Legitimacy	7	7	7	7	7	5
Reference Group	6	6	6	6	5	4
Stress	8	8	8	8	8	5
Susceptibility	7	7	7	7	7	7
Afford Avail	5	5	5	5	3	3

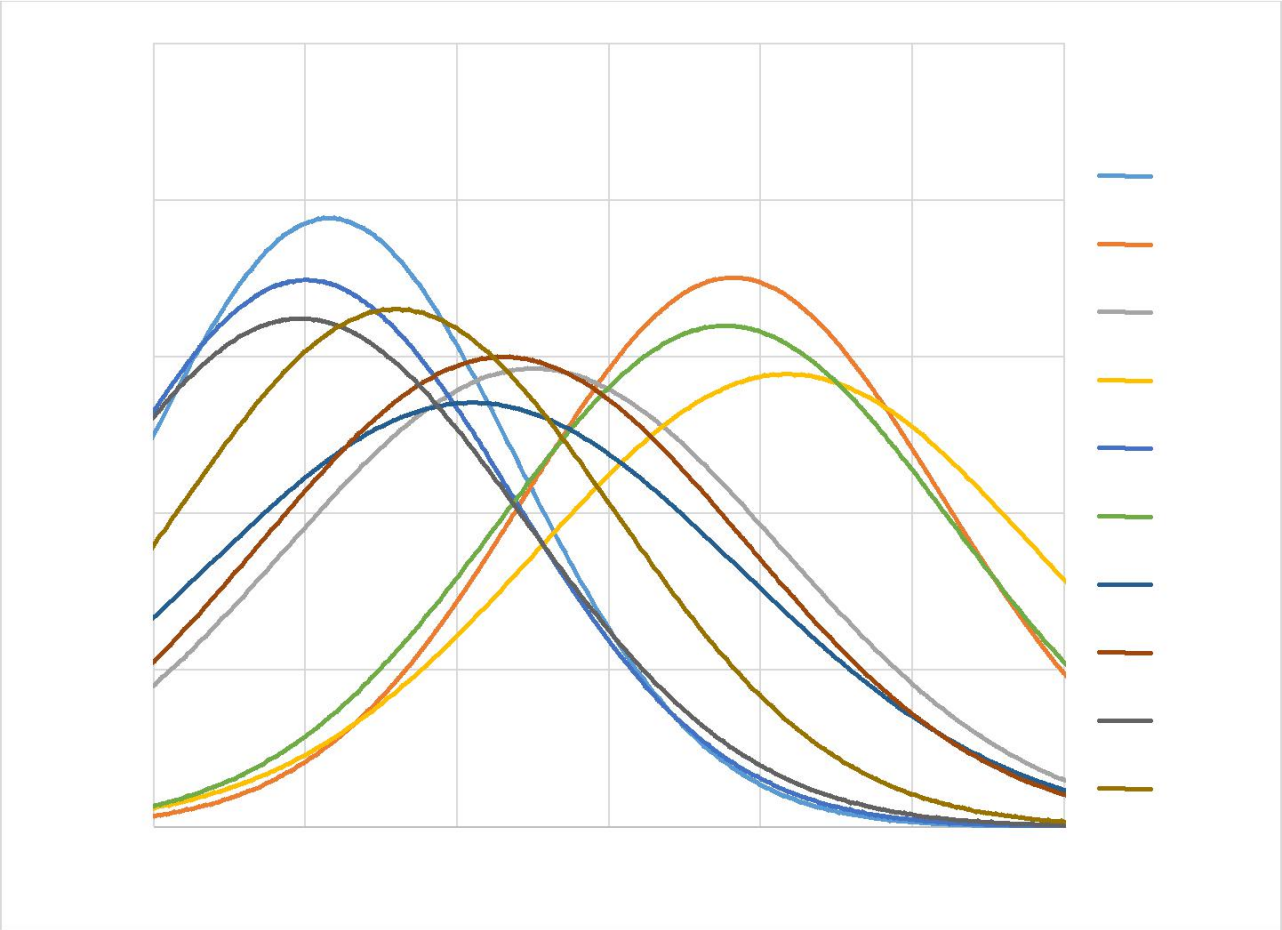
Notes and Actions: Model fit largely unchanged

Action: examine distribution of each scale

Rather than continuing to modify based on MI, consideration of ability to detect change is considered here, as shortening a scale can significantly reduce this (Perry et al., submitted).

Distribution: Distribution is an important element of creating a scale that is capable of detecting change. This is particularly important when one might aim to test participants twice in order to determine the effectiveness of an intervention, such as an educational program. The distributions of each scale are shown below (Figure 3):

Figure 3. Distributions of the ASDI



Notably, there is a positive skew evident for attitude, cheating, susceptibility, and availability/affordability in particular. This is the result of many participants indicating a very low score on these subscales. In a practical sense, fairly shallow curves mean that the effect size must be greater in order to detect statistically significant change. To shorten the scale, rather than simply removing items with the largest modification indices to reduce the chi-square and therefore achieve better fit indices, items will be selected based on the impact on the scale distribution. The susceptibility scale had a particularly flat curve. To examine this in more detail, the frequency of each item was explored. As the longest tail of the distribution curve was at the low end, the

proportion of responses of “1” was noted (see Table 7.2):

Table 8.2. Proportion of Responses.

Item	1	2	3	4	5	6	7
%	65.8	63.9	62.4	61.7	64.6	58.4	61.7

This represents a trade-off between model fit and practical use. SUSCEPT6 has the lowest proportion of respondents recording a score of “1”. However, it also had the greatest impact on raising chi-square, as aggregate WITH modification indices for the score were 163.368. Comparatively, SUSCEPT1, which had the largest amount of respondents marking a “1”, had a total MI of 72.447. Consequently, removing SUSCEPT6 item would have the more positive effect on model fit but serve to flatten the curve further and reduce the ability to detect change. Given the purpose of the ASDI and the already acceptable fit indices, a decision was made to remove the two items with the greatest proportion of respondents marking “1”.

Action: Remove SUSCEPT1 and SUSCEPT5

Model 7: 10-factor, 61-item

Table 9. Model 7: 10-factor, 61-item loadings

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
3366.375	1724	.914	.909	.049	.040 (.038, .042)

Table 9.1. Model 7, 10-factor, 61-items Std Loadings

Scale	Items	≥ .32	≥ .45	≥ .55	≥ .63	≥ .70
Attitude	8	8	8	4	3	3
Threat	4	4	4	4	3	1
Benefit	7	7	7	7	7	6
Esteem	6	6	6	5	5	4
Cheating	5	5	5	5	5	5
Legitimacy	7	7	7	7	7	5
Reference Group	6	6	6	6	5	4
Stress	8	8	8	8	8	5
Susceptibility	5	5	5	5	5	5
Afford Avail	5	5	5	5	3	3

Notes: There was a marginal improvement in fit. The next stage was to explore the stress scale. The stress scale contained eight items in model 8 and therefore could be reduced. A combination of distribution and MI were assessed. Regarding distribution, were a negative kurtosis statistic indicates a flatter curve, the items recorded the following (see Table 8.2):

Table 9.2 Item Kurtosis for the Stress Items

Item	2	3	4	5	6	7	8	9
Kurtosis	-.799	-.237	-.887	-.619	-.852	-1.010	-1.104	-.893

Table 9.3 Aggregate with MI (>10) by item were

Item	2	3	4	5	6	7	8	9
Agg MI	11.671	30.401	58.539	152.034	13.232	175.349	165.338	22.023

Both STRESS7 and STRESS8 presented the most platykurtic and highest MI (although partially due to their relationship with each other). Consequently, both of these were removed. To reduce the scale to five items, STRESS5 was also removed, as it demonstrated relatively high MI.

Action: Remove STRESS5, STRESS7, and STRESS8

Model 8: 10 Factor, 58-Item ASDI

Table 10. Model 8, 10 Factor, 58-items Loadings

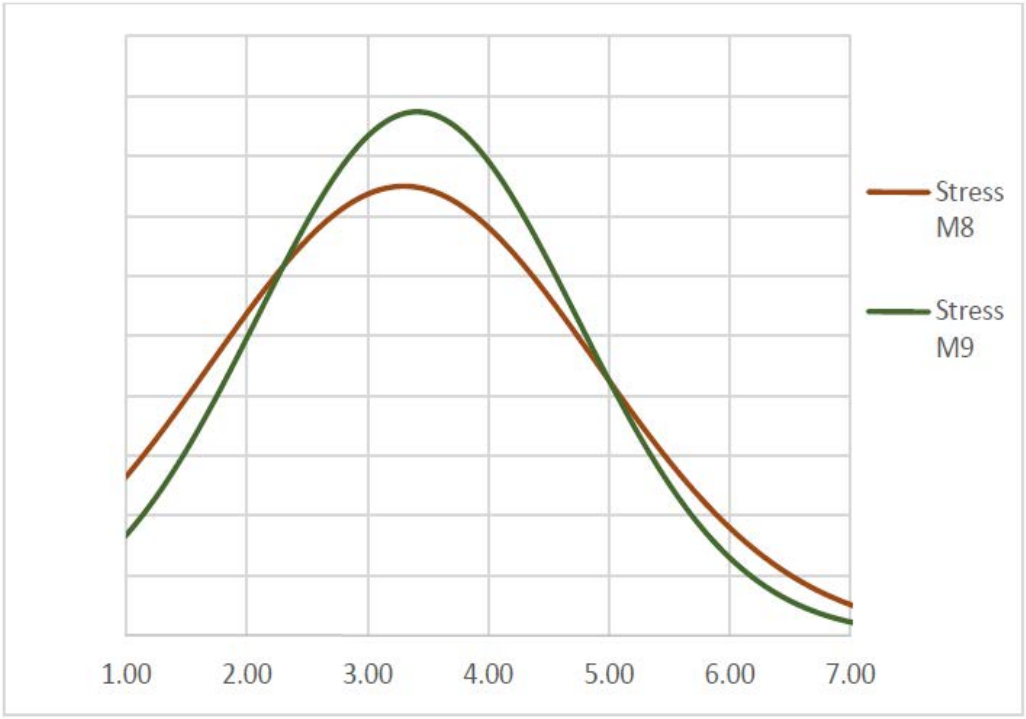
χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
2910.902	1550	.923	.918	.048	.038 (.036, .040)

Table 10.1 Model 8, 10 Factor, 58-items Std Loadings

Scale	Items	≥ .32	≥ .45	≥ .55	≥ .63	≥ .70
Attitude	8	8	8	4	3	3
Threat	4	4	4	4	3	1
Benefit	7	7	7	7	7	6
Esteem	6	6	6	5	5	4
Cheating	5	5	5	5	5	5
Legitimacy	7	7	7	7	7	5
Reference Group	6	6	6	6	5	4
Stress	5	5	5	5	5	3
Susceptibility	5	5	5	5	5	5
Afford Avail	5	5	5	5	3	3

Notes: Improved model fit. The changes also significantly impacted the distribution curve to create a greater point, improving the scale's ability to detect change. This is highlighted in Figure 4:

Figure 4: Model 9, 10 Factor, 58-items



The next scale to be addressed was the attitude scale. The attitude scale contained eight items in Model 9 and therefore could be reduced. It is worth noting that only 4 of the 8 items recorded a standardized loading of > .55. The loadings form model 9 were as follows (Table 9.2):

Table 10.2. Attitude Scale Loadings

Item	Loading
ATT2	.605
ATT4	.478
ATT5	.729
ATT6	.521
ATT7	.482
ATT9	.491
ATT11	.739
ATT12	.771

The loadings pointed to some weaker loadings. However, the descriptive statistics note that the better loading items actually presented some departure from normality (Table 9.3):

Table 10.3. Descriptive Statistics for the Attitude Scale

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
ATT2	591	6.00	1.00	7.00	1.5719	.0509	1.23830	1.533	2.419	.101	5.447	.201
ATT4	595	6.00	1.00	7.00	2.6185	.0668	1.63113	2.661	.769	.100	-.230	.200
ATT5	592	6.00	1.00	7.00	2.0017	.0658	1.60108	2.563	1.583	.100	1.608	.201
ATT6	596	6.00	1.00	7.00	3.1309	.0670	1.63666	2.679	.207	.100	-.881	.200
ATT7	598	6.00	1.00	7.00	2.2993	.0788	1.92724	3.714	1.374	.100	.622	.200
ATT9	596	6.00	1.00	7.00	3.1242	.0644	1.57331	2.475	.376	.100	-.494	.200
ATT11	599	6.00	1.00	7.00	1.8331	.0584	1.43027	2.046	1.789	.100	2.419	.199
ATT12	599	6.00	1.00	7.00	2.0150	.0636	1.55870	2.430	1.610	.100	1.874	.199

As removing the items with departure from normality would leave a poorly-loaded scale, it was decided to remove the scale.

Action: Remove Attitude scale

Model 9: 9-factor, 50-item

Table 11. Model 9, 9-Factor, 50-item loadings

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
2175.449	1139	.934	.929	.045	.039 (.036, .041)

Table 11.1. Model 9, 9-Factor, 50-item Std loadings

Scale	Items	≥ .32	≥ .45	≥ .55	≥ .63	≥ .70
Threat	4	4	4	4	3	1
Benefit	7	7	7	7	7	6
Esteem	6	6	6	5	5	4
Cheating	5	5	5	5	5	5
Legitimacy	7	7	7	7	7	5
Reference Group	6	6	6	6	5	4
Stress	5	5	5	5	5	3
Susceptibility	5	5	5	5	5	5
Afford Avail	5	5	5	5	3	3

Next, we reviewed the Benefit scale. The extremely high loadings observed throughout indicated some potential redundancy and even a possible linear dependency. The loadings from model 10 were as follows (Table 10.2):

Table 11.2. Benefit Item Loads

Item	Loading
BEN1	.630
BEN5	.711
BEN6	.863
BEN7	.823
BEN8	.908
BEN9	.876
BEN10	.838

Although all loadings are good, there is a pattern to suggest that two are weaker than the others. Examination of the MI suggested that, although no very large changes (typically < 30), the highest was observed for BEN1 WITH BEN5 (62.232). Consequently, these two items were removed.

Action: Remove BEN1 and BEN5

Model 10: 9-factor, 48-item ASDI

Table 12. Model 10: 9-factor, 48-item Loadings

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
1919.848	1044	.941	.937	.043	.037 (.035, .040)

Table 12.1 Model 10: 9-factor, 48-item Std Loadings

Scale	Items	≥ .32	≥ .45	≥ .55	≥ .63	≥ .70
Threat	4	4	4	4	3	1
Benefit	5	5	5	5	5	5
Esteem	6	6	6	5	5	4
Cheating	5	5	5	5	5	5
Legitimacy	7	7	7	7	7	5
Reference Group	6	6	6	6	5	4
Stress	5	5	5	5	5	3
Susceptibility	5	5	5	5	5	5
Afford Avail	5	5	5	5	3	3

We then considered the Esteem scale with a view of removing one item. The loadings from model 11 were as follows (Table 11.2):

Table 12.2. Esteem factor loadings

Item	Loading
ESTEEM1	.878
ESTEEM2	.813
ESTEEM3	.866
ESTEEM4	.523
ESTEEM7	.809
ESTEEM11	.632

Although the only notable MI was between ESTEEM1 WITH ESTEEM2 (62.232), this is not particularly large relative to the chi-square statistic. Rather, the lower loading exhibited by ESTEEM4 will more likely be repeated in an independent sample. Consequently, this item was removed.

Action: Remove ESTEEM4

Model 11: 9-factor, 47-item ASDI

Table 13. Model 11, 9-Factor, 47-Item Loadings

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
1841.855	998	.943	.938	.043	.038 (.035, .040)

Table 13.1. Model 11, 9-Factor, 47-Item Std Loadings

Scale	Items	≥ .32	≥ .45	≥ .55	≥ .63	≥ .70
Threat	4	4	4	4	3	1
Benefit	5	5	5	5	5	5
Esteem	5	5	5	5	4	4
Cheating	5	5	5	5	5	5
Legitimacy	7	7	7	7	7	5
Reference Group	6	6	6	6	5	4
Stress	5	5	5	5	5	3
Susceptibility	5	5	5	5	5	5
Afford Avail	5	5	5	5	3	3

We then considered the legitimacy scale. The loadings from model 11 are presented in Table 12.2.

Table 13.2. Legitimacy Item Loadings

Item	Loading
LEGIT2	.772
LEGIT3	.684
LEGIT4	.693
LEGIT5	.816
LEGIT6	.861
LEGIT7	.888
LEGIT8	.817

All loadings were very good to excellent. The previous distribution graph identified a trend towards quite a high mean score for the scale. To examine this more closely, we explored the descriptive statistics (see Table 12.3).

Table 13.3. Descriptive Statistics for the Legitimacy Items

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
LEGIT2	594	6.00	1.00	7.00	4.7593	.06270	1.52803	2.335	-.096	.100	-.467	.200
LEGIT3	596	6.00	1.00	7.00	5.3909	.06530	1.59406	2.541	-.713	.100	-.304	.200
LEGIT4	595	6.00	1.00	7.00	4.5025	.06433	1.56925	2.463	-.153	.100	-.386	.200
LEGIT5	594	6.00	1.00	7.00	4.8148	.06051	1.47471	2.175	-.014	.100	-.554	.200
LEGIT6	592	6.00	1.00	7.00	4.8716	.06371	1.55020	2.403	-.288	.100	-.456	.201
LEGIT7	595	6.00	1.00	7.00	4.8336	.05944	1.44979	2.102	-.174	.100	-.351	.200
LEGIT8	595	6.00	1.00	7.00	4.9950	.06345	1.54777	2.396	-.443	.100	-.413	.200

Notes. LEGIT3 had a substantively higher mean score than the others and as such, was removed. To reduce the scale to five items, LEGIT4 was also removed as the lowest remaining loading item.

Action: Remove LEGIT3 and LEGIT4

Model 12: 9-factor, 45-item ASDI

Table 14. 9 Factor, 45-item Loadings

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
1672.906	909	.946	.941	.043	.037 (.035, .040)

Table 14.1. 9 Factor, 45-item Std Loadings

Scale	Items	≥ .32	≥ .45	≥ .55	≥ .63	≥ .70
Threat	4	4	4	4	3	1
Benefit	5	5	5	5	5	5
Esteem	5	5	5	5	5	4
Cheating	5	5	5	5	5	5
Legitimacy	5	5	5	5	5	5
Reference Group	6	6	6	6	5	4
Stress	5	5	5	5	5	3
Susceptibility	5	5	5	5	5	5
Afford Avail	5	5	5	5	3	3

The only remaining scale with more than five items was the Reference Group scale. Loadings for this scale in model 12, like all before, were good to excellent (see Table 14.2)

Table 14.2. Reference Group Scale Loadings

Item	Loading
REFGR1	.585
REFGR2	.690
REFGR4	.825
REFGR5	.925
REFGR6	.947
REFGR8	.727

Inspection of the MI found that the lowest loading item, REFGR1 presented five times, aggregating 155.63. Only two other MI statements included other items from the scale and these were relatively minor. Consequently, REFGR1 was removed.

Action: Remove REFGR1

Model 13: 9-factor, 44-item ASDI

Table 15. Model 13, 9-Factor, 44-item loadings

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
1498.959	866	.954	.950	.042	.035 (.032, .038)

Table 15.1. Model 13, 9-Factor, 44-item Std loadings

Scale	Items	≥ .32	≥ .45	≥ .55	≥ .63	≥ .70
Threat	4	4	4	4	3	1
Benefit	5	5	5	5	5	5
Esteem	5	5	5	5	5	4
Cheating	5	5	5	5	5	5
Legitimacy	5	5	5	5	5	5
Reference Group	5	5	5	5	5	4
Stress	5	5	5	5	5	3
Susceptibility	5	5	5	5	5	5
Afford Avail	5	5	5	5	3	3

Notes. Excellent model fit achieved considering complexity of the model, which is severely punished in independent cluster models as this. For completeness, we conducted ESEM with geomin rotation on Model 14. This would also enable inspection of cross-loadings for the first time (Table 14.2).

Table 15.2 Exploratory structural equation modeling

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
1006.680	586	.969	.950	.017	.035 (.031, .038)

Table 15.3 Std Loadings

Item	Threat	Benefit	Esteem	Cheating	Legitimacy	Ref Group	Stress	Suscept	Afford Avail
THREAT2	**0.59**	-0.06	0.01	-0.04	0.01	-0.03	0.03	0.00	-0.15
THREAT4	**0.64**	-0.04	0.02	0.05	-0.09	-0.01	-0.06	-0.05	-0.06
THREAT9	**0.65**	0.06	0.05	0.00	0.04	0.03	0.05	0.01	0.07
THREAT10	**0.83**	0.01	-0.03	-0.04	0.05	-0.01	-0.02	0.01	0.03
BEN6	-0.03	**0.83**	0.03	0.07	0.02	0.01	0.02	-0.02	-0.01
BEN7	-0.04	**0.80**	0.00	0.01	0.02	0.05	0.03	0.01	0.00
BEN8	0.02	**0.92**	0.01	-0.04	-0.01	0.00	0.01	0.04	0.00
BEN9	-0.03	**0.90**	-0.03	-0.04	-0.04	-0.02	-0.02	0.01	0.00
BEN10	0.06	**0.84**	-0.01	0.06	0.00	-0.01	-0.03	-0.01	0.01
ESTEEM1	-0.02	0.02	**0.90**	0.01	0.03	-0.02	0.05	-0.01	0.01
ESTEEM2	-0.03	-0.04	**0.84**	-0.01	-0.04	0.00	-0.01	0.03	0.03
ESTEEM3	0.02	0.00	**0.85**	0.01	0.00	0.02	-0.02	-0.04	-0.02
ESTEEM7	0.04	0.03	**0.76**	-0.03	0.00	-0.01	-0.11	-0.01	-0.02
ESTEEM11	0.07	-0.02	**0.61**	0.00	0.04	-0.01	0.01	0.04	0.01
CHEAT1	-0.01	0.00	0.02	**0.89**	-0.01	0.00	-0.02	0.00	0.01
CHEAT2	0.02	0.02	-0.03	**0.81**	-0.11	0.02	-0.01	0.01	0.01
CHEAT3	-0.02	-0.04	0.00	**0.81**	0.04	0.02	0.03	0.13	-0.04
CHEAT4	-0.01	0.08	0.01	**0.75**	0.02	-0.01	0.01	0.05	0.02
CHEAT7	-0.06	0.00	-0.03	**0.68**	-0.02	-0.01	-0.02	0.03	0.05
LEGIT2	0.00	-0.04	0.01	0.01	**0.73**	0.03	0.00	-0.06	-0.03
LEGIT5	0.08	-0.05	-0.05	-0.07	**0.77**	0.02	-0.07	0.06	0.00
LEGIT6	0.02	0.06	-0.03	-0.02	**0.88**	0.00	0.02	0.00	0.01
LEGIT7	-0.01	0.02	0.03	0.05	**0.91**	-0.02	0.02	-0.03	0.02
LEGIT8	-0.04	0.00	0.07	0.00	**0.81**	-0.01	-0.01	-0.01	-0.03
REFGR2	0.01	0.02	0.01	0.06	0.01	**0.67**	-0.02	-0.01	-0.03
REFGR4	-0.01	-0.03	0.03	-0.11	0.01	**0.84**	-0.01	0.07	-0.01
REFGR5	-0.02	0.01	-0.03	-0.02	0.00	**0.94**	-0.02	-0.04	0.05
REFGR6	0.01	0.01	-0.02	0.04	-0.01	**0.93**	0.02	0.00	0.02
REFGR8	0.00	0.00	0.00	0.02	0.00	**0.70**	0.06	0.03	-0.05
STRESS2	0.01	-0.01	0.05	-0.04	0.00	0.01	**0.73**	0.06	-0.07
STRESS3	0.08	0.02	-0.10	0.19	-0.01	0.00	**0.67**	-0.15	0.02
STRESS4	-0.01	0.04	-0.02	-0.02	-0.05	0.00	**0.80**	0.00	-0.01
STRESS6	-0.08	-0.02	-0.03	-0.03	0.01	-0.02	**0.75**	0.08	0.03
STRESS9	-0.01	-0.03	0.08	0.03	0.02	0.04	**0.65**	-0.04	0.02
SUSCEPT2	-0.02	0.00	-0.01	-0.02	-0.02	-0.03	0.02	**0.92**	0.00
SUSCEPT3	0.00	0.01	-0.02	0.05	0.04	-0.01	-0.01	**0.90**	-0.02
SUSCEPT4	-0.02	0.03	0.02	0.09	0.00	0.02	0.01	**0.81**	0.06
SUSCEPT6	0.00	0.06	0.02	0.02	-0.06	0.05	-0.01	**0.72**	0.07
SUSCEPT7	0.02	-0.03	-0.01	0.01	-0.01	0.03	0.00	**0.92**	-0.02
AFFAV1	0.01	0.01	0.17	0.03	-0.03	0.01	0.02	0.00	**0.56**
AFFAV2	-0.02	-0.04	0.01	0.07	0.00	0.05	0.04	0.04	**0.68**
AFFAV3	-0.04	0.00	0.03	-0.01	0.03	-0.03	-0.01	-0.06	**0.76**

AFFAV4	0.03	0.03	-0.02	-0.08	0.00	-0.02	-0.05	0.02	**0.81**
AFFAV8	0.01	-0.01	-0.11	0.07	-0.03	0.01	0.02	0.05	**0.53**

Note. Intended factor loadings are in bold.

Notes. Typically, ESEM loadings are lower, as the variance is more widely spread over a greater number of estimated parameters. Here, all standardized loadings remained good (> .55). More importantly, there were no substantive cross-loadings apparent on any scale. This supports the independence of each scale within the ASDI. Indeed, the only strong relationship among factors is between cheating and susceptibility, although these are still distinct from one another. This is noted further in the observed factor correlations from CFA and ESEM (Table 14.4).

Table 15.4. Factor Correlations from CFA and ESEM

	Threat	Benefit	Esteem	Cheating	Legitimacy	Ref Group	Stress	Suscept	Afford Avail
Threat	-	-.14	.19	-.28	.33	-.16	-.11	-.25	-.14
Benefit	-.16	-	.02	.31	-.07	.09	.09	.27	.21
Esteem	.21	.02	-	-.16	.20	-.09	-.19	-.11	.01
Cheating	-.34	.34	-.17	-	-.23	.30	.14	.66	.31
Legitimacy	.37	-.07	.22	-.26	-	.01	-.09	-.21	-.18
Ref Group	-.19	.11	-.11	.33	-.01	-	.19	.36	.11
Stress	-.15	.11	-.23	.18	-.12	.22	-	.14	.09
Suscept	-.30	.30	-.14	.72	-.23	.38	.18	-	.33
Afford Avail	-.18	.21	.02	.34	-.19	.14	.10	.36	-

Note. CFA factor correlations below the diagonal, ESEM factor correlations above

Internal consistency

The final aspect of the initial construction and validation was to assess scale reliability by measuring the internal consistency. Although many measures of this are used, the most common is Cronbach's alpha (1951), which is sensitive to sample size. To also identify the internal consistency of a scale without such sensitivity, we also calculated the mean inter-item correlation (MIC). Typically, alpha values > .70 are considered acceptable. There is no consensus regarding MIC, but for a 5-item scale, a MIC of around .40 would produce a very strong alpha value. The results supported the internal consistency of all scales are presented in Table 14.5.

Table 15.5. Internal Consistency of all Scales

	Alpha	MIC
Threat	.78	.47
Benefit	.94	.74
Esteem	.90	.64
Cheating	.92	.70
Legitimacy	.92	.69
Ref Group	.91	.68
Stress	.85	.53
Susceptibility	.95	.79
Afford Avail	.81	.46

Review

The proposed 9-factor, 44-item of the ASDI was reviewed by the research team for conceptual clarity. It was noted that the Availability and Affordability scale was inconsistent with the others, as it was a practical consideration whereas the others were psychological constructs. The decision was made to remove this scale from the model.

Action: Remove Availability and Affordability scale

Model 14: 8-factor, 39-item ASDI

We conducted CFA and ESEM on what was likely to be the final model of the ASDI. The estimation of fewer parameters presented a marginally improved model fit (see Table 15).

Table 16. Model 14, 8-Factor, 39-item CFA and ESEM

	χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
CFA	1161.947	647	.961	.957	.038	.035 (.031, .038)
ESEM	791.901	457	.973	.957	.016	.035 (.031, .039)

Table 16.1. Standardized Parameter Estimates

Item	Threat		Benefit		Esteem		Cheating		Legitimacy		Ref Group		Stress		Suscept	
	CFA	ESEM	CFA	ESEM	CFA	ESEM	CFA	ESEM	CFA	ESEM	CFA	ESEM	CFA	ESEM	CFA	ESEM
T2	.65	**.60**		-.07		.00		-.06		.02		-.03		.02		-.03
T4	.63	**.64**		-.05		.02		.04		-.09		-.01		-.06		-.05
T9	.63	**.65**		.07		.06		.01		.03		.03		.05		.03
T10	.84	**.82**		.01		-.02		-.04		.04		-.01		-.01		.02
B6		-.03	.85	**.83**		.03		.07		.02		.01		.02		-.02
B7		-.04	.81	**.80**		.00		.01		.03		.05		.03		.01
B8		.02	.92	**.92**		.01		-.04		-.01		.00		.01		.04
B9		-.02	.89	**.90**		-.03		-.05		-.04		-.02		-.02		.01
B10		.06	.85	**.84**		-.01		.06		-.01		-.01		-.03		-.01
E1		-.02		.02	.88	**.90**		.01		.03		-.02		.05		-.01
E2		-.04		-.04	.82	**.85**		-.01		-.04		.00		-.01		.03
E3		.02		.00	.87	**.85**		.01		.00		.02		-.02		-.04
E7		.04		.03	.81	**.76**		-.03		.00		-.01		-.11		-.02
E11		.07		-.02	.63	**.61**		.00		.04		-.01		.01		.04
C1		-.01		.00		.02	.89	**.90**		-.01		.00		-.02		-.01
C2		.02		.01		-.03	.85	**.82**		-.11		.02		.00		.01
C3		-.01		-.05		.00	.88	**.81**		.05		.03		.03		.12
C4		-.01		.08		.02	.82	**.76**		.02		-.01		.01		.05
C7		-.06		.00		-.02	.73	**.69**		-.03		-.01		-.02		.04
L2		.00		-.04		.01		.01	.76	**.74**		.03		-.01		-.07
L5		.07		-.05		-.05		-.07	.80	**.78**		.02		-.07		.06
L6		.02		.06		-.03		-.01	.87	**.88**		.00		.02		.01
L7		-.01		.03		.03		.05	.90	**.90**		-.02		.02		-.03
L8		-.04		.00		.06		.00	.82	**.81**		-.01		-.01		-.02
R2		.01		.02		.01		.06		.01	.67	**.67**		-.02		-.02
R4		-.01		-.03		.03		-.11		.01	.82	**.84**		-.01		.06
R5		-.02		.01		-.02		-.02		-.01	.93	**.94**		-.02		-.03
R6		.01		.02		-.02		.05		-.01	.95	**.93**		.02		.00
R8		.00		-.01		.00		.02		.00	.72	**.70**		.06		.02
S2		.01		-.02		.05		-.04		.01		.01	.71	**.73**		.05
S3		.08		.02		-.10		.20		-.01		.00	.68	**.67**		-.14
S4		-.01		.04		-.02		-.02		-.05		.01	.81	**.80**		.01
S6		-.08		-.02		-.03		-.02		.01		-.02	.78	**.76**		.09
S9		-.01		-.03		.08		.03		.02		.05	.64	**.65**		-.03
SU2		-.02		.00		-.01		-.02		-.02		-.03		.02	.91	**.92**
SU3		.00		.01		-.03		.04		.04		-.01		-.01	.91	**.90**
SU4		-.02		.04		.02		.09		.00		.02		.01	.91	**.82**

Table 16.2. Factor Correlations

	Threat	Benefit	Esteem	Cheating	Legitimacy	Ref Group	Stress	Susceptibility
Threat	-	-.15	.19	-.29	.34	-.16	-.11	-.26
Benefit	-.16	-	.02	.32	-.07	.09	.09	.28
Esteem	.21	.01	-	-.16	.20	-.09	-.19	-.11
Cheating	-.34	.34	-.17	-	-.23	.30	.14	-.66
Legitimacy	.37	-.07	.21	-.26	-	.01	-.09	-.21
Ref Group	-.18	.11	-.11	.33	-.01	-	.19	.36
Stress	-.15	.11	-.23	.18	-.12	.22	-	.14
Susceptibility	-.30	.30	-.14	.72	-.23	.38	.18	-

Note. CFA below, ESEM above diagonal

Further Review

Model 15 was presented to the research group for review. It was felt that the exclusion of the Attitude was a weakness of the scale. Consequently, this was added to Model 15 and then re-analyzed.

Action: Re-introduce Attitude scale

Model 15: 9-factor, 51-item ASDI

Table 17. 9-Factor, 51-item CFA

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
2276.615	1188	.929	.924	.046	.039 (.037, .041)

We were particularly interested in the Attitude scale. As such, the standardized loadings were examined (See Table 16.1).

Table 17.1. Attitude Standardized Loadings

Item	Loading
ATT1	.339
ATT2	.600
ATT3	.348
ATT4	.499
ATT5	.698
ATT6	.554
ATT7	.487
ATT8	.409
ATT9	.568
ATT10	.524
ATT11	.722
ATT12	.731

Notes. Three items (ATT1, ATT3, and ATT8) presented a loading below .45. These were removed.

Action: Remove ATT1, ATT3, and ATT8

Model 16: 9-factor, 48-item ASDI

Table 18. Model 16, 9-Factor, 48-Item CFA

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
1937.232	1044	.939	.935	.043	.038 (.035, .040)

Table 18.1 Model 16, 9-Factor, 48-Item Std Loadings

Item	Loading
ATT2	.597
ATT4	.477
ATT5	.719
ATT6	.533
ATT7	.489
ATT9	.533
ATT10	.498
ATT11	.731
ATT12	.759

Notes. Examination of the MI identified two relatively largest potential reductions to chi-square: ATT10 WITH ATT9: 104.199. ATT12 WITH ATT5: 92.085. ATT5 and ATT12 previously presented an excellent loading. ATT9 was also included in several smaller MIs and was therefore removed.

Action: Remove ATT9

Model 17: 9-factor, 47-item ASDI

Table 19. Model 17, 9-Factor, 47-item CFA

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
1753.109	998	.948	.943	.042	.036 (.033, .038)

Table 19.1. Model 18, 9-Factor, 47-item Std Loadings

Item	Loading
ATT2	.609
ATT4	.465
ATT5	.737
ATT6	.511
ATT7	.487
ATT10	.452
ATT11	.738
ATT12	.775

Notes. The MI was relatively lower for ATT5 WITH ATT12, thus both were retained on the basis of their loading strength. Three items remained with a loading < .50. These were removed to create a five-item scale.

Action: Remove ATT4, ATT7, and ATT10

Model 18: 9-factor, 44-item ASDI

Table 20. Model 18, 9-Factor, 44-item CFA

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
1521.880	866	.952	.948	.041	.036 (.033, .038)

Table 20.1. Model 18, 9-Factor, 44-item Std Loadings

Item	Loading
ATT2	.591
ATT5	.762
ATT6	.480
ATT11	.725
ATT12	.804

Note. ATT6 loading now fell below .50 and was therefore also removed.

Action: Remove ATT6

Model 19: 9-Factor, 43-Item ASDI

Table 21. 9-Factor, 43-Item CFA

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
1440.403	824	.954	.950	.039	.035 (.032, .038)

Table 21.1. Attitude Std Loadings

Item	Loading
ATT2	.590
ATT5	.766
ATT11	.722
ATT12	.813

Note. This scale now appeared to be factorially valid. To examine cross-loadings, ESEM was conducted on Model 20 (Table 20.2).

Table 21.2. Model 20 ESEM

χ^2	*df*	CFI	TLI	SRMR	RMSEA (90% CI)
964.406	552	.969	.950	.017	.035 (.032, .039)

Table 21.3. Item Cross Loadings

Item	Attitude		Threat		Benefit		Esteem		Cheating		Legitimacy		Ref Group		Stress		Suscept	
	CFA	ESEM	CFA	ESEM	CFA	ESEM	CFA	ESEM	CFA	ESEM	CFA	ESEM	CFA	ESEM	CFA	ESEM	CFA	ESEM
A2	.59	**.42**		.00		.04		-.03		.11		-.02		.06		.03		.06
A5	.77	**.74**		.00		-.02		.05		.15		.03		-.07		.04		-.02
A11	.72	**.57**		-.02		.11		-.05		.01		-.09		.07		-.05		.06
A12	.81	**.89**		-.01		-.02		-.01		-.05		-.01		.00		-.01		.01
T2		-.07	.65	**.60**		-.06		-.01		-.04		.01		-.02		.02		-.02
T4		.01	.63	**.64**		-.05		.02		.04		-.09		.00		-.06		-.06
T9		.02	.63	**.65**		.07		.06		.00		.04		.02		.05		.02
T10		-.01	.84	**.82**		.02		-.02		-.03		.04		-.01		-.01		.02
B6		.02		-.03	.85	**.83**		.03		.06		.03		.00		.02		-.02
B7		-.01		-.04	.81	**.80**		.00		.01		.02		.05		.03		.01
B8		.02		.02	.92	**.92**		.02		-.04		.00		-.01		.01		.04
B9		.01		-.02	.89	**.90**		-.03		-.05		-.03		-.02		-.02		.00
B10		-.03		.06	.85	**.85**		-.01		.07		-.01		-.01		-.03		-.01
E1		.02		-.02		.02	.88	**.90**		.00		.03		-.02		.05		-.01
E2		-.03		-.04		-.03	.82	**.84**		.00		-.05		.00		-.01		.04
E3		-.04		.02		.00	.87	**.85**		.02		-.01		.02		-.03		-.03
E7		-.00		.04		.03	.81	**.76**		-.03		.00		-.01		-.11		-.02
E11		.08		.07		-.03	.63	**.61**		-.03		.05		-.01		.01		.03
C1		.05		-.01		.00		.02	.89	**.87**		-.01		.00		-.02		-.01
C2		.11		.02		.01		-.03	.86	**.77**		-.09		.02		-.01		.01
C3		-.03		-.02		-.04		-.01	.88	**.81**		.04		.03		.03		.13
C4		-.03		-.01		.09		.01	.82	**.76**		.01		.00		.01		.06
C7		.01		-.06		.01		-.02	.74	**.67**		-.03		.00		-.02		.04
L2		.01		.00		-.05		.01		.00	.76	**.74**		.03		-.01		-.07
L5		.02		.07		-.05		-.05		-.08	.80	**.78**		.02		-.07		.06
L6		-.00		.02		.06		-.03		-.02	.87	**.88**		.00		.02		.01
L7		-.01		-.01		.03		.03		.04	.90	**.90**		-.02		.01		-.03
L8		-.01		-.04		.00		.06		.01	.82	**.80**		-.01		-.01		-.01
R2		-.01		.01		.02		.01		.07		.01	.67	**.67**		-.02		-.02
R4		-.06		-.01		-.02		.03		-.08		.00	.82	**.84**		.00		.07
R5		.04		-.02		.00		-.02		-.02		.01	.93	**.94**		-.02		-.04
R6		.01		.01		.01		-.02		.05		.00	.95	**.93**		.02		.00
R8		.01		.00		-.01		.00		.03		.00	.72	**.70**		.06		.02

S2		-.05		.01		-.01		.04		-.03		.00		.01	.71	**.73**		.05
S3		.04		.08		.02		-.10		.18		-.01		.00	.68	**.67**		-.14
S4		.01		-.01		.04		-.02		-.03		-.05		.01	.81	**.80**		.00
S6		.00		-.08		-.01		-.03		-.02		.01		-.02	.78	**.76**		.08
S9		-.01		-.01		-.03		.08		.03		.02		.05	.64	**.65**		-.03
SU2		.04		-.01		-.01		-.01		-.02		-.02		-.03		.02	.91	**.91**
SU3		-.02		.01		.01		-.03		.06		.04		-.01		-.01	.91	**.89**
SU4		.08		-.02		.03		.03		.07		.01		.01		.02	.91	**.81**
SU6		.08		-.01		.06		.03		.00		-.05		.05		-.01	.81	**.73**
SU7		-.05		.02		-.03		-.02		.03		-.02		.02		.00	.91	**.92**

Table 21.4. Factor Correlations of Model 19

	Attitude	Threat	Benefit	Esteem	Cheating	Legitimacy	Ref Group	Stress	Susceptibility
Attitude	-	-.20	.25	-.16	.47	-.29	.16	.11	.41
Threat	-.28	-	-.15	.19	-.28	.33	-.15	-.11	-.26
Benefit	.29	-.16	-	.02	.31	-.07	.10	.09	.28
Esteem	-.18	.21	.02	-	-.16	.20	-.09	-.19	-.11
Cheating	.57	-.34	.34	-.17	-	-.22	.29	.14	.65
Legitimacy	-.33	.37	-.07	.22	-.26	-	.01	-.09	-.21
Ref Group	.22	-.18	.11	-.11	.33	-.01	-	.18	.36
Stress	.15	-.15	.11	-.23	.18	-.12	.22	-	.14
Susceptibility	.50	-.30	.30	-.14	.72	-.24	.38	.18	-

Note. CFA below, ESEM above diagonal

It is notable that the correlation between attitude and cheating (CFA = .57), suggests that these is a moderately strong association between attitudes towards doping and attitudes towards cheating, but it is not so strong that they share an enormous amount of variance – there is significant difference between them. Following the analysis of Model 20, it was confirmed as the final model to take forward.

The 9-factor, 43-item ASDI was put forward for the next study: Study 3, Convergent and Discriminatory Validity.

Study 3: Convergent and Discriminatory Validity

Construct validity is often referred to as an over-arching aspect of validity (Coaley, 2010). In effect, construct validity can be said to be the extent to which the relationship between the unobserved construct and the observed data measure the understood theory in a meaningful way. It can be assessed in a number of ways. Evidence of construct validity is initially derived from factor structure in the development of a measure. The use of a priori model testing, such as structural equation modelling here, is theoretically driven. Therefore, construct validity can be evidenced by theoretically sensible model fits.

Campbell and Fiske (1959) initially described construct validity by referring to convergent and discriminant validity. These are effectively subordinates of construct validity. Convergent validity is defined by a construct that correlates positively with theoretically associated constructs. Statistically speaking, this is defined by the extent to which a measure's variance is related with the variance of its underlying construct (Barrett, Phillips, & Alexander, 1981; Guion & Cranny, 1982). Conversely, in discriminant (or divergent) validity, inexplicable correlations should not exist. For example, a positive relationship between sportspersonship and deviance would be theoretically and conceptually invalid. Equally, very strong correlations between two variables would suggest an element of redundancy (Kline, 2005).

The purpose of this study therefore, was to examine the convergent and divergent validity of the ASDI by its association with a measure of doping attitudes, situational temptation, and honesty and humility. To achieve this, we constructed a structural equation model whereby situational temptation and honesty and humility were predictor variables of ASDI scales and doping attitudes.

Methods

Participants

A sample of 423 athletes, but after screening for social desirability, 30 athletes were removed. As such, data from 393 athletes (male n = 263, female n = 130), aged between 12 and 18 years of age (M_{age} = 16.42, SD = 1.69) were analyzed for Study 3. Participants resided in the United Kingdom (n = 113), Australia (n = 137), Hong Kong (n = 69), or the United States (n = 74). Our sample consisted of North West European (n = 152), Oceania (n = 109), South East Asian (n = 31), North American (n = 68), Southern and Eastern European (n = 7), North East Asian (n = 1), Southern and Central Asian (n = 8), North African or Middle Eastern (n = 4), Central American (n = 1), South American (n = 7), and unspecified (n = 5) athletes. Athletes in Study 3 competed at beginner (n = 9), amateur (n = 294), semi-professional (n = 33), professional (n = 6), county or state (n = 15), national (n = 25), or international (n = 9).

Measures

Adolescent Sport Doping Inventory. Participants completed the 43-item Adolescent Sport Doping Inventory, developed in Study 2 of this report. Participants responded to the stem "This questionnaire measures factors that are related to attitudes about Performance Enhancing Drugs

(PEDs). There are no wrong or right answers, and it is important that you answer all questions as honestly as possible. Please answer each question by circling the appropriate number, which represents how you feel." Questions included "In order to be successful in my sport, I need to take PEDs" and "Taking PEDs could help me keep my place in the team or training squad." All questions were answered on a 7-point Likert-type scale, anchored at 1 = *'strongly disagree'* and 7 = *'strongly agree.'*

Performance Enhancement Attitudes Scale (PEAS; Petroczi & Aidman, 2009) is a 17-item unidimensional self-report instrument that assesses attitudinal beliefs towards doping in sport. Participants responded to the stem "Please answer the following questions about Performance Enhancing Drugs honestly. " "Doping is necessary to be competitive" and "The media blows the doping issue out of proportion" were two questions that were featured in this questionnaire. All questions were answered via a 6-point Likert-type scale, which was anchored at 1 = *'strongly disagree'* and 6 = *'strongly agree.'*

Situational Temptation. The extent to which the participants were tempted to used performance enhancing drugs was assessed using the 4-item measure of situation temptation (Lazarus, Barkoukis, Rodafinos, & Tzorbatzoudis, 2010). This questionnaire contained the stem "How much would you be tempted to use banned doping substances to enhance your performance this season?" This questionnaire contained items such as "If you believed that most of your team mates or competitors were using them" and "If you were preparing for an important game/competition." All questions were answered on a 5-point Likert-type scale, which was anchored at 1 = *'not at all tempted'* and 5 = *'very tempted.'*

Honesty and Humility. Participants completed the honesty-humility questions of the 60-item HEXACO-60 (Ashton & Lee, 2009). Honesty-humility was represented by 10 questions, which contained subscales on sincerity, fairness, greed-avoidance, and modesty. Participants responded to the stem "On the following page you will find a series of statements about you. Please read each statement and decide how much you agree or disagree with that statement. Then circle the number that matches your response." All questions were answered via a 5-point Likert-type scale, which was anchored at 1 = *'strongly disagree'* and 5 = *'strongly agree.'*

Social Desirability. Four items, which were taken from the 153-item TEIQue (Petrides, 2009) were used to assess social desirability. Two of the questions (e.g., "I have stolen/taken things as a child" and "I have never put pleasure or leisure activities before school work") were inserted at the end of the PEAS (Petroczi & Aidman, 2009) and were scored on a 6-point Likert-type scale anchored at 1 = *'strongly disagree'* and 6 = *'strongly agree.'* The other two questions (e.g., "I have never lied to spare someone else's feelings" and "some of my responses in these questionnaires are not 100% honest") were inserted at the end of the Honesty and Humility (Ashton & Lee, 2009) and answered on a 5-point Likert-type scale, which was anchored at 1 = *'strongly disagree'* and 5 = '*strongly agree'*.

Data Analysis

Data were initially screened for completeness, outliers, univariate normality, and social desirability. We examined internal consistency by estimating omega point estimates and confidence intervals in addition to coefficient alpha, as omega holds fewer assumptions than alpha (Dunn, Baguley, & Brunsdon, 2014). As we had large variations in length of scale, which impacts both alpha and omega estimates, we also calculated mean inter-item correlation (MIIC), as recommended by Schmitt (1996). As a guide, to obtain a coefficient alpha of .80, a hypothetical three-item scale would require a MIIC of .57, whereas a 10-item scale would only require a MIIC of .28 (Cortina, 1993).

To address one of the study aims, the examined the factor structure of the ASDI, as it has yet to have been validated on a sample independent from the one from which it was formed. We tested this through confirmatory factor analysis (CFA) and exploratory structural equation modelling (ESEM; Asparouhov & Muthén, 2009). Model fit was interpreted broadly employing Hu and Bentler's (1999) recommendations of comparative fit index (CFI) and Tucker-Lewis index (TLI) close to .95, standardized root mean-square residual close to .08 and root mean square error of approximation close to .05. However, we also noted the caveats of Perry, Nicholls, Crust, and Clough (2015) in focusing more closely on the factor structure than mere model fit, particularly owing to the complexity of the model. The main analyses comprised of testing a structural equation model positing situational temptation and honesty and humility and exogenous predictor variables of ASDI scales and doping attitudes, which was co-varied with all ASDI factors.

Results

Preliminary Analyses

There were no missing data or outliers identified. Descriptive statistics are displayed in Table 1. Univariate skewness was < 2 in all variables with the exception of the attitudes scale of the ASDI, which was slightly positively skewed, with a large proportion of participants scoring the minimum on this scale. This distribution also presented as leptokurtic for this reason.

Table 22. Descriptive statistics for ASDI, doping attitudes, situational temptation, and honesty and humility

Variable	Mean	SD	Min	Max	Skew	Kurt	α	ω (95% CI)	MIIC
ASDI									
Attitude	1.71	1.15	1.00	7.00	2.06	4.45	.87	.87 (.83, .91)	.65
Threat	5.00	1.41	1.00	7.00	-.50	-.13	.91	.91 (.88, .93)	.71
Benefit	2.53	1.55	1.00	7.00	.77	-.44	.93	.93 (.92, .95)	.73
Esteem	5.69	1.32	1.00	7.00	-1.59	2.68	.92	.92 (.89, .94)	.71
Cheating	2.01	1.29	1.00	7.00	1.48	1.70	.89	.90 (.87, .92)	.63
Legitimacy	4.80	1.41	1.00	7.00	-.43	-.13	.91	.91 (.89, .93)	.68
Reference Group	2.34	1.43	1.00	7.00	.97	.14	.92	.91 (.89, .93)	.70
Stress	3.11	1.40	1.00	7.00	.40	-.48	.87	.87 (.84, .89)	.57
Susceptibility	2.03	1.37	1.00	7.00	1.29	.70	.94	.94 (.93, .96)	.77
PEAS	2.15	.78	1.00	5.00	.85	.57	.89	.89 (.87, .91)	.34
Situational Temptation	1.55	.86	1.00	5.00	1.81	2.74	.93	.93 (.90, .95)	.76
Honesty and Humility							.63	.58 (.44, .67)	.15
Sincerity	3.13	.84	1.00	5.00	.16	-.34	.23	.36 (.18, .58)	.09
Fairness	3.38	.90	1.00	5.00	-.16	-.38	.40	.57 (.41, .65)	.19
Greed-avoidance	2.88	.83	1.00	5.00	.08	.01	.08	.09 (.00, .26)	.04
Modesty	3.90	1.03	1.00	5.00	-.83	-.02	.74	.74 (.66, .80)	.59

We calculated Omega point estimates and confidence intervals using the MBESS package (Kelley & Lai, 2012), in R (R Development Core Team, 2012), with 1,000 bootstrap samples. For ASDI subscales, internal consistency was excellent on all measures. PEAS reported high alpha and omega levels with lower MIIC due to the length of the scale. Situational temptation also demonstrated high levels of internal consistency. The HEXACO-60 honesty and humility scales contain very few items, which generates very low alpha and omega estimates. However, it is worth noting that the MIIC are also very low. Even when combining all items, the scale presents quite low internal consistency in the sample. Results pertaining to these scales were treated with caution, with the exception of modesty.

ASDI Factor Structure

CFA revealed a good model fit without the need for any modification; $\chi^2(824) = 1528.33$, $p < .001$, CFI = .931, TLI = .924, SRMR = .050, RMSEA = .047 (90% CI = .043, .050). Standardized parameter estimates for all factor loadings are presented in Table 2. The loadings clearly support the factor structure of the ASDI in the independent cluster model (ICM). The ESEM model with geomin rotation allowed all items to load on all subscales. Model fit was again good; $\chi^2(552) = 1079.89$, $p < .001$, CFI = .948, TLI = .915, SRMR = .019, RMSEA = .049 (90% CI = .045, .054). The priority however, was to check that all items loaded onto their intended scale sufficiently and that cross-loadings were not substantive. The factor loadings indicated that all items load substantively onto their own factors and no cross-loadings on any factor were greater than .25. This supports the factor structure but also the independence of each scale within the ASDI.

Table 23. Standardized parameter estimates for ASDI CFA and ESEM

Item	CFA	R^2	ESEM	R^2	Item	CFA	R^2	ESEM	R^2
Attitude					*Legitimacy*				
1	.82	.71	.69	.67	24	.85	.73	.84	.73
2	.77	.75	.65	.60	25	.90	.81	.88	.82
3	.88	.81	.77	.77	26	.80	.64	.78	.66
4	.75	.71	.60	.56	27	.86	.74	.86	.75
Threat					28	.71	.50	.69	.52
5	.78	.73	.62	.61	*Reference Group*				
6	.85	.84	.74	.72	29	.77	.59	.71	.60
7	.85	.81	.72	.71	30	.81	.66	.73	.67
8	.89	.89	.80	.79	31	.92	.84	.90	.85
Benefit					32	.97	.93	.90	.93
9	.76	.68	.59	.58	33	.69	.48	.64	.50
10	.81	.69	.66	.66	*Stress*				
11	.91	.94	.85	.83	34	.72	.52	.71	.53
12	.93	.91	.87	.87	35	.64	.41	.52	.49
13	.86	.85	.75	.73	36	.78	.61	.71	.64
Esteem					37	.87	.75	.83	.77
14	.74	.71	.57	.55	38	.75	.57	.79	.65
15	.77	.76	.63	.59	*Susceptibility*				
16	.95	.92	.90	.90	39	.89	.79	.70	.79
17	.94	.89	.88	.88	40	.87	.76	.83	.77
18	.78	.73	.62	.60	41	.89	.79	.73	.78
Cheating					42	.83	.69	.70	.69
19	.70	.61	.52	.50	43	.92	.84	.84	.85
20	.69	.52	.49	.47					
21	.92	.69	.82	.84					
22	.86	.73	.75	.74					
23	.78	.79	.67	.61					

Construct Validity

To examine construct validity, we tested a structural model that included the CFA-ICM measurement model of ASDI, regressed on situational temptation and honesty and humility variables, which were included as observed variables. Mean PEAS score was also regressed on these to compare path estimates with those to ASDI. Finally, scores between all ASDI scales were co-varied with mean PEAS score. Model fit was acceptable; $\chi^2(1028) = 1838.42$, $p < .001$, CFI = .928, TLI = .918, SRMR = .046, RMSEA = .045 (90% CI = .042, .048). Standardized parameter estimates are presented in Table 3. PEAS score was positively associated with attitude, benefit, cheating, reference group, stress, and susceptibility. Conversely it was negatively correlated with legitimacy.

Situational temptation was a significant predictor of all doping scales. Notably, there was a large positively path estimate to susceptibility (β = .61, $p < .001$, 95% CI = .47, .75), cheating (β = .57, $p < .001$, 95% CI = .42, .71), and reference group (β = .52, $p < .001$, 95% CI = .38, .65). Significant positive paths from situational temptation were also present to attitude, benefit, and stress. Negative paths to esteem and legitimacy were also significant. The results support the convergent and divergent validity of the ASDI but it is also supported by the similar effect of the positive path form situational temptation to PEAS (β = .49, $p < .001$, 95% CI = .36, .62).

Of the honesty and humility scales, sincerity and greed-avoidance predicted very little. This is consistent with their predictive paths to PEAS score however. Small to moderate negative paths were significant from fairness to attitude, benefit, cheating, reference group, and susceptibility. These were also consistent with the effect size between fairness and PEAS score. A similar effect size, but positive, was observed for the estimation of fairness to esteem. Finally, modesty negatively predicted attitude, benefit, cheating, reference group, and susceptibility. Overall, legitimacy was the only ASDI scale to not have a statistically significant predictor from the honesty and humility variables.

Table 24. Standardized parameter estimates with 95% confidence intervals for SEM

Variable	Situational Temptation	Sincerity	Fairness	Greed Avoidance	Modesty	PEAS[1]
Attitude	.39** (.18, .59)	-.00 (-.14, .13)	-.12* (-.27, .04)	.03 (-.14, .19)	-.16** (-.30, -.02)	.40** (.25, .55)
Threat	-.12* (-.27, .02)	.15** (.01, .30)	.03 (-.12, .19)	.02 (-.12, .17)	.06 (-.06, .17)	-.08 (-.23, .08)
Benefit	.34** (.18, .51)	.06 (-.07, .19)	-.29** (-.42, -.16)	-.01 (-.16, .13)	-.10* (-.21, .01)	.19** (.05, .34)
Esteem	-.25** (-.40, -.10)	-.04 (-.18, .11)	.12* (-.01, .25)	-.03 (-.18, .12)	-.02 (-.25, .21)	-.06 (-.21, .10)
Cheating	.57** (.42, .71)	-.00 (-.12, .11)	-.22** (-.34, -.10)	.01 (-.12, .13)	-.23** (-.36, .09)	.33** (.17, .50)
Legitimacy	-.13** (-.27, .00)	.05 (-.10, .19)	.07 (-.07, .22)	-.02 (-.18, .14)	-.02 (-.13, .09)	-.19** (-.34, -.05)
Reference Group	.52** (.38, .65)	.05 (-.07, .17)	-.12* (-.25, .02)	.06 (-.07, .19)	-.15* (-.31, .01)	.20** (.06, .34)
Stress	.36** (.22, .50)	.09 (-.05, .23)	-.03 (-.18, .13)	-.13* (-.28, .01)	-.04 (-.15, .07)	.27** (.15, .40)
Susceptibility	.61** (.47, .75)	.05 (-.05, .16)	-.13** (-.24, -.02)	-.02 (-.14, .10)	-.21** (-.34, -.09)	.34** (.17, .51)
PEAS	.49** (.36, .62)	.04 (-.07, .16)	-.11* (-.23, .01)	-.02 (-.14, .10)	-.28** (-.43, -.13)	-

Note. *Statistically significant at $p < .05$, **$p < .01$. [1]Figures represent correlation coefficients, not path estimate

Study 4: Test and Re-Test Reliability

Test-retest stability, sometimes referred to as reliability, is a vital component of a psychometric validation (Kline, 2005). It refers to the extent to which a scale retains a degree of resistance to change. This is normally assessed by administering it to the same group of people on two different occasions. The premise is that stable measures will disregard environmental conditions and mood. Therefore, one would expect a fairly dispositional measure to retain high stability. The most common method of quantifying the test-retest stability of a scale is the use of correlation, with Pearson's *r* scores > .80 considered stable (Anastasi & Urbina, 1997; Kline, 1993). However, Nevill, Lane, Kilgour, Bowes, and Whyte (2001) and Lane, Nevill, Bowes, and Fox (2005) stress that the correlational approach has clear limitations. Specifically, they highlight that because correlation is a measure of relationship, not agreement, it is possible to derive a high *r* value, intraclass correlation, with very limited or even no exact agreement at participant level. Therefore, this should be used in conjunction with other methods.

One alternative is repeated measures null hypothesis statistical testing. Schutz (1998) suggested using a repeated measures design MANOVA, though a paired-samples t-test would also be appropriate. It should be noted however, that high within-subjects variation could negate individual variances and present a non-significant *t* or *F* value even if the measure were unstable. Wilson and Batterham (1999) suggested identifying the proportion of agreement. Specifically, they propose identifying the percentage of participants scoring within (±1) of their first score for each item. It is stressed that this should be conducted at item level as well as subscale level, as should all test-retest analysis because subscale level has the ability to mask unstable items (Lane et al., 2005). The expected proportion of responses within this threshold of course depends on the number of response alternatives. Wilson and Batterham, Nevill et al., (2001) and Lane et al., only considered five-point scales.

Methods

Participants

A sample of 92 participants (male *n* = 55, female *n* = 37) aged 17-18 were recruited to take part in the study. The sample included a wide range of sports, which were performed at beginner (*n* = 8), club – amateur (*n* = 67), club – semi-professional (*n* = 10), county/state (*n* = 4), and international (*n* = 3) level. On average, participants had been playing their sport for 9.24 years (*SD* = 3.84). In total, 17 different sports were represented from four countries.

Measures

Adolescent sport doping inventory (ASDI). The forty-three item, nine-factor model developed in Study 2.

Procedure

Participants completed the ASDI twice with a seven day gap in between. A study using health status self-report measures by Merx, Menezes, Horvitz, Jones, and Warren (2003) found no difference in stability coefficients if the retest was conducted two days or two weeks apart, so any point within this time frame appeared appropriate.

Data Analysis

Preliminary analysis first examined Q-Q plots to test for outliers and univariate normality was evaluated. To examine stability, item-level and subscale-level correlations were conducted. This included Pearson's product-moment correlations (*r*), and intraclass correlations (ICC). Levels of agreement > .50 are considerate moderate, and > .80 is considered strong (Ferguson, 2009). Paired sample *t*-tests were conducted to test for no difference, calculating *p*-values and 95% bootstrapped confidence intervals. Following the recommendations of Nevill et al. (2001) and Lane et al. (2005), the percentage of responses within (±1) for each item were calculated. At least 80-90% of tests retest responses ±1 was considered as supportive of temporal stability. All analyses were conducted at both item level and subscale level.

Results

Preliminary analysis demonstrated no issues with outliers or normality, as all items and subscales presented acceptable skewness (< 2) and kurtosis (< 2) estimates. Item level relationships are presented in Table 1, while subscale level relationships are in Table 2. All items and subscales demonstrated a significant ($p < .001$) relationship between test and retest in all correlations. Typically, this was moderate to strong. A very similar pattern emerged for item-level correlational analyses. Only three of the 43 items produced a statistically significant *t*-value, as did one of the six subscales (reference group). The percentage of responses (±1) for each item ranged from 77.17% to 95.65% for all items and 80.43% to 95.65% for subscales.

To determine the magnitude of the difference in legitimacy, we calculated Cohen's *d* as $t/\sqrt{N}$. Ferguson (2009) suggests that the recommended minimum practical effect size for Cohen's *d* is .41. Here, $d = .23$. As such, the effect size is small to negligible in the only subscale that reported any effect at all.

Conclusion

The results support the test-retest stability of the ASDI at item and sub-scale level, which infer that the 43-item ASDI is a suitable measure to explore factors that might predict doping behaviour among adolescent athletes.

General Conclusions

In Phase 1 of this three phase project we qualitatively explored coaches' perceptions of performance enhancement during adolescence and in relation to the factors identified within the SDCM (Donovan et al., 2002), to inform the development of the ASDI. On the whole, we found support for the SDCM and therefore suggest that it is relevant to adolescent athletes from different continents, along with a few minor amendments to the model. Based on the interviews with the coaches, we believe that adding age/maturation, participation level, stress, ethnicity, and country of residence makes the model more applicable to adolescent athletes. The coaches who were interviewed all thought that other coaches, parents, and peers influenced doping susceptibility among adolescent athletes. This in turn was thought to impact upon doping behavior among this group of athletes. Phase 1 was vital for informing the development of the ASDI in Phase 2. This resulted in the generation and validation of a 43-item ASDI.

The final version of ASDI included the following subscales: attitude, threat, benefit, esteem, cheating, legitimacy, reference group opinion, stress, and susceptibility. As such, this is very similar to the constructs associated with the SDCM (Donovan et al., 2002), although the questions in the ASDI are based upon specific nuances among adolescent athletes. Although not included as subscales within the ASDI, other factors were found to influence doping behaviour in Phase 1 (e.g., age/maturation, participation level, ethnicity, and country of residence) are all factors that can be assessed using alternative measures. There are a variety of questionnaires and methods to assess maturity, so we thought it was appropriate to remove age/maturation subscale in the validation process, which might not have thoroughly assessed this construct. Further, constructs such as participation level, ethnicity, and country of residence can be assessed within

demographic information.

A strength of this research programme relates to the multi-national sample of the data collected. With the exception of Study 4, which involved athletes exclusively from the United Kingdom, Study 1, Study 2, and Study 3 included large samples with athletes who resided in either the United Kingdom, Australia, Hong Kong, or the United States. As such, scholars who use the ASDI can be confident that the scale will be relevant to adolescent athletes from a number of different countries, given the diversity of the athletes sampled in the present study. Future research could involve translating the ASDI and testing it in other countries.

Practical Applications

We have developed a theory- and empirically-guided questionnaire that can be used by researchers who want to assess factors that predict doping behaviours among adolescent athlete, and thus identify athletes who might be at risk of committing doping offences. The ASDI could also be used to assess the impact of anti-doping interventions or educational programmes. That is, participants could complete the ASDI before starting an anti-doping intervention/educational programme and then after completing the intervention/programme to assess the impact of such a programme.

Limitations

A strength of the research programme relates to the diversity of the participants recruited for this research. However, the samples are generally dominated by athletes from the United Kingdom. For example, only 21 U.S athletes completed the 104-item ASDI (Study 2). Collecting data across international sites is very challenging, and despite the imbalance of participants. However, given the multi-phase nature of this research, countries that were under-represented in

one study, featured more prominently across other studies. Indeed, 74 athletes from the U.S completed the 43-item ASDI in Study 3, which means that 95 athletes from the U.S participated in this phase of the research program.

Phase 3

Introduction to Phase 3 of the Research Programme

Three separate studies were conducted in Phase 3 of this research program, using the Adolescent Sport Doping Inventory, in order to identify psychosocial factors that predict attitudes and susceptibility towards doping:

- Study 1: Maturation, Doping Attitudes and Susceptibility among Adolescent Athletes
- Study 2: Attitudes to Doping, Psychological Stress, Achievement Goals, Emotions, and Coping among Adolescent Athletes
- Study 3: Environmental-Social Factors and Doping Attitudes and Susceptibility

Study 1: Maturation, Doping Attitudes and Susceptibility among Adolescent Athletes

Introduction

Adolescence (the period in which a person is aged between 12 and 18 years of age) is associated with dramatic biological and psychological changes (Schirlin et al., 2009). In other domains, maturation has been found to influence the way adolescent athletes think and manage stress (Nicholls et al., 2009, 2013, 2015a). Nicholls et al. (2015b) reported that coaches believe maturity will influence attitudes towards doping among adolescent. In particular, the coaches in the Nicholls et al. (2015b) study suggested that late developers may be tempted to dope, due to their lack of maturity. As such, it is likely that maturation levels be related to attitudes and susceptibility.

Objectives: Examine the relationship between doping attitudes and (1) biological maturity, (2) cognitive-social maturity, and (3) emotional maturity.

Hypotheses: It was predicted that there will be a negative relationship between biological maturity and favorable attitudes towards doping. This is because athletes who were biologically immature (i.e., late developers) may perceive a greater disadvantage than those who are more mature, and they will therefore have a greater susceptibility to engage in doping behaviors. It was also predicted that there would be significant paths between cognitive-social maturity and emotional maturity, with positive doping attitudes.

Methods

Participants

Three-hundred and twenty-seven athletes (male *n* = 227, female *n* = 99), aged between 12 and 18 years of age (M_{age} = 16.27, *SD* = 1.59) participated in Study 1. Our sample resided in the United Kingdom (*n* = 197), Australia (*n* = 42), Hong Kong (*n* = 38), or the United States (*n* = 53). Our sample consisted of North West European (*n* = 218), Oceania (*n* = 41), South East Asian (*n* = 12), North American (*n* = 24), Southern and Eastern European (*n* = 8), North East Asian (*n* = 3), Southern and Central Asian (*n* = 1), Central American (*n* = 10), South American (*n* = 3), and unspecified (*n* = 7) athletes. Athletes competed at beginner (*n* = 26), amateur (*n* = 244), semi-professional (*n* = 17), professional (*n* = 2), county or state (*n* = 20), national (*n* = 17), or international (*n* = 1).

Measures

Doping Attitudes. The Adolescent Sport Doping Inventory (ASDI; Nicholls et al., 2016) will be used to assess attitudes to doping and factors that predict doping behaviors.

Biological Maturity. The Khamis-Roche (KR) method (Khamis & Roche, 1994) was used to assess the biological maturity of the participants. Participants reported their age and height, and also the height of their mother and father. The KR method represents biological maturity as a percentage of predicted height, relative to age. For example, a 15-year-old male whom has achieved 100% or greater of his predicted adult height would be considered early, while a boy who had attained 90% of his predicted adult height would be considered late.

Self-reported height is typically over-estimated (Epstein, Valoski, Kalarchian, & McCurley, 1995). Consequently, we applied adjustments to all heights reported, according to the recommendations of Epstein et al. (1995), whom constructed the following equations based on measurements of over 1000 measured and estimated heights; (y = adjusted value and x = self-reported measurement): for height $y = 2.803 + .953x$ for women, and $y = 2.316 + .955x$ for men. We then calculated predicted adult height as the mid-point of both parent's adjusted height, which was expressed as a percentage and assigned a z score relative to age. To obtain typical age to height values, we used the growth charts from Centers for Disease Control and Prevention (CDC; www.cdc.gov/growthcharts). Maturity status was classified according to z score, with -1.0 to +1.0 representing average, z scores below -1.0 considered late, and z scores greater than 1.0 considered as early.

Cognitive-Social Maturity. The Cognitive Social Maturity Questionnaire (CSMQ; Levers-Landis et al., 2006) is an 8-item questionnaire that will be used to assess cognitive social maturity. The CSMQ assesses three types of cognitive social maturity: (1) conscientiousness, (2) rule following, and (3) peer influence on behaviour.

Emotional Maturity. An adapted version of the adapted the USM Emotional Quotient Inventory (USMEQ-i;Yusoff et al., 2011) will assess the emotional maturity level of the participants. This will involve participants completing 8-items.

Data Analyses

Data from all measures was firstly screened for outliers, missing data and univariate normality. We assessed internal consistency using omega point estimates and

bootstrapped confidence intervals. This method was preferred to Cronbach's alpha, as it holds fewer assumptions (Dunn, Baguley, & Brunsden, 2013).

After examining correlation coefficients, we ran a hierarchical linear egression to determine the predictive capabilities of maturity and ASDI variables on doping susceptibility.

Results

Data were initially screened for missing data and outliers. Overall, fewer than 1% of cells contained missing data and examination of Q-Q plots identified no issues with outliers. Descriptive statistics, normality estimates, and omega point estimates are presented in Table 25. There were no issues with skewness (all scales < 2). Scale internal consistency was confirmed by assessing omega point estimates and bootstrapped confidence intervals, calculated using the MBESS package (Kelley & Lai, 2012) in R (R Development Core Team, 2012) with 1,000 bootstrap samples. All subscales comfortably exceeded the generally acceptable level of > .70. Indeed, all ASDI scales were in excess of .80.

Assigning *z* scores for biological maturity, we found that of the 204 whom provided sufficient data to calculate this variable, 115 (56.37%) were early in their maturation, 21 (10.29%) were on time, and 68 (33.33%) were late. A one-way ANOVA to determine if these groups had an effect on doping yielded no significant differences (e.g., for susceptibility; $F(2,201) = .50$, $p = .61$).

Table 25. Descriptive statistics, normality estimates, and omega point estimates for all scales.

Subscale	Mean	SD	Min	Max	Skew	Kurt	ω (95% CI)
ASDI							
Attitude	7.76	5.28	4.00	28.00	1.79	3.12	.85 (.78, .89)
Threat	19.62	5.73	4.00	28.00	-.46	-.18	.87 (.83, .90)
Benefit	14.06	7.99	5.00	35.00	.62	-.67	.92 (.91, .94)
Esteem	28.64	6.35	5.00	35.00	-1.56	2.58	.89 (.86, .92)
Cheating	12.13	7.51	5.00	35.00	1.17	.60	.90 (.87, .92)
Legitimacy	24.33	6.44	5.00	35.00	-.45	.24	.88 (.85, .91)
Reference Group	12.63	7.88	5.00	35.00	1.02	.24	.93 (.91, .95)
Stress	15.73	7.49	5.00	44.00	.58	-.14	.87 (.81, .90)
Susceptibility	12.17	7.60	5.00	35.00	1.07	.30	.93 (.91, .95)
Maturity							
Biological Maturity	2.40	6.67	-35.28	17.24	-.79	2.56	-
Emotional Maturity	31.11	6.00	10.00	40.00	-.65	.19	.87 (.85, .89)
Total Social Cognitive Maturity	28.74	5.82	8.00	40.00	-.40	.23	.76 (.70, .81)
Conscientiousness	12.43	2.43	3.00	15.00	-1.53	2.83	.76 (.68, .82)
Peer Influence	6.80	2.76	2.00	10.00	-.24	-.98	.79 (.71, .84)
Rule Following	9.52	3.38	3.00	15.00	-.05	-.96	.80 (.75, .84)

To gain initial insight of variable associations, we examined the Pearson bivariate correlations with 1,000 bootstrapped samples of ASDI scales with biological, emotional, and social cognitive maturity. The results are presented in Table 26. Correlations were interpreted following the recommendations of Zhu (2012) of < .20 = no correlation, .20-.39 = low correlation, .40-.59 = moderate correlation, .60-.79 = moderately high correlation, and > .80 = high correlation. Biological maturity was unrelated to doping constructs, while emotional and social cognitive maturity was negatively associated with doping susceptibility.

Table 26. Pearson bivariate correlations with 1,000 bootstrapped 95% confidence intervals.

Variable	Biological maturity	Emotional Maturity	Conscientiousness	Peer Influence	Rule Following	Social-cognitive Maturity
Attitude	.00 (-.10, .11)	-.25** (-.37, -.12)	-.27** (-.40, -.14)	-.17** (-.29, -.06)	-.30** (-.41, -.18)	-.35** (-.46, -.25)
Threat	.01 (-.09, .10)	.19** (.07, .31)	.11 (-.01, .24)	.14* (.03, .26)	.07 (-.03, .18)	.19** (.07, .31)
Benefit	-.01 (-.11, .10)	-.19** (-.30, -.07)	-.19** (-.31, -.05)	-.16** (-.27, -.04)	-.16** (-.27, -.05)	-.19** (-.30, -.07)
Esteem	.08 (-.03, .19)	.38** (.25, .51)	.40** (.23, .53)	.07 (-.06, .19)	.17** (.06, .28)	.38** (.25, .51)
Cheating	.02 (-.09, .12)	-.25** (-.38, -.12)	-.38** (-.51, -.24)	-.19** (-.31, -.07)	-.40** (-.50, -.30)	-.25** (-.38, -.12)
Legitimacy	-.04 (-.13, .06)	.17** (.06, .29)	.26** (.12, .38)	.04 (-.08, .16)	.21** (.11, .31)	.17** (.06, .29)
Reference Group	.03 (-.08, .14)	-.14* (-.27, -.01)	-.36** (-.48, -.23)	-.30** (-.41, -.17)	-.36** (-.47, -.25)	-.14* (-.27, -.01)
Stress	-.00 (-.13, .11)	-.25** (-.36, -.13)	-.21** (-.33, -.08)	-.23** (-.35, -.11)	-.24** (-.36, -.11)	-.25** (-.36, -.13)
Susceptibility	-.04 (-.15, .07)	-.22** (-.35, -.09)	-.37** (-.50, -.24)	-.26** (-.37, .13)	-.36** (-.45, -.25)	-.22** (-.35, -.09)

*Statistically significant at $p < .05$, **$p < .01$.

Next, we conducted a hierarchical linear regression to determine the extent to which doping susceptibility was predicted by maturity the remaining ASDI variables. First, we entered demographic variables of gender, ethnicity, skill level, and years' experience in block one, then maturity variables in block two, and finally, the eight remaining ASDI subscales in block two. Confidence intervals were obtained from 1,000 bootstrapped samples. The results from this analysis are presented in Table 2. Model one (demographics) was not statistically significant ($\Delta R^2 = .030$, $F(4,301) = 2.335$, $p = .056$). Model two explained a substantive amount of variance ($\Delta R^2 = .213$, $F(7,258) = 13.673$, $p < .001$). This was a cumulative effect of the three maturity variables however, as none of them presented statistically significant coefficients. Overall, 66.4% of doping susceptibility variance was accounted for, as model three also substantively increased R^2 ($\Delta R^2 = .421$, $F(15,290) = 38.197$, $p < .001$). Three ASDI scales significantly contributed to the increased variance in doping susceptibility explained; benefit, cheating, and reference group.

Table 27. Hierarchical linear regression coefficients.

	B (95% CI)	SE β	*β*	*t*	R^2
Block 1					.030
Gender	.357 (-.955, 1.532)	.756	.021	.472	
Ethnicity	-.163 (-.338, .007)	.087	-.072	-1.877	
Skill level	-.007 (-.340, .319)	.221	-.001	-.033	
Years' experience	.049 (-.103, .211)	.080	.022	.610	
Block 2					.243**
Biological maturity	-.029 (-.144, .057)	.051	-.025	-.565	
Social-cognitive maturity	-.085 (-.214, .050)	.055	-.065	-1.540	
Emotional maturity	-.019 (-.119, .070)	.050	-.015	-.378	
Block 3					.664**
Attitude	.071 (-.064, .216)	.066	.049	1.087	
Threat	-.043 (-.151, .060)	.051	-.032	-.836	
Benefit	.133 (.045, .206)	.041	.141	3.230**	
Esteem	.015 (-.079, .122)	.051	.013	.303	
Cheating	.346 (.210, .493)	.052	.346	6.700**	
Legitimacy	.002 (-.107, .106)	.048	.001	.035	
Reference Group	.375 (.229, .532)	.046	.382	8.096**	
Stress	.003 (-.087, .094)	.039	.003	.080	

*Statistically significant at $p < .05$, **$p < .01$.

Discussion

We found partial support for our hypotheses that maturation was associated with doping attitudes. Although biological maturity was not associated with doping attitudes, attitudes correlated significantly with emotional maturity and the three subscales of cognitive-social maturity (e.g., conscientiousness, rule following, and peer influence). It should be noted, however, that the correlations were low.

Nicholls et al. (2015) were among the first scholars to reveal that maturation might be associated with doping among young people. Although the correlations were low, doping attitudes were negatively associated with both emotional maturity and cognitive social maturity. Given that attitudes predicted doping prevalence among young people (e.g., Zelli et al., 2010), this represents an important finding. Indeed, our findings suggest that those who are able to successfully manage their emotions are less likely to favorably about PEDs, inferring that PEDs may be used to help athletes manage negative emotions associated with their own performance or insecurities about one's appearance. This contention is supported by the finding that stress levels were negatively associated with emotional maturity. For example, an athlete may be angry or anxious (or both) about poor performance and taking PEDs could eradicate such negative emotions, because the athlete is likely to believe that his or her performance will improve if PEDs are consumed. As such, doping may be form of coping that allows athletes to regulate their internal responses.

In regards to cognitive social maturity, all three subscales correlated negatively with doping attitudes, which was expected. It is therefore unsurprising that conscientiousness, which represents a person wanting to carry out tasks (e.g., training or competing) well and diligently, was negatively associated with doping attitudes. These findings imply young people with high levels of conscientiousness see PEDs as bad and would therefore be less likely to dope. Similarly, those who are less influenced by their peers are also more likely to have an unfavorable view of doping. Peers may be a key factor in influencing whether a young person will dope or not, because Wroble et al. (2002) found that 18% of young people that took AAS did so because of peer

pressure. Furthermore, Laure et al. (2004) revealed that young people obtained PEDs from friends or health professionals. Building resistance to negative peer influence appears important in the battle against PEDs. The strongest correlation between doping attitudes and cognitive social maturity was with rule following. As doping represent a clear breach of the rules (WADA, 2015), this finding is expected, and suggests that rule following applies within a doping context.

A limitation of this study relates to the strength of the correlations. We would argue that although the strength of the correlations are low, cumulatively, they suggest that doping is related to both emotion and cognitive-social maturation. In conclusion, governing bodies could screen young athletes for emotional and cognitive-social maturity to help identify those who may have favorable doping attitudes and thus be more likely to take PEDs.

Study 2: Attitudes to Doping, Psychological Stress, Achievement Goals, Emotions, and Coping among Adolescent Athletes

Introduction

Psychological factors such as goals, emotions, and coping have influenced attitudes in domains other than doping. Further, Nicholls et al. (2015b) identified stress as a key factor that may influence attitudes towards doping among adolescent athletes. However, the relationship between these constructs and doping is unknown among adolescent athletes and adolescent athletes of different cultures. Research by Gucciardi et al. (2011) found a strong relationship between appraisal and doping attitudes, so it is likely that goals, emotions, and coping will also be related to doping given the strong relationship between appraisals, goals, emotions, and coping (Lazarus, 1999).

Objectives: Assess the relationship between doping attitudes and (1) stress appraisals, (2) achievement goals and, (3) coping.

Hypotheses: It was hypothesized that threat appraisals would correlate positively, whereas as challenge appraisals would correlate negatively with attitudes to doping. It was also predicted that there will be positive relationships between performance-approach and performance avoidance goals with doping attitudes and doping susceptibility, but negative relationships between attitudes to doping with mastery-approach and mastery-avoidance goals. This is because athletes who are more focused on themselves would be less likely to compare themselves to others and thus feel the need to take performance enhancing drugs. Finally, task-oriented coping

strategies would correlate negatively with favorable attitudes towards doping, whereas distraction-oriented and disengagement-oriented coping would correlate positively with doping attitudes. This was because athletes using distraction- and disengagement are less likely to be successful with such strategies, so may see doping as a mechanism of enhancing performance.

Methods

Participants

Three-hundred and sixty-seven athletes (male *n* = 259, female *n* = 108), aged between 12 and 18 years of age (M_{age} = 16.27, *SD* = 1.59) participated in Study 2. Our sample resided in the United Kingdom (*n* = 210), Australia (*n* = 72), Hong Kong (*n* = 31), or the United States (*n* = 54). Our sample consisted of North West European (*n* = 228), Oceania (*n* = 67), South East Asian (*n* = 15), North American (*n* = 26), Southern and Eastern European (*n* = 5), Central American (*n* = 11), South American (*n* = 2), North African or middle Eastern (*n* = 2), Sub-Saharan (*n* = 1) and unspecified (*n* = 10) athletes. Athletes competed at beginner (*n* = 41), amateur (*n* = 209), semi-professional (*n* = 76), professional (*n* = 2), county or state (*n* = 22), national (*n* = 9), or international (*n* = 5). Three athletes failed to report their skill level.

Measures

Doping Attitudes. The Adolescent Sport Doping Inventory (ASDI; Nicholls et al., 2016) will be used to assess attitudes to doping and factors that predict doping behaviors.

Appraisals. Participants completed six challenge and six threat questions from the Stress Appraisal Measure (SAM; Peacock & Wong, 1990).

Achievement Goals. The Achievement Goals Questionnaire for Sport (AGQ; Conroy, Elliot, & Hofer, 2003) will assess achievement goals. This is a 12-item questionnaire, containing four subscales: (1) Mastery Approach, (2)Mastery Avoidance, (3) Performance Approach, and (4) Performance Avoidance goals.

Coping. The Coping Inventory for Competitive Sport (CICS; Gaudreau & Blondin, 2002) will measure coping. The CICS categorises coping in three second-order dimensions (a) task-orientated coping, (b) distraction-orientated coping, and (c) disengagement-orientated coping.

Data Analyses

Data from all measures was firstly screened for outliers, missing data and univariate normality. We assessed internal consistency using omega point estimates and bootstrapped confidence intervals. This method was preferred to Cronbach's alpha, as it holds fewer assumptions (Dunn, Baguley, & Brunsden, 2013). Given the complexity of model required to assess the associations between variables, we tried to limit the number of parameters to be estimated in order to achieve Bentler and Chou's (1987) recommendation of a ratio of five cases per free parameter.

For the main analyses, we tested a series of path models whereby ASDI subscales were posited as exogenous variables. These were predictors of achievement goal variables, which in turn were predictors of stress appraisal and finally, these were posited as predictors of coping strategy. Model acceptability was assessed using Hu

and Bentler's (1999) recommendations for fit indices of CFI > .90, TLI > .90, SRMR < .08, RMSEA < .05 indicating an acceptable model fit, while CFI and TLI > .95 represent an excellent fit of the model and data.

Results

Data were initially screened for missing data and outliers. Overall, fewer than 1% of cells contained missing data and examination of Q-Q plots identified no issues with outliers. Descriptive statistics, normality estimates, and omega point estimates are presented in Table 28. There were no issues with skewness (all scales < 2). Scale internal consistency was confirmed by assessing omega point estimates and bootstrapped confidence intervals, calculated using the MBESS package (Kelley & Lai, 2012) in R (R Development Core Team, 2012) with 1,000 bootstrap samples. All subscales comfortably exceeded the generally acceptable level of > .70. Indeed, all scales were in excess of .80 with the exception of disengagement-oriented coping (ω = .70).

Table 28. Descriptive statistics, normality estimates, and omega point estimates for all scales.

Subscale	Mean	SD	Min	Max	Skew	Kurt	ω (95% CI)
ASDI							
Attitude	7.37	4.47	4.00	28.00	1.95	4.61	.80 (.72, .85)
Threat	19.51	5.45	4.00	28.00	-.56	.40	.84 (.80, .88)
Benefit	14.81	7.32	5.00	35.00	.32	-.71	.90 (.88, .92)
Esteem	29.19	4.97	6.00	35.00	-1.27	2.40	.80 (.75, .85)
Cheating	12.93	7.16	5.00	35.00	.72	-.29	.89 (.86, .91)
Legitimacy	23.60	6.59	5.00	35.00	-.25	-.01	.88 (.85, .90)
Reference Group	13.18	7.23	5.00	35.00	.60	-.47	.92 (.90, .93)
Stress	15.46	6.37	5.00	34.00	.28	-.56	.84 (.81, .87)
Susceptibility	11.72	6.50	5.00	34.00	.77	-.25	.89 (.86, .91)
AGQ							
Mastery Approach	18.75	2.98	6.00	21.00	-1.63	2.69	.85 (.79, .89)
Mastery Avoidance	14.15	4.97	3.00	21.00	-.55	-.55	.94 (.93, .95)
Performance Approach	15.41	4.34	3.00	21.00	-.61	-.29	.87 (.84, .89)
Performance Avoidance	13.93	5.02	3.00	21.00	-.40	-.54	.87 (.84, .90)
SAM							
Challenge	17.08	2.91	7.00	20.00	-1.11	.84	.80 (.75, .83)
Threat	9.07	3.85	4.00	20.00	.59	-.39	.84 (.80, .87)
CICS							
Task	81.35	14.71	37.00	115.00	.00	-.43	.91 (.89, .92)
Distraction	20.64	6.39	8.00	40.00	.13	-.66	.81 (.78, .83)
Disengagement	19.51	5.53	8.00	40.00	.09	-.34	.70 (.63, .75)

To gain initial insight of variable associations, we examined the Pearson bivariate correlations with 1,000 bootstrapped samples of ASDI scales with achievement goals, stress appraisal and coping strategies. The results are presented in Table 29. Correlations were interpreted following the recommendations of Zhu (2012) of < .20 = no correlation, .20-.39 = low correlation, .40-.59 = moderate correlation, .60-.79 = moderately high correlation, and > .80 = high correlation. Correlations were generally low, although esteem and stress appeared to have the most significant relationship with other variables.

Table 29. Pearson bivariate correlations with 1,000 bootstrapped 95% confidence intervals.

Variable	Mastery Approach	Mastery Avoidance	Performance Approach	Performance Avoidance	Challenge	Threat	Task	Distraction	Disengagement
Attitude	-.21** (-.33, -.08)	-.07 (-.19, .05)	.01 (-.11, .13)	.06 (-.05, .16)	-.20** (-.32, -.08)	.15** (.05, .27)	-.16** (-.26, -.05)	-.00 (-.09, .10)	.18** (.07, .27)
Threat	.23** (.12, .35)	-.08 (-.20, .03)	.10* (-.01, .22)	-.00 (*.10, .11)	.18** (.07, .28)	-.19** (-.29, -.08)	.14** (.04, .24)	-.12* (-.20, -.03)	-.16** (-.25, -.07)
Benefit	-.06 (-.16. .04)	.09 (-.02, .20)	.07 (-.05, .18)	.12* (-.01, .23)	-.11* (-.22, -.01)	.12* (.03, .23)	-.07 (-.18, .04)	.11* (.01, .21)	.22** (.13, .31)
Esteem	.37** (.25, .49)	.00 (-.10, .11)	.26** (.16, .37)	-.03 (-.13, .08)	.37** (.27, .47)	-.29** (-.40, -.19)	.33** (.24, .42)	-.08 (-.17, .02)	-.17** (-.28, -.07)
Cheating	-.26** (-.36, -.16)	.03 (-.07, .14)	-.00 (-.11, .09)	.06 (-.05, .16)	-.25** (-.35, .16)	.23** (.14, .33)	-.06 (-.16, .05)	.26** (.16, .36)	.37** (.28, .46)
Legitimacy	.26** (.16, .36)	.02 (-.10, .14)	.09 (-.02, .22)	-.04 (-.16. .09)	.30** (.20, .39)	-.13* (-.24, .02)	.31** (.22, .41)	-.06 (-.16, .05)	-.13* (-.22, -.03)
Reference Group	-.17** (-.26, -.08)	.12* (.03, .23)	-.06 (-.16, .05)	.06 (-.05, .16)	-.26** (-.35, -.16)	.31** (.21, .42)	.00 (-.10, .10)	.22** (.12, .32)	.27** (.18, .37)
Stress	-.10 (-.20, .01)	.39** (.29, .48)	-.03 (-.14, .08)	.23** (.12, .32)	-.29** (-.38, -.19)	.63** (.56, .70)	-.18** (-.29, -.07)	.20** (.10, .30)	.29** (.19, .38)
Susceptibility	-.28** (-.38, -.17)	.07 (-.04, .18)	-.04 (-.15, .06)	.08 (-.03, .19)	-.28** (-.38, -.18)	.30** (.21, .39)	-.07 (-.16, .04)	.19** (.10, .28)	.34** (.25, .43)

*Statistically significant at $p < .05$, **$p < .01$.

Next, we conducted a hierarchical linear regression to determine the extent to which doping susceptibility was predicted by the remaining ASDI variables. First, we entered demographic variables of gender, ethnicity, skill level, and years' experience in block one, before entering the eight remaining ASDI subscales in block two. Confidence intervals were obtained from 1,000 bootstrapped samples. The results from this analysis are presented in Table 30. Model one (demographics) revealed minimal effect ($\Delta R^2 = .035$, $F(4,356) = 3.20$, $p = .013$). Overall, 65.5% of doping susceptibility variance was accounted for, as model two substantively increased R^2 ($\Delta R^2 = .620$, $F(12,348) = 55.06$, $p < .001$). Four ASDI scales significantly contributed to the increased variance in doping susceptibility explained; attitude, benefit, cheating, and reference group.

Table 30. Hierarchical linear regression coefficients.

	B (95% CI)	SE β	*β*	*t*	R^2
Block 1					.035*
Gender	.642 (-.228, 1.537)	.477	.045	1.345	
Ethnicity	.017 (-.143, .165)	.069	.009	.251	
Skill level	-.015 (-.335, .322)	.179	-.003	-.081	
Years' experience	.054 (-.077, .175)	.066	.029	.828	
Block 2					.655**
Attitude	.276 (.153, .392)	.052	.186	5.265**	
Threat	-.064 (-.151, .038)	.042	-.052	-1.522	
Benefit	.113 (.048, .178)	.032	.126	3.546**	
Esteem	-.055 (-.164, .072)	.049	-.042	-1.119	
Cheating	.293 (.196, .387)	.036	.323	8.055**	
Legitimacy	.029 (-.051, .108)	.036	.029	.812	
Reference Group	.372 (.280, .466)	.035	.413	10.668**	
Stress	.034 (-.038, .108)	.036	.033	.932	

*Statistically significant at $p < .05$, **$p < .01$.

Path analyses

The first path model constructed was a mediation model, whereby coping strategies were regressed on stress appraisals, which were regressed on achievement goals, which were regressed on ASDI scales. Mastery approach was covaried with performance approach and mastery avoidance was covaried with performance avoidance to better represent the relationship between these variables. This model required the estimation of 78 parameters, presenting a ratio to participants of 4.71:1. Model fit indicated much room for improvement: $\chi^2(57) = 300.81$, CFI = .793, TLI = .574, SRMR = .083, RMSEA = .108 (95% CI = .96, .112). Modification indices suggested that

chi-square would be significantly reduced, and therefore model fit improved, with the introduction of several direct paths. Paths were estimated only when the predictor variable should appear to the left of the outcome variable. For example, an ASDI scale could be a predictor of all endogenous variables, achievement goals could be predictors of stress appraisals and coping strategies but not of ASDI scales. Stress appraisals could predict coping strategies, but coping strategies, as the final variables in the model, could not act as predictor variables. Specifically, the following paths were added:

- Task Coping ON Esteem;
- Task Coping ON Legitimacy;
- Challenge Appraisal ON Esteem;
- Challenge Appraisal ON Legitimacy;
- Challenge Appraisal ON Stress;
- Threat Appraisal ON Esteem;
- Threat Appraisal ON Stress;

This resulted in an improved model fit; $\chi^2(46) = 138.23$, CFI = .922, TLI = .800, SRMR = .043, RMSEA = .074 (95% CI = .060, .088) and the estimation of 89 parameters. RMSEA estimate of .074 indicates significant error in the model. Consequently, we next removed all paths that were not statistically significant. This was judged by meeting two conditions; a) $p > .05$ and b) 95% confidence intervals contained zero. The resultant model, which estimated 53 parameters, indicated good model fit; $\chi^2(37) = 79.05$, CFI = .962, TLI = .926, SRMR = .041, RMSEA = .056 (95% CI = .039, .073). All paths in this model were statistically significant and are presented in Figure 5.

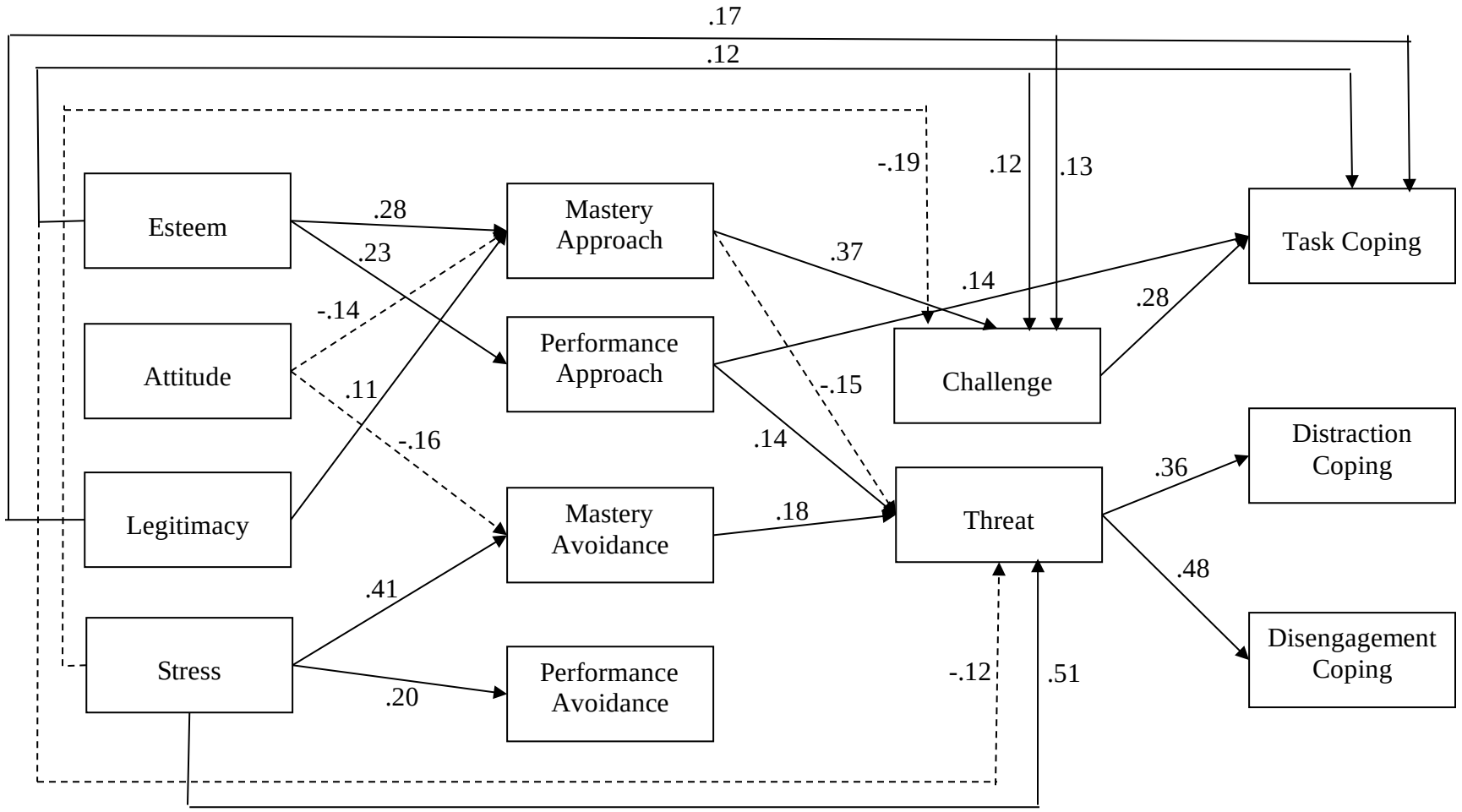
Four ASDI variables remained in this final path model. Esteem positively predicted mastery approach (β = .28, p < .001, 95% CI = .11, .45) and performance approach (β = .23, p < .001, 95% CI = .09, .36) goals. Attitude was negative predictive of both mastery approach and mastery avoidance. Stress presented a positive path to mastery avoidance and performance avoidance. Notably, stress was also a significant predictor of threat appraisals (β = .51, p < .001, 95% CI = .39, .62). Finally, we examined indirect effects throughout the model. The results of this analysis are presented in Table 31. The most significant indirect effect was stress via threat appraisals leading to disengagement coping (γ = .283, p < .001, 95% CI = .203, .362).

Table 31. Standardized indirect effects with 95% confidence intervals.

	Via challenge	Via threat	Via mastery approach	Via performance approach	Via mastery avoidance
Task coping					
Mastery approach	.104 (.047, .162)	N/A	-	-	-
Performance approach	N/A	N/A	-	-	-
Mastery avoidance	N/A	N/A	-	-	-
Performance avoidance	N/A	N/A	-	-	-
Attitude	-.015 (-.035, .004)	N/A	-.015 (-.035, .004)	N/A	N/A
Esteem	.034 (-.008, .075)	N/A	.029 (.007, .051)	.031 (-.003, .065)	N/A
Legitimacy	.036 (-.001, .073)	N/A	.012 (-.004, .027)	N/A	N/A
Stress	-.053 (-.093, -.012)	N/A	N/A	N/A	N/A
Distraction coping					-
Mastery approach	N/A	-.054 (-.103, -.004)	-	-	-
Performance approach	N/A	.050 (.008, .092)	-	-	-
Mastery avoidance	N/A	.064 (.025, .104)	-	-	-
Performance avoidance	N/A	N/A	-	-	-
Attitude	N/A	-.002 (-.016, .011)	.008 (-.004, .020)	N/A	-.010 (-.020, .000)
Esteem	N/A	-.046 (-.099, .007)	-.015 (-.031, .001)	.011 (.000, .023)	N/A
Legitimacy	N/A	-.006 (-.014, .003)	-.006 (-.014, .003)	N/A	N/A
Stress	N/A	.207 (.134, .281)	N/A	N/A	.026 (.008, .044)
Disengagement coping					
Mastery approach	N/A	-.116 (-.140, -.006)	-	-	-
Performance approach	N/A	.033 (.013, .125)	-	-	-
Mastery avoidance	N/A	.055 (.037, .138)	-	-	-
Performance avoidance	N/A	N/A	-	-	-
Attitude	N/A	-.015 (-.021, .015)	.011 (-.006, .027)	N/A	-.014 (-.028, .000)
Esteem	N/A	-.109 (-.135, .008)	-.020 (-.042, .002)	.016 (.000, .031)	N/A
Legitimacy	N/A	-.008 (-.020, .004)	-.008 (-.020, .004)	N/A	N/A
Stress	N/A	.283 (.203, .362)	N/A	N/A	.036 (.012, .059)

Note. N/A refers to where there is no path in model to estimate. There were no estimates via performance avoidance.

Figure 5. Final path model with standardized parameter estimates.



Discussion

The aim of this study was to assess whether variables associated with stress (e.g., achievement goals, appraisals, and coping) were associated with doping. Similar to Study 1 of Phase 3, we found partial support for our hypotheses, although the correlations were low. As expected, challenge appraisals were negatively associated with doping attitudes, whereas threat appraisals were positively associated with favorable attitudes towards doping. In regards to achievement goals, only mastery-approach goals were associated with attitudes, and this relationship was negative. Finally, task-oriented coping was negatively associated with doping attitudes, whereas disengagement was positively associated with doping attitudes.

Study 2 represents one of the first attempts to explore the relationship between stress appraisals and doping attitudes. The coaches who were interviewed by Nicholls et al. (2015) suggested that stress may be a key factor in influencing whether athletes will dope. Although we did not examine doping prevalence, doping attitudes predict doping among young people (Zelli et al., 2010). The findings in this study add to Nicholls et al. (2015) by inferring the way in which stress is appraised (i.e., challenge vs. threat) predicts doping attitudes. As such, it would beneficial to encourage young athletes to view stressful situations as challenging, by encouraging to focus on what they could gain, what they want to achieve, and creating strategies for how goals could be achieve.

Only one form of achievement goal, mastery-approach goals, were associated with doping attitudes. The direction of the correlation was expected, but our finding

suggests that achievement goals are less related to doping attitudes than other constructs. Although doping attitudes are associated with doping use among young athletes (e.g., Zelli et al., 2010), we did not record substance or methods used. Further research endeavors could explore the relationship in more detail by examining if there is a relationship between doping prevalence and achievement goals among young athletes.

Given that coaches in Nicholls et al. (2015) believed that doping is related to stress, it is unsurprising that attitudes towards doping with linked to coping. That is, young athletes with a favorable doping attitude were more likely to use disengagement-oriented coping, whereas an unfavorable doping attitude was associated with task-oriented coping. Those who deploy task-oriented coping strategies are actively trying to master a stressful situation, and it appears these individuals are less likely to think favorably about PEDs. As such, young athletes could be encouraged to use task-oriented strategies.

A recent systematic review by Nicholls et al. (2017) identified 22 psychological constructs that were associated with doping. Neither, appraisals, achievement goals, nor coping were not on the list, so this study adds to the long list of psychological variables that predict doping. In some respects, it is not surprising that the correlation values were small given the number of different psychological factors that predict doping among young people. These include aggression (Sagoe et al., 2016), motivation (Chan et al., 2015), and norms (Barkoukis et al., 2015). There is quite a diverse range of psychological factors that have already been identified, and it is likely that others will emerge, which all contribute a small part to doping. A consequence of this is that doping

education programs need to be varied and cover a wide range of topics. A limitation of Study 2, and similar to Study 1 and Study 3 of Phase 3 is that we did not explore doping prevalence among the sample and have inferred a relationship between attitudes towards doping and substance use based on previous findings with young people that linked attitudes and doping use. In conclusion, we identified three other psychological variables that are associated with doping among young athletes. Given that stress appraisals and coping can both be manipulated among athletes, training in these constructs could be included in doping education programs for young people.

Study 3: Environmental-Social Factors and Doping Attitudes and Susceptibility

Introduction

The sporting environment has been found to have an impact on attitudes (Christodoulidis et al., 2001). It is therefore plausible that the motivational climate may shape attitudes towards doping, as might the coach-athlete relationship, and coaching behaviour, particularly because coaches are thought to exert a strong influence on young athletes (Wrobble et al., 2002). Indeed, Terney and McLain (1990) reported that 2% of athletes said a coach had recommended AAS. Further, some young athletes may use their coach to obtain AAS (Stilger and Yesalis, 1999). Recent research by Nicholls et al. (2015) revealed that coaches are crucial in influencing and shaping adolescents' attitudes towards doping.

Objectives: Assess the relationship between doping attitudes and (1) the motivational climate, (2) coach-athlete relationship, and (3) coach behaviour.

Hypotheses: Attitudes to doping would be negatively associated with an empowering motivational climate, but positively associated with a disempowering motivational climate. Further, an athlete's poor perception of his or her coach-athlete relationships will be positively associated with positive attitudes towards doping, whereas controlling coaching behaviors will be positively associated with positive doping attitudes, but autonomy supportive coaching behaviors will be negatively associated with positive attitudes towards doping.

Methods

Participants

Three-hundred and ninety athletes (male *n* = 275, female *n* = 115), aged between 12 and 18 years of age (M_{age} = 16.06, *SD* = 1.83) participated in Study 2. Our sample resided in the United Kingdom (*n* = 255), Australia (*n* = 45), Hong Kong (*n* = 34), or the United States (*n* = 56). Our sample consisted of North West European (*n* = 279), Oceania (*n* = 41), South East Asian (*n* = 12), North East Asian (*n* = 2), North American (*n* = 27), Southern and Eastern European (*n* = 5), Central American (*n* = 11), South American (*n* = 2), Sub-Saharan (*n* = 1) and unspecified (*n* = 10) athletes. Athletes competed at beginner (*n* = 41), amateur (*n* = 209), semi-professional (*n* = 76), professional (*n* = 2), county or state (*n* = 22), national (*n* = 9), or international (*n* = 5). Three athletes failed to report their skill level.

Measures

Doping Attitudes. The Adolescent Sport Doping Inventory (ASDI; Nicholls et al., 2016) will be used to assess attitudes to doping and factors that predict doping behaviors.

Motivational Climate. The Empowering and Disempowering Motivational Climate Questionnaire-Coach (EDMCQ-C; Appleton et al. 2016) will be used to assess the motivational climate. This is a 37-item questionnaire, which assesses the extent to which the climate is empowering or disempowering.

Coach-Athlete Relationship. The 11-item Coach Athlete Relationship Questionnaire (CART-Q; Jowett & Ntoumanis, 2004) will assess the athletes' perceptions of closeness, commitment, and complementarity with their coach.

Coach-Behaviour. The same approach adopted by Healy et al. (2014) will be used to assess coach behaviour. That is, participants will complete an adapted version of the Health-Care Climate Questionnaire (Williams et al., 1996) to assess coach autonomy support, in addition to the Controlling Coach Behaviours Scale (Bartholomew et al., 2010) to measure the extent to which the coach displays controlling behaviours.

Data Analyses

Data from all measures was firstly screened for outliers, missing data and univariate normality. We assessed internal consistency using omega point estimates and bootstrapped confidence intervals. This method was preferred to Cronbach's alpha, as it holds fewer assumptions (Dunn, Baguley, & Brunsden, 2013).

After examining correlation coefficients, we ran a hierarchical linear egression to determine the predictive capabilities of environmental and ASDI variables on doping susceptibility.

Results

Data were initially screened for missing data and outliers. Overall, fewer than 1% of cells contained missing data and examination of Q-Q plots identified no issues with outliers. Descriptive statistics, normality estimates, and omega point estimates are presented in Table x. There were no issues with skewness (all scales < 2). Scale internal consistency was confirmed by assessing omega point estimates and bootstrapped confidence intervals, calculated using the MBESS package (Kelley & Lai, 2012) in R (R Development Core Team, 2012) with 1,000 bootstrap samples. All ASDI, CART-Q, and Coach Behaviour subscales exceeded .80, indicating very high internal

consistency. Two of the subscales from EDMCQ-C however were below .70. The socially supporting subscale (ω = .68, 95% CI = .59, .75) was marginally below but not enough to cause concern. The autonomy supportive subscale however was substantively below .70 (ω = .55, 95% CI = .48, .61). Examination of the inter-item correlation matrix identified that item 22 negatively correlated with two items form the same scale. Consequently, we removed this item and re-examined internal consistency. This presented a marginal improvement (ω = .62, 95% CI = .54, .68). This slightly shortened scale was used in subsequent analyses.

Table x. Descriptive statistics, normality estimates, and omega point estimates for all scales.

Subscale	Mean	SD	Min	Max	Skew	Kurt	ω (95% CI)
ASDI							
Attitude	7.51	4.06	4.00	28.00	1.74	3.10	.84 (.79, .88)
Threat	21.08	5.20	4.00	28.00	-.76	.47	.88 (.85, .91)
Benefit	12.26	7.11	5.00	35.00	1.05	.40	.92 (.90, .94)
Esteem	29.14	5.37	5.00	35.00	-1.52	3.17	.88 (.85, .91)
Cheating	10.47	6.32	5.00	35.00	1.47	1.73	.89 (.85, .91)
Legitimacy	24.66	6.17	5.00	35.00	-.42	.17	.88 (.85, .91)
Reference Group	11.53	6.82	5.00	35.00	1.01	.26	.93 (.91, .94)
Stress	14.90	6.50	5.00	35.00	.38	-.59	.88 (.85, .90)
Susceptibility	10.70	6.34	5.00	35.00	1.22	1.07	.91 (.86, .93)
EDMCQ-C							
Task Involving	37.80	5.30	18.00	76.00	.28	6.97	.74 (.50, .85)
Autonomy Supportive[1]	15.60	2.59	7.00	20.00	-.32	-.36	.62 (.54, .68)
Socially Supporting	12.09	2.20	3.00	15.00	-.73	.55	.68 (.59, .75)
Ego Involving	18.68	5.92	8.00	25.00	.27	-.65	.84 (.82, .86)
Controlling Coaching	25.75	7.59	10.00	61.00	.62	1.37	.77 (.67, .84)
CART-Q							
Closeness	23.97	4.24	5.00	30.00	-1.66	3.68	.94 (.91, .96)
Commitment	16.20	3.36	3.00	21.00	-.96	1.14	.80 (.75, .85)
Complementarity	23.34	4.17	4.00	29.00	-1.42	2.70	.90 (.85, .93)
Overall Coach Athlete Relationship	63.49	11.10	17.00	77.00	-1.50	3.01	.96 (.94, .97)
Coach Behaviour							

Autonomy Support	81.00	14.21	25.00	105.00	-.86	.62	.94 (.92, .95)
Controlling Coach Behaviours	43.07	17.17	17.00	105.00	.74	.13	.92 (.88, .94)

[1]Calculated after removing item 22.

To gain initial insight of variable associations, we examined the Pearson bivariate correlations with 1,000 bootstrapped samples of ASDI scales with all environmental variables. The results are presented in table x. Correlations were interpreted following the recommendations of Zhu (2012) of < .20 = no correlation, .20-.39 = low correlation, .40-.59 = moderate correlation, .60-.79 = moderately high correlation, and > .80 = high correlation. Correlations were largely in the hypothesized directions but small.

…

Table x. Pearson bivariate correlations with 1,000 bootstrapped 95% confidence intervals.

Variable	Task Involving	Autonomy Supportive	Socially Supporting	Ego Involving	Controlling Coaching	Closeness	Commitment	Complementarity	Overall Relationship	Autonomy Support
Attitude	-.06 (-.17, .04)	-.02 (-.13, .09)	-.02 (-.14, .10)	.08 (-.04, .17)	.13* (.01, .23)	-.05 (-.17, .06)	.01 (-.12, .14)	-.07 (-.20, .05)	-.04 (-.17, .08)	-.08 (-.20, .03)
Threat	.20** (.08, .32)	.25** (.14, .34)	.18** (.08, .28)	-.11* (-.20, -.02)	-.08 (-.19, .03)	.15** (.05, .25)	.17** (.07, .27)	.18** (.09, .28)	.18** (.08, .27)	.23** (.14, .32)
Benefit	-.15** (-.27, -.05)	-.16** (-.27, -.06)	-.17** (-.28, -.06)	.31** (.21, .39)	.24** (.14, .35)	-.16** (-.27, -.05)	-.15** (-.27, -.04)	-.18** (-.29, -.07)	-.18** (-.29, -.06)	-.20** (-.31, -.09)
Esteem	.28** (.17, .40)	.19** (.08, .30)	.19** (.08, .29)	-.13** (-.22, -.04)	-.12* (-.22, -.01)	.26** (.13, .39)	.31** (.20, .43)	.28** (.15, .42)	.30** (.17, .43)	.35** (.24, .45)
Cheating	-.28** (-.37, -.18)	-.22** (-.31, -.12)	-.23** (-.33, -.13)	.32** (.20, .41)	.27** (.17, .38)	-.24** (-.35, -.13)	-.21** (-.33, -.09)	-.24** (-.36, -.13)	-.25** (-.36, -.13)	-.30** (-.40, -.19)
Legitimacy	.28** (.18, .39)	.27** (.17, .36)	.29** (.18, .39)	-.28** (-.38, -.19)	-.19** (-.29, -.08)	.20** (.10, .30)	.20** (.10, .30)	.21** (.10, .31)	.22** (.12, .31)	.29** (.18, .38)
Reference Group	-.18** (-.29, -.07)	-.07 (-.18, .04)	-.15** (-.27, -.05)	.27** (.16, .38)	.31** (.20, .41)	-.16** (-.28, -.05)	-.13* (-.24, -.01)	-.17** (-.29, -.05)	-.16** (-.28, -.05)	-.21** (-.32, -.10)
Stress	-.07 (-.16, .02)	-.14** (-.24, -.04)	-.13* (-.24, -.02)	.26** (.17, .35)	.21** (.10, .33)	-.13* (-.22, -.04)	-.15** (-.25, -.06)	-.15** (-.25, -.05)	-.15** (-.28, -.05)	-.13* (-.24, -.02)
Susceptibility	-.16** (-.26, -.07)	-.05 (-.15, .06)	-.11* (-.22, -.01)	.19** (.09, .29)	.21** (.10, .32)	-.14** (-.25, -.03)	-.07 (-.18, .03)	-.14** (-.25, -.03)	-.13* (-.23, -.02)	-.17** (-.28, -.06)

*Statistically significant at $p < .05$, **$p < .01$.

Next, we conducted a hierarchical linear regression to determine the extent to which doping susceptibility was predicted by coaching environment the remaining ASDI variables. First, we entered demographic variables of gender, ethnicity, skill level, and years' experience in block one, then EDMCQ-C variables in block two, CART-Q variables in block three, autonomy supportive and controlling coach behaviours in block four, and finally, the eight remaining ASDI subscales in block five. Confidence intervals were obtained from 1,000 bootstrapped samples. The results from this analysis are presented in Table x. Model one (demographics) was not statistically significant (ΔR^2 = .026, $F(5,371) = 1.977$, $p = .081$). Model two explained a statistically significant amount of variance ($\Delta R^2 = .083$, $F(10,366) = 4.455$, $p <$ .001). Model three did not really explain anything further ($\Delta R^2 = .007$, $F(13,363) = 3.657$, $p < .001$). Model four also added negligible explanation of variance ($\Delta R^2 = .039$, $F(15,361) = 4.407$, $p < .001$). Finally, model five substantively increased R^2 ($\Delta R^2 = .409$, $F(23,353) =$ 19.840, $p < .001$). In total, 56.4% of variance in doping susceptibility was explained, largely from ASDI subscales, and partially through EDMCQ-C subscales.

Autonomy supportive from the EDMCQ-C and autonomy supportive coaching behaviours presented contradictory findings, with a positive coefficient for autonomy supportive but negative for autonomy supportive behaviours. Of the ASDI predictors, cheating, reference group, and stress were all significant and positive contributors to doping susceptibility.

Table x. Hierarchical linear regression coefficients.

	B (95% CI)	SE β	*β*	*t*	R^2
Block 1					.026
Gender	.063 (-989, 1.156)	.548	-.017	-.418	
Ethnicity	.062 (-.109, .206)	.077	.014	.349	
Skill level	.050 (-.332, .426)	.192	.010	.259	
Years' experience	.025 (-.115, .154)	.072	.014	.349	
Block 2					.109**
Task Involving	-.075 (-.174, .035)	.059	-.063	-1.271	
Autonomy Supportive	.789 (.352, 1.230)	.228	.370	3.466**	
Socially Supportive	.040 (-.262, .311)	.150	.014	.269	
Ego Involving	.034 (-.104, .155)	.062	.032	.543	
Controlling Coaching	-.024 (-.115, .084)	.047	-.029	-.515	
Block 3					.116
Closeness	.006 (-.289, .273)	.125	.004	.044	
Commitment	.124 (-.125, .382)	.124	.066	1.003	
Complementarity	-.047 (-.334, .271)	.129	-.031	-.364	
Block 4					.155**
Autonomy Support	-.744 (-1.243, -.244)	.273	-.305	-2.722**	
Controlling Coach Behaviours	-.036 (-.087, .011)	.023	-.098	-1.597	
Block 5					.564**
Attitude	.126 (-.034, .282)	.066	.091	1.891	

Threat	-.037 (-.111, .044)	.048	-.030	-.777
Benefit	.015 (-.066, .092)	.041	.017	.371
Esteem	-.016 (-.115, .096)	.047	-.014	-.344
Cheating	.213 (.103, .323)	.050	.214	4.299**
Legitimacy	.049 (-.043, .140)	.045	.047	1.097
Reference Group	.424 (.314, .525)	.044	.460	9.533**
Stress	.129 (.044, .226)	.041	.132	3.150**

*Statistically significant at $p < .05$, **$p < .01$.

Discussion

The main aim of this study was to assess how coach-related variables (e.g., motivational climate, coach behavior, and the coach-athlete relationship) were associated with doping attitudes. Only construct was significantly associated with doping attitudes and that was controlling coaching. Another factor that predicts doping prevalence among young people is susceptibility (Barkouskis et al., 2015; Blank et al., 2016). Susceptibility was associated with the motivational climate, the coach-athlete relationship, and coach behaviors. That is, athletes who were susceptible towards doping were in a controlling and uncaring environment, had a poor relationship with their coach, and were coached with controlling behaviors.

Although coaching factors did not predict attitudes, they were linked to susceptibility. Given that susceptibility is another factor that is associated with doping prevalence, it could be argued that doping is required in coach education programs, because this could also impact upon doping prevalence. It should be noted, however, that the correlations between susceptibility and the coaching factors were relatively small.

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APPENDICES

Appendix 1 – Interview Guide

In this interview we are interested in hearing about your perceptions regarding elite adolescents' attitudes towards doping and the factors that might influence such attitudes and susceptibility towards doping.

PART 1: ADOLESCENTS' ATTITUDES TOWARDS DOPING

1) To what extent do adolescent athletes believe that they can reduce the period in which they are out injured by taking performance enhancing drugs

2) Describe whether you believe that adolescent athletes who take recreational drugs do so to help them with performance in someway

3) To what extent do adolescent athletes believe that the health risks associated with doping are over exaggerated?

4) Describe whether adolescent athletes think that doping is an unavoidable part of sport, in that some athletes are always going to dope

5) To what extent do adolescent athletes believe that there is no difference between performance enhancing drugs and the use of technical advances (e.g., new equipment) to boost performance?

PART 2: FACTORS THAT MIGHT INFLUENCE ATTITUDES TOWARDS DOPING.

Threat Questions

1) To what extent do you believe that adolescent athletes would believe that they would be able to take banned substances out of competition and get away with it, because the tests would not detect the substance?

2) To what extent do you believe that adolescent athletes would believe that they would be able to take banned substances during competition and get away with it, because the tests would not detect the substance?

3) Describe whether you think adolescent athletes would believe that they could be successful in appealing any ban from testing positive for performance enhancing drug.

4) Tell me about whether you think adolescent athletes are aware of the severity of sanctions for a positive test?

5) To what extent are adolescent athletes aware of the perceived health consequences of taking performance enhancing drugs, such as the severity of illnesses, the likelihood of getting ill, or whether any effects would be reversible?

Benefit Questions

1) From your dealings with adolescent athletes, to what extent do you believe that they think it is necessary to take performance enhancing drugs at some point to perform at the highest level possible?

2) To what extent do adolescent athletes believe that they would be able to take performance enhancing drugs without any of health problems or undue cost?

3. Describe whether an adolescent athlete knowing that is rival is doping would influence them to take performance enhancing drug

Legitimacy

1) Describe secure do you think adolescent athletes think testing procedures are for drug testing?

2) How serious do you think adolescents think that authorities such as WADA is in preventing doping?

3) Overall, how effective do adolescent athletes think that doping authorities are in preventing banned substances being taken?

Morality/Cheating

1) Describe whether you think athletes would dope if they thought they would win.

2) If an adolescent athlete knew other people were cheating, describe whether you think that would make them want to cheat or not.

3) Describe whether you think adolescent athletes are more likely to cheat if they think they can get away with it.

Self-esteem

1) To what extent will an athlete's self-esteem influence whether they might take a performance enhancing drug?

Reference Group

1) To what extent would views of parents or friends about an athlete if they were caught doping act as a deterrent?

PART 3: DOPING SUSCEPTIBILITY

1) To what extent do you think that a coach who encourages an adolescent athlete to dope would influence whether he/she does so or not?

2) Describe whether you think an adolescent athlete would be more tempted to dope if he or she believed that other athletes were doping

3) To what extent would an adolescent athlete be more tempted to dope if they were told that his or her performance would improve?

4) Describe whether you think that athletes would be more tempted to take performance enhancing drugs when preparing for the most important competitions/matches

Appendix 2: Sample Interview Transcript

PART 1: ADOLESCENTS' ATTITUDES TOWARDS DOPING

MT: Yeah. Right, so the first part - just looking at adolescent attitudes towards doping, so can you tell me to what extent do adolescent athletes believe they can reduce the period in which they are out injured by taking performance enhancing drugs? #00:02:29-4#

I think it's quite low in that respect. Certainly from my experiences in in my sport, I I don't think it's they they see it as a as a way of recovering and returning to injury quicker. #00:02:40-7#

MT: Ok, what would they see it as a use for, then? #00:02:45-2#

Predominately, to give them the edge in physical development in order to be physically capable to progress in sports. It'd be more about enhancing the physical preparation to be bigger and stronger rather than to return to injury. #00:02:59-0#

MT: Yeah. #00:03:00-0#

So it'd be about giving themselves a performance advantage physically in the collision, the contact, and probably the biggest biggest one is around trying to overtake the opposition. Obviously it's a an academy stronger, that's probably the temptation is around that age group to give them supplements to be able to train stronger, harder, and make themselves bigger to perform in the game. #00:03:20-0#

MT: Do you think that they could use performance enhancing drugs to help prevent injury by being bigger than the other guy, for example or? #00:03:31-5#

I think that's the perception that they have. Obviously from the education that they get, they obviously get told about the the risk to, particularly around tendons and ligaments, so they get they get told the risk to to taking performancing drugs. I don't think they see it as not a massive injury prevention directly, I think its more around the perception is 'it gives me an advantage physically' so therefore they wouldn't necessarily see it as 'I'm doing this to prevent me getting injured, it makes me so much stronger and bigger, it puts me in a performance advantage to make a professional contract'. #00:04:03-4#

MT: Ok. Can you describe whether you believe that adolescent athletes who take recreational drugs such as marijuana or cocaine do so to help themselves with performance in some way? #00:04:17-8#

No I don't, I don't think that, my experiences are no, not not in the not in rugby league. They may take it for recreational and downtime. Prescription drugs are probably a a bigger challenge for for our game so, rather than marijuana and recreational so, sleepers are are a bigger problems, post-performance to help recovery and get their head down. #00:04:45-2#

MT: Would that be from a doctor or would that be over the counter stuff that you can buy? #00:04:50-0#

Combination of what they can get hold of from somebody else over the counter, and then there's a bit of a problem in the game where some senior players will take them, and the kids will just start copying in in the junior environment and we had we had we did have a situation in the past where players would basically ask for them on behalf of some, they'd all ask for a small one then somebody else would be taking three or four instead. But a a lot of it is under the counter type, what works for somebody else so they're through reputation, so prescription drugs

that somebody else has passed on but certainly not through a GP or a club doctor. #00:05:30-6#

MT: Is this something you've seen for a quite a while then in in rugby league? #00:05:34-0#

Yeah yeah, it's the the advent of evening games. So, recently get an eight o'clock kick off, playing a high contact game, you're not finishing til half past ten, eleven o'clock at night. The use of sleepers has has become bigger and bigger and bigger, so as the junior players come in, that's one of the things that they start, they follow suit, and yeah it's it's it's has been a problem and it's something that obviously the rugby league are working on at the moment. #00:06:01-8#

MT: How how are the rugby league working on addressing this issue? #00:06:05-7#

Education awareness... there's a, we have a, we have a like an apprenticeship or rookie camp, we have a apprenticeship program as well, players are given their education on that In addition to that every clubs doctor has a confidentiality there's a confidentiality helpline and around around specifically around that support and in addition to that,

every club has a welfare officer, and that's been one of the big drives of the of the welfare officers support. So its people knowing that one - it's an education point for the junior players around 'you don't need it, there's alternatives, you can get your better sleep pattern, you can do other things', and then supporting the older ones that are around the older the around the age group environment out of the age group environment, there's more around the support for those who are taking them. #00:06:57-6#

MT: Ok. That's not something I've really heard of before, the use of like sleeping sleeping tablets before. I wasn't aware of that. Do you think your athletes, they they see like the the dangers of using those drugs, or do they think because you can get them over the counter, they're absolutely fine to use? #00:07:19-3#

There's a real mix. I mean, there's there's two sides to it I feel I mean obviously some of the some of the some of the stuff that that they get through over people, not not all of it's above the counter, so some of it's from somebody else under the counter, that the challenge is that they don't know what they're taking. So often it's a mix or a combination, and there have been circumstances where some athletes have been unable to function for a considerable period of time afterwards, so y'know they're just taking something to get them to sleep but actually the impact is beyond what they were expecting. So, yeah I am aware

that certain junior players been sent sent home from the club have been supported afterwards cause they've taken something that's had a an adverse reaction and that's the obviously that's the challenge between taking prescription drugs, taking counter drugs, and then taking something that they can get at the passed on second hand or through the gym, etcetera. #00:08:14-3#

MT: Yeah, ok. To what extent do adolescent athletes believe the health risks associated with doping are over-exaggerated? #00:08:24-7#

I would say, particularly in the fifteen to eighteen that they think it's a scare tactic. So it's used a a deterrent rather than it's not real. I think its I think it's it's a by-product of three things: One - its, the outlook of young people, which is 'it won't happen to me', I think the second factor is 'it'll happen to me further down the line so there's a risk to come to that as performance athletes - that's not me, it doesn't bother me'. And I think I think the third factor is because of the way it's put across sometimes its y'know, in rugby league there's a big drive on testicles and shrinking testicles and they laugh it off as 'oh it's not me' and I think to some extent they see it as a de, because of the way it's a framed, they see it as as a as a deterrent rather than an actual risk. #00:09:18-3#

MT: Yeah, ok. Can you describe whether adolescent athletes think that doping is an unavoidable part of sport, in that some athletes are always going to dope no matter what? #00:09:32-3#

: In's interest, I've seen a I've seen a I've seen quite a big shift recently. I think there was almost a case of the players don't... I think the players are more more more aware of that individuals that come from sort of like the community game in on the fringes, the the youngsters that are in a club environment now, fourteen fifteen, sixteen, seventeen, eighteen are more aware of the benefits of, whilst there's a risk to them but legal supplements, and supplementation, so that but I think there's there's an awareness that some players that come from a a community or a later developer if you like, fringe player have taken something to come in and I think there's there's almost a kids almost assume that and you you hear that y'know, its youth age banter but you hear the banter of 'oh, he's gotta be on growth, he was never that big last year etcetera etcetera. So I think I think there's there's an acknowledgement that it it does take place and sometimes that occurs in the in the sport, but not necessarily it's everybody does it now. #00:10:42-8#

MT: Yeah. #00:10:43-5#

I think that's probably increase in education, increase in support, and the fact that they're given alternatives. So there's there's a big a big, certainly in the last seven or eight years, there's been a much greater drive to educating on the alternatives to, or what do you think it does for you, and and and as you mentioned before about the the injury illness type symptoms of taking taking illegal supplements and and steroids, but one of the things that's big flip is that for us, it's now more a case of 'do you know what benefit they do? And even if you do take them, you've gotta train on them and actually there's better supplements and there are better alternatives and y'know you're chasing the one percenters and you've not even hit your potential yet. So I think it's through an education point of view rather than 'you don't do this, it's such a risk', it's educating them why, why they think there's a benefit when they do it, and I think that that educations started earlier and more frequent and that that's probably the biggest different difference if I'm honest. There used to be an annual, its part of the operational rules in rugby league, so all the players must receive a full doping workshop, and it was an annual 'sit through this and get out'. Now the coaches are more aware of it now, now the programs hit it more often and its visited more often, I I think there's probably greater awareness that it's not such a risk, sorry, there's not such a need and the players are more aware of alternatives, so I think it removes that risk. #00:12:10-7#

MT: Yeah, ok. To to what extent do adolescent athletes believe that there is no difference between performance enhancing drugs and the

use of technical advances, such as new equipment, to boost performance? #00:12:27-6#

In rugby league they see it as a big difference. So it's still at that age where you're changing type structure if you get if you get caught, so there's a there's a big difference between, that that assumption would be 'yeah that's cheating' whereas y'know gloves, helmets, pads, grips whatever that's y'know part of the game so they would see it as a significant difference. #00:12:47-9#

PART 2: FACTORS THAT MIGHT INFLUENCE ATTITUDES TOWARDS DOPING.

Threat Questions

MT: Yeah, ok. To what extent do you believe that adolescent athletes would believe that they would be able to take banned substances out of competition and get away with it, because the tests would not detect what they were taking? #00:13:04-1#

Yeah yeah I would certainly say up until the last eighteen months, quite high. Whether they take them or not, the perception is they'll clear out of your system, you can't get caught, it's ok in out of season. I think with some of the higher profile cases that have come out in rugby

league out there and more juniors going to out of season competition out of season testing etcetera and then national testing pool, that's probably made it a bit more cautionary and so there's that risk, but certainly yeah it was there certainly was a feeling that if you took it in off season, if you chose to take something in off-season you wouldn't get caught, that was fine. #00:13:43-4#

MT: Yeah, ok. How about during competition? Do you believe that athletes would believe that they were able to take substances then and get away with it? #00:13:55-6#

Well anybody gets caught obviously is gonna get away with it so I think there's a view that yeah the some some see the risk worthwhile, but I think there's an acknowledgement that if you get if you take them and you get caught and you get you get identified for testing then you will get caught,. So I don't I don't think there's a belief that they can beat the system. I think quite a lot of cases, they're looking for, they're taking they're taking something that that they've been told is not yet banned or it doesn't have a banned substance so they're trying they're looking for a performance gain, not necessarily knowing exactly what they're taking, and then that's the risk that that's the risks that calculated risk that some will take. #00:14:34-9#

MT: Yeah, ok. Can you describe whether you think adolescent athletes would believe they could successful in appealing any ban for testing positive for performance enhancing drugs? #00:14:48-1#

Oh yeah yeah yeah. Obviously I know UKAD have just put out that they're tightening up again, but I think certainly in rugby league in the last four to five years, when when it was a straightforward mandatory four year ban and the education it four year bans, y'know we started getting pushed back last four years where players are saying 'well I know somebody who's got a lesser ban' and 'I know somebody that told who else was selling them so they got lesser ban' or we've had we've had a couple players playing in the championship where, and it's an interesting perception of the players, the bans that the players got cause the circumstances was was of a duration that basically was the off-season, so they ended up getting a nine or ten month ban, so by the time they did it, the players were almost like 'well, he's got away with that'. So there is a perception that you can mitigate your circumstances to such a point that actually, it doesn't carry very much weight. So in the last three years certainly there's been at least one player that their ban their ban fell with, the clubs didn't make the play-offs so they were out early in the season, in September, with the agreement they had they returned in March, missed two games. So it's almost like #00:16:01-0#

MT: Two games?! #00:16:00-9#

: Yeah cause its off-season cause of the length of duration. So no, yeah. So it's that mitigated circumstances, y'know, intel provided intelligence to UKAD and then because of the times of of of the the ban, and it ended up missing two games. There's a couple of other examples where people have missed parts of the season in the past. More in the Championship but, and that that's the one where it does make y'know I've been quite open with when I worked full-time at the RFL with UKAD that I don't think that does us any favours, because I think kids see it as, if you like, the risk is more in their favour now. #00:16:39-0#

MT: Definitely #00:16:40-5#

And y'know it was good good to hear that y'know certainly that the idea of the four year ban coming back, although I think y'know they even when I was at a I was at world class conference in November and I think when somebody pressed hard 'are you categorically saying people will get a four year ban?', 'well no, that's what we're going back to' so so its I don't think even there's y'know it's the legalities test case and careers, I'm not sure, I think they're saying that they're going to have to wait and see what it is as a test case but there seems to be this

reluctance to to go that statutory mandatory four year ban and I think certainly when people see much lower levels of ban, they think 'oh well that's not too bad' and y'know from a junior playing perspective if I'm honest that's probably more of a deterrent. So certainly in the pathway, you're talking when we used to educate the fourteen, fifteen, six year olds, we talked about if you got as four year ban, the likelihood of you being offered a contract post four years is non-existent. Suddenly if it starts to be if you're eighteen and its and its nine month ban, you might get another contract. So it was almost like a, it's a career stopper early on in your career and obviously if if you're right rightly aware at that age group, that's where the the potential thought process is probably greater, about trying to get that performance advantage to be get a contract, to get selected, to get in the first team. So that was that was a a difficult thing for us, it worked really well for us with a four year four years fit quite nicely with the idea of that basically it was a, if you got caught, you chose to take that risk, it was your career over if you got caught. #00:18:15-7#

MT: Ok well, for example, speaking of that lad that that missed two games, could there not be further consequences in that say some clubs wouldn't now want to potentially like sign him in the future, or do clubs accept that doping is part and parcel of the sport and they'll happily sign someone that they know has been doping, for example? #00:18:39-7#

Yeah I don't think they accept that its part and parcel of the sport but I think there's an acknowledgement that 'you've been caught, you do your service' so there's never been, in our sport, there's been obviously a couple of high-profile ones. Terry Newton's obviously was, and unfortunately Terry died and, in a way he probably was the horrendous thing to do but obviously some of the tablets that that Terry was taking, he was on sleepers as well, and y'know it had a profound medical effect on him, and at that probably had an impact on the sport to make them think differently in a lot of situations. But then you get Gareth Hock, so I don't know much y'know, Gareth got got banned y'know obviously got banned for cocaine but he got a significant ban but throughout that time, Wigan paid for a personal trainer and it kept him on his salary, so as soon as his ban was over, he continued, he was still paid on his contract. In the past, Ryan Hudson got tested positive moving from Huddersfield to Bradford, his contract was torn up so to some extent, Ryan was out of the game. Y'know Gareth Ryan to this day, always claimed always stated that he took a he was taking a supplement that had a banned substance within it, but I think pretty much that clubs are pretty open to recontracting so the players that come through rec, the vast majority are recontracted, certainly if they've made it into a into a into the full-time arena, those players come back after the ban, often with the wrong club, so they serve the ban and then they're back in the club, but I y'know just thinking now of Gareth Hock, Ryan Hudson, Gleeson, trying to think who else did it, Dave... yeah, they've all all the lads who were around the first Super League first team come straight

back in. Championship depending on where they are that just depends and that's to some extent that's whether they chose to go back in to the game cause obviously they're part-time players but there's quite a few, the guy I was talking about with a two match ban obviously with his club he went straight back in, there's quite a few other players that have received a ban and returned. Depends on on where they are in a performance level - sometimes at part-time they drop down a level but its part-time player but players that have that have become a, we use the term a 'regular first teamer' in a in Super League full-time environment - there's always a place for them coming back somewhere. #00:21:06-2#

MT: Yeah. You touched on this earlier but what do you think the views of adolescent athletes are on the severity of sanctions for a positive test? #00:21:21-6#

: ...I think I think their view is that I think when it when it was seen as four years, it was pretty y'know, they saw it as it was the right thing. I've been lucky enough to y'know every year for seven years I did I did I did our anti-doping at a national national level which was a hundred and eight kids, plus the national under fourteens, which is another forty kids. In all the time I did that education for seven years, I've only ever had three kids ever say 'I'll take the risk cause the ban ain't that bad'. So in all the time the delivery, we only had ever had three kids. And it was a

confidence in confidence really in a workshop type activity. In all that time we've only had three kids, y'know some might be thinking it three that stood out. I think most kids think that the ban is right, I think there's a concern, there certainly is that perception that now its dropped, and its much lower, that it it almost mitigates the risk, and I think that that's a genuine, certainly that's a genuine threat to to to young people now cause the reality is that society society is moving towards the quick fix, the short training, what's the what's the performance advantage? And if you start making the risk down, I think that's a challenge and particularly in our sport where the age of Super League young players is dropping, so the game's getting tougher so people are playing younger so if you can break through quicker at a younger age, one it provides you with a potential revenue and job and two it gets you through the door quicker for longer, you're making more money. So I do think that's there's a genuine, I think that now they see that the dropping as a as a less of a deterrent, and certainly the comments when it was four years it was (inaudible) particularly we're talking about fourteen, fifteen, sixteen, seventeen, eighteen, nineteen, that that was seen as a while, and now this eighteen months, nine months, two years, mitigated out to return on this date, its seen as a bit of a 'oh well hang on a minute - that's a bit different now'. #00:23:27-9#

MT: Ok. To what extent are adolescent athletes aware of the perceived health consequences of taking performance enhancing drugs, such as

the severity of illnesses, the likelihood of getting ill, or whether any effects would be reversible? #00:23:45-3#

: I think I think they're aware of it and so the the the education they receive through the rugby league and and the welfare and the support they're very very aware of it. My experiences are the only ones who are genuinely genuinely become concerned were we used to do an activity where they we talk about 'would you put up, to be the best in the world, would you put up with a few spots? Would you put up with a y'know, would you put up a few mood swings? Would you put up with it?' And we went through progressively some of the by-products of taking banned substances. Most of the kids will go 'well, y'know' until you talk about its (inaudible), they'll put up with the, the vast majority start getting to severe problems. My only experiences if I'm honest that that are really concerned - young female players when they realise the risk to being sterile, not being able to have kids, that is probably quite a big shock to those. #00:24:38-7#

MT: Yeah. #00:24:40-1#

: But the vast majority of our players, it's it's like I said right at the very beginning, it's that 'that won't but that won't happen to me'. So I think there's that protection of 'it's a scare tactic and that's the extremes of all

these things that happen'. I don't think I don't think what helps is that whilst it's not as big as it was in the pro game, it's quite significant number of people take steroids around the amateur game and around the gyms that they're in and they see people and so the perception is that 'it isn't happening to him so it'll be alright for me'. #00:25:10-9#

Benefit Questions

MT: Ok. Aagain you touched on it again there, but from your dealings with adolescent athletes, to what extent do you believe that they think it is necessary to take performance enhancing drugs at some point to perform at the highest level? #00:25:24-9#

: I don't think it, my experience in in rugby league is that I don't think they think it's a it's a necessary. I think it's used as a... I think it's used when they get, when they get behind in a situation, so either they're, its seen as a potential risk where there's a full-time contract up for grabs, or they're in the under eighteens moving into the under nineteens (inaudible) looking for a full time contract or where they slip behind 'I've got got weak, I'm not as strong as I was, I've missed time out at the gym, I've had an injury' so obviously with the physicality of rugby league, if you're if you're injured and you can't train, that's a significant impact on your development. So I think that's probably the biggest prevalent then it's worth the risk. I don't think they see it as a

comeback from injury, what they do and you mentioned that before, what they do see it as 'if I've had time out because of the injury, it'll help me back up to speed where I was' and its used as almost like 'a fix to get me through a window' and I know a couple of conversations I've had with players where they always talk about in that third-person type of situation 'it's somebody else, not me', but I think one of the the comments which comes up 'it's almost like a short-term fix to get me back to where I need to be' and I and my experience is that they they talk a lot about that. The ones that's the biggest worry is that if they get left behind, cause obviously the sports not massive and the risk of not being contracted at a certain age is significant cause you you you're development is is curtailed as you've moved from a full-time to a part-time environment and I think that's probably where that thought that thought crosses their mind the most, 'what do I need to do to keep in this environment, to keep going?' #00:27:10-8#

MT: Yeah. To what extent do adolescent athletes believe that they would be able to take performance enhancing drugs without any of the health problems or undue cost? #00:27:22-8#

: Yeah cause they think of it as short-term, I don't think they think there's a big risk to their health at all. #00:27:28-5#

MT: Yeah #00:27:29-4#

: And I think that that I, that I, y'know in our workshops we talk that y'know we talk about the fact that you don't know, what we did talk about, you don't know what's actually round the corner for you. One of the things is 'I'm not gonna be take it forever. If you did take it, it wouldn't be forever so it's alright, it would be short-term' and it's almost like that it's... I'm just trying to think what one of the fifteen year olds said, 'ah that's the bodybuilders that do it for ten years' and that's that's the feeling of it - its somebody who takes it every day for ten years is where they end up with a severe problem so I think they just think 'oh it gets you through a window, it gets you through an opportunity and that's the perception out there'. #00:28:07-1#

MT: Yeah. Well surely if they've relied on it once to get through that window, they might rely on it again to get through another? #00:28:14-1#

: Oh yeah yeah. As I say, its the its the their perception is is it won't it won't that that the long-term effects, it's that short-term fix, its that short-term get through an injury, get through a training program, get through a structure. I think the difficulty with in rugby league is every everybody who has been caught has basically gone 'oh it was just', nobodies come

nobodies come out and gone 'yeah I was on a systematic doping program, where I've been taking for X number of years', its always been a 'supplement' or a 'silly mistake' or a 'back from injury', so at the moment y'know the kids perception certainly is 'it's just that short-term', that's y'know that's the conversations I've had with the players, that's where they see it as a potential fix. #00:28:56-0#

MT: Yeah. Can you describe whether an adolescent athlete, knowing that a rival is doping, would influence them to take performance enhancing drugs? #00:29:06-6#

: I'm not aware of anybody saying they would do it as to compete with somebody, but I think that I think the other other bit we've had a conversation is, what they wouldn't do either is is would, we've had this is an interesting conversation we have, but they wouldn't hide they'd grass them up, that's their choice. Which is an interesting one really, but also, and I've talked to you about the injury and the situation of somebody being injured, they're prepared to take potentially somebody was talked about might take a performance enhancing drug but whilst they wouldn't take them, necessarily take them cause somebody else is, they wouldn't also inform on them either. So it's almost like a perverse loyalty that 'if that's his choice, it's his choice. I'm not gaining I'm not gaining an advantaged my telling somebody he's taking that'. #00:29:55-8#

Legitimacy

MT: Yeah. Can you describe how secure you think adolescent athletes think that the testing procedures are for drug testing? #00:30:05-9#

: Oh I would say they think it's very secure, yeah yeah. They don't they don't question it, the the my experience with all the players that I work with, none not one any any of the age groups up to the women's team, and they just don't ever challenge the the process. So I mean they think it's pretty secure. I think we're probably pretty lucky cause our competition is is predominately played in first-world countries so we don't have the same problems of being tested in in other countries about what so they get tested in either pretty much in England, France, Australia, New Zealand so the experiences themselves have always be of of a of a of a... substantial and well-organised process and they've never had a bad experience really. So I've I've y'know the old, every comment I've ever had is 'yeah its', they see it as the business really. I know it sounds daft, but that's what they see it as, y'know it's really good. One of the best processes. #00:31:05-5#

MT: Yeah. How serious do you think adolescent athletes think that authorities such as the World Anti-Doping Agency is in preventing doping? #00:31:19-7#

: If I'm really honest, I think they think that they think it's serious at the top, but not necessarily at the bottom. And that's just down to they know the volume of testing that gets done, so they're aware of how often they get tested in Super League and in competitions and the players that are that get around that edges, but at the bottom where they are in their twenties and that, the volume of testing is less, so I think they they see it as, yeah they are serious about it, I think that, bless you, they also acknowledge they also acknowledge that probably they prioritise in certain windows. #00:32:00-5#

MT: Ok. #00:32:01-9#

: Certain age groups. #00:32:02-8#

MT: So, how often do your athletes get tested then, do you find your adolescent athletes? #00:32:11-5#

: In the in the academy competition, depending on who you are and in pre-season out of competition, training pool, depends on who you are, so obviously intelligence lead and a and a bad lucky number out of out of the bag but y'know most most out of it, obviously with the size of the

playing pool, most people might get tested once or twice a season. #00:32:34-3#

MT: Yeah. #00:32:35-9#

: Pre-season then one in comp, and if you're really unlikely and it fell really badly, you might get done bad you've got to y'know if your team gets to the grand final and you got pulled in you got pulled in season once, you might get really unlucky in another game too, and then in pre-season you might get it four times. If you're in the first-team squad then obviously that changes significantly for the testing. And if you're international, you're probably expected to get tested once in a tournament but then depending on it, they'll pull seven players normally, so obviously a squad of eighteen played played two games, fourteen players get tested, there's a number of twenty out of twenty two though, nearly a third of the squad won't necessarily get tested. #00:33:18-0#

MT: Overall, how effective do adolescent athletes think that doping authorities are in preventing banned substances being taken? #00:33:30-2#

: ...My my my view would be that they think they do the best they possibly can, in the circumstances they're at. So they do the testing that's that's realistic to the size of the certainly for the size of the sport and what they're able to do, so I think there's an acknowledgement that the testing's there, it's it's out there. Whether they think they do enough is a is well suppose it's to perception, when they get pulled for a test and they've gotta hang around they think they do it too much but I think most of them say y'know one of the comments is certainly is 'we don't get tested enough'. As as we discuss it as as a principle so it doesn't directly affect them, it's all about the fact that pre-season probably doesn't get enough testing at that age group. #00:34:16-1#

Morality/Cheating

MT: Interesting question I think this one - can you describe whether you think athletes would dope if they thought they would win? #00:34:28-9#

: D'ya mean if they could win the sport, or whether they could dope if they wouldn't get caught for doping? #00:34:36-0#

MT: As in whether they thought it whether doping meant they would win super league, for example? #00:34:41-6#

: Well we used to do that as an activity. If they could guarantee it, I reckon, if they could guarantee success at the back end, I think we're roughly about fifty percent. Fifty percent at a junior level when we did the interviews. So we used to do it as an activity, we used to talk about 'if you could guarantee that you would be at the top of your game for three years and then not be able to play again, what would you do it?' About fifty percent. So that's that. If you turned round and told them that nobody would ever found out about them doping, that shoots up massively. So the, I think, I think, I think there's about eighty-five percent sort of said 'look, if you never got caught and you could only play for three years', that's maybe worth the risk, eighty-five percent. Now we're talking about fifteen, sixteen year old kids here doping education program workshop. But yeah, it was quite high that. Which is the reason why we changed the way we delivered our workshop. #00:35:34-5#

MT: Do you there's there's a culture of doping in rugby league? #00:35:39-9#

: Don't think there's a cult culture in it at all now, no. I wouldn't say there's a culture. I think it more prevalent in the amateur game, away from the professional game and there's lads who go and train in the gym, they take supplements etcetera. I think there's a there's an innate risk with junior players because they're not necessarily on, they're

taking lots of supplements, they're taking something to try and get themselves an advantage and to train to max their meals etcetera they're taking combinations of supplements and they're etcetera and they're not necessarily getting tested, the the products aren't getting tested prior so there's a risk to that. One one of the activities we do, particularly with the, it's getting better if there is a super league club, they'd potentially get looked after and the supplements are provided and obviously they're batch tested and there's the vast majority of clubs I must say are batch tested, but not every club gets batch tested. But one of the risks is that, y'know we asked the youngsters 'when you get a supplement, where do you get it from?' Its wherevers cheapest all the time. 'Do you read the label?' 'No, I'm just looking for creatine'. So that the y'know that's where the risk creeps in, or they're looking for whey whey whey protein supplement. #00:36:48-3#

MT: If an adolescent athlete knew other people were cheating, can you describe whether you think that would make them want to cheat or not? #00:37:01-6#

: I don't think it would. Having known players who who who, whilst they won't tell you who it is or they'll tell you retrospectively, it doesn't make them wanna do it. And I said to you, there's almost a perverse culture where they don't feel the need to to actually inform on somebody either. So it's also a 'they do it, it's up to them'. So its they're quite indifferent

to it, if you like. 'That's what they choose to do, that's what they choose to do'. It doesn't make somebody else go 'well if you're doing it, I'll do it'. #00:37:28-5#

MT: Yeah. #00:37:29-6#

: Having said that, I'm sure I'd be quite naive to think that if somebodies gonna try it in a in a team sport, I'll be very surprised at the young end if they're not trying it with somebody else. Y'know I'll be surprised if it isn't two people trying it rather than one individual. So, I suppose you, the flip side is that my perception would be in a junior team sport like rugby league, they're probably trying it with somebody else. #00:37:57-1#

MT: You spoke of like the pressures of the environment as adolescent athletes are development developing - either they make it or they they drop down into the part-time. Could that pressure not create an an environment where you know doping is more prevalent? #00:38:13-7#

: Yeah, I think so. I think I think there's an a acknowledgement if you don't acknowledge, there's an acknowledgement it could do. That's the y'know... elite performance high performance sport challenges

challenges people in all facets of their physically, socially, psychologically, the challenges you've gotta do, y'know sacrifices people make and sometimes sometimes people will get the lines will get blurred and people are prepared, they make a conscious decision to 'well actually, that's that's that's acceptable for this window' or 'I need it for this'. Yeah I think there's there's certainly a possibility that the pressure the pressure to get a contract, the pressure to be to get full-time environment, certainly is a is a factor, it's one of the ones we discuss with the players. #00:39:06-1#

MT: Yeah. To what extent are adolescent athletes more likely to cheat, if at all, if they can get if they think they can get away with it? #00:39:16-8#

: As I said before, it surprised us that it was the bottom end of the junior players. There's a bit of brav, y'know with boys there's a bit of bravado behind putting your hands up for stuff. But we did a discussion activity, y'know we did that that that activity was done for two or three years, and I think we I think when we used to keep data on it, it was about eighty five percent of them would say 'if we never got caught, we'd do it'. So, and that I suppose it goes back to my earlier conversation, where they don't see the injuries or the ill health problems as an issue for them. Tt simply the risk is getting caught and I and I suppose, I haven't really thought of it, but obviously when I was talking to you

about the four year ban was important, they saw that as perceived as a risk, suppose that our kids it's the it's the public perception and the risk of getting a long ban for your sporting career that are the biggest risk impact. #00:40:06-3#

MT: Does rugby define a lot of these players? #00:40:09-5#

: Sorry? #00:40:10-9#

MT: Does rugby define these players, a lot of these players, in the terms of their identity? #00:40:18-2#

: I wouldn't say it defines them, but they're, I don't think they necessarily perceive themselves as they are only rugby. But I do think that from the for the vast majority of our youngsters that coming from a working working class background that playing prowess, the physical prowess through school, through the community club, gives them a a strong character, strong identity as such, but I don't think it defines their identity. #00:40:44-7#

MT: Ok. The the reason I ask if if an adolescent athlete was more invested in rugby than say another one, and he obviously, there was a

possibility that he might be having to drop down to part-time #00:41:00-6#

: Yeah. #00:41:01-7#

MT: I was I was interested to see if there was any link between one's identity in terms of how much they associate themselves with rugby, and their chances of doping? #00:41:10-5#

: Oh don't get me wrong. Their their identity... sports, something I probably look at each year, they'll they'll identify themselves as a prof, the kids when you talk to them, they identify themselves as a rugby player and a professional rugby player. What they probably don't do is as associate themselves as only a rugby player it what I would probably, so they... so in that respect, yeah, that it the the fear factor of, when I think it's a by-product, it's similar to what you said before, I think the by-product is when you're in a club system and club environment from the age of fourteen, fifteen, sixteen, seventeen, eighteen, the thought of losing that, that might be of the factors that would make somebody, particularly if the reason they're why they're losing it is because of coming back from an injury or someone's overtaken them or or they perceive it's that little bit so its 'if I was a bit quicker, that would help me, if I was little bit bigger, y'know we've moved away as a sport

but certainly certainly early on about in my my time in the RFL, before there was a lot of competition where young player you're just not big enough, y'know you're not big enough to play the game you're not phys, and that that message goes away, a youngster gets told that message and you've got an off-season, what do they do? And that's when think it comes comes into their mind. #00:42:32-4#

MT: Yeah. #00:42:33-2#

: Y'know I recall a young player talking to me who's an international, talking about a head coach who's no longer in the country, an Australian and whether he y'know suggested it or not or inferred it or not, turned round to him and said 'you've gotta put another twelve KGs on if you if you think you're gonna play in my first team'. If he'd of put twelve K K KGs on, he'd have done ver veryy well in any shape or form to put twelve KGs on, so it was y'know it was almost like an indirect challenge to the kid to say 'oh well, are you gonna do it?'. So, I don't think the coach meant it in that particular way, I certainly don't think it was a directed 'you need to go take drugs' but it certainly was asking him y'know when you're a certain size player, without without betraying confidence in the player, when you're a certain size player playing a certain position, there's only certain ways you can put that amount of muscle mass on #00:43:26-0#

MT: Yeah. #00:43:26-4#

: so I think that I think there is that that risk. #00:43:29-5#

MT: You you say that, so could one's perhaps say natural body type or even ethnicity so, perhaps you're comparing a rugby player from Asia against say a rugby player from New Zealand, one is naturally gonna be a lot bigger than the other #00:43:47-8#

: Yeah yeah probably. #00:43:49-0#

MT: Could that natural size have an influence on them their propensity to dope? #00:43:53-9#

: Not in the UK. I think that'd be interesting in in in the southern hemisphere with the Polynesians versus particularly the Australians. There are players running around that at thirteen and fourteen there are y'know there are there are eight seventy eighty KG thirteen and fourteen years olds running around in the islands and that's putting people off even playing the game so I think maybe there's na there's an

impact there. I think at the moment in in this country, that that doesn't influence that junior development, so there's not that direct pressure to think about it. #00:44:26-9#

Self-esteem

MT: Ok. How about one's, how much will an athletes self-esteem influence whether they might take performance enhancing drugs? #00:44:40-4#

: My perception would be, from the conversations from other players, all our referen all the references I've said to you before would be when someone's got low self-esteem. So it's when I'm injured, I'm out, I'm gonna lose a place in the position, I'm in a performance slump, somebody's overtaken me in my environment, I've been held up to be successful or my contracts up for grabs, so I would imagine that all those conversations are at around when they when they've got low self-esteem at that time because there's a they're not where they used to be, so it's a performance slump if you like. #00:45:18-7#

MT: Lastly, how about one's socio-economic background? So, perhaps someone from a poorer family or maybe a richer family - would this have any influence on their likelihood to dope? #00:45:33-9#

: Socio-economic no. I think, and I know it sounds daft, and it doesn't really (in audible) but class where you grew up. If it's around your social environment when you're growing up, it's not seen as such a big deal. So I grew up with, y'know give me as an example, I went to college, went to university, PE teacher by trade originally, blah blah blah. When I grew up, it was everybody, drugs were easy readily available when I was a kid around where I grew up on the estate and stuff like that, it's accessible. Y'know I I know people when I taught who would be horrified me saying 'well, to be fair, it's what people did'. So I think, where where the kids and where a lot of community rugby league clubs are - it's around and its y'know its accessible anywhere and don't get me wrong, I'm not suggesting one minute, but I think it's more the gyms where you went to etcetera, people were taking it and and there were drugs around and it was accessible, if you wanted it, it was it was accessible. So I think potentially that makes it easier for you to access if you choose to take it I think but what I'm not saying is because you're from a lower socio-economic background you're more likely to take it, but I think if you did wanna get it, it's easier to access. There's a player, it's the those kids are more likely to cause of the gyms and the places they frequent in the locality, they'll know where to get it. #00:46:54-4#

Reference Group

MT: Yeah. To what extent would views of parents or friends about an athlete if they were caught doping act as a deterrent? #00:47:05-1#

: Oh, it's significant. I think the one thing that comes out in rugby league is everyone... even if somebody's taking a supplement and they've been tested positive for that or we've had we've had a couple of players that have tested with taking inhalers ineffectively and y'know a couple of players pseudoephedrine, when the when the change came in 2010, automatically, or if if they get done for that, they're assuming they've done everything. So the the perception is our kids don't hold back, if he's done that, he'll do everything, so it's on, they're very black and white as it were so if you get if a players caught, they assume the worst. #00:47:42-6#

MT: Yeah. So like if if one of these athletes got caught taking say pseudoephedrine, and their their parents or friends disowned them for being a drugs cheat, could this not potentially put them off or do you think they'd just be more consumed with the potential gains they might get in performance? #00:48:05-3#

: No I think I think the family perception the family perception in in rugby league in particular would be very strong. So Gareth Gareth Hocks is y'know well, be honest with you, we give a number of presentations as

I've mentioned and one of the ones that we use, the final final slide on the presentation used to be Gareth Hock because he, Gareth talked about not the ban wasn't the worst thing, it was telling his mum. #00:48:27-5#

MT: Yeah #00:48:28-6#

: Rugby league's quite a small, close knit community type thing, and that's the worst thing is having to tell people and it's the fact that everybody associates everything you've ever done as a ban, that's the thing that the kids have, that's the bit that that that they talk about that's why they wouldn't do it, that's the probably the biggest reason for not doing it is letting other people down or letting their community club down or being perceived as a cheat all that time. That's certainly the bit they talk about as being the bit why they wouldn't do it. #00:48:56-4#

MT: Ok. On the flip side of that, if a rugby league player or adolescent rugby league player was unsure about doping, but his parents like suggested that he dopes so that he gets his super league contract, do you think that would make him more likely to do it? #00:49:16-4#

: ...I don't know that one. I've never thought about it like that before so, interesting one. I suppose he'd getting a positive affirmation that's it alright in in that respect so if he decided to do it, he's getting the support, I suppose the other bit to come out of it for a young person is if its accepted at home, you're not having to skulk around your house so therefore you've got a haven where you can do it so I suppose if its suggested there, I think he's probably gonna weigh more towards, well, I don't think automatically make them do it, but I certainly think they would it may be a reason. If they decide they were gonna use it themselves then certainly I think that's probably a big help. #00:50:12-2#

MT: Ok. #00:50:13-4#

: I suppose that that's the way I'd give it. I don't don't think, I'm just trying to think (inaudible). #00:50:18-0#

INTERVIEW BRIEFLY PAUSED #00:50:22-7#

INTERVIEW RESUMES #00:52:02-8#

PART 3: DOPING SUSCEPTIBILITY

MT: Yeah so to to what extent do you think that a coach who encourages an adolescent athlete to dope would influence whether he or she does so or not? #00:52:16-9#

: Yeah I think that would be a, I think cause of the the coach-athlete relationship, if it was done over time and and and because they'll know the susceptibility of the athlete at the appropriate time when they've when they've got low self-esteem and they're struggling in a situation, yeah I think that would be quite a significant impact on it and would would would make an would certainly make an athlete consider it. #00:52:45-2#

MT: Yeah. Would that would that just be any coach, or would a coach whose perhaps taught that athlete for maybe ten years have a bigger influence? #00:52:56-5#

: I I, two things: one is a coach with influence of power, so it might be coaches who've been coaching for two years in a professional environment so that close relationship, and then you're right, somebodies who's who's built a relationship over time. Yeah. #00:53:10-3#

MT: Ok. Purely in terms of temptation, can you describe whether you think an ath adolescent athlete would be more tempted to dope if he or she believed others were? #00:53:23-0#

: No I don't, I don't, I don't as I mentioned, I don't think that's a significant factor for them. I think it's a decision they tend to make themselves. #00:53:33-8#

MT: To what extent would an adolescent athlete be more tempted to dope if they were told that his or her performance would improve? #00:53:42-7#

: I think they know that's a possibility anyway so I don't think it increases it at the current time. #00:53:49-2#

MT: Yeah. Can you describe whether you think athletes would be more tempted to take performance enhancing drugs when preparing for the most important competitions or matches? #00:54:03-3#

: Yeah I I would say it that's that's exact same same argument, same discussion and all that. I don't think it's around games for us, but I think it's around that crucial stages in their career - that's when they're more

likely to do it. Rather than a game. Matches for us, they they, the more important the match, the more likely they are to get tested as well. #00:54:22-0#

MT: Yeah. #00:54:22-9#

: So particularly at junior level, internationals, grand finals, you're guaranteed there's a test in that game. #00:54:28-3#

MT: Do you think that an adolescent athlete dopes out of excitement at what he could achieve, what doors it could open for him in the future, or out of fear that he or she might not make it and realise their goals that they've longed for for many years? #00:54:52-7#

: ...Fear. I think I've gotta think I'm thinking of all the the discussions I've had over the years, yeah. And the discussions, it's not coming, they don't see it as doping to to win, they see it as not to lose that opportunity. Yeah. So fear. Fear of losing that opportunity rather than a guaranteed win. #00:55:20-4#

MT: Yeah. Finally, is there is there any topics or any questions that I haven't asked you that you would have expected me to have asked you at all on this subject? #00:55:32-9#

: Just the risk of supplementation. #00:55:35-4#

MT: Ok. #00:55:36-1#

: I think that's probably the big one for us which is... we talk to youngsters about the risk of supplementation cause that's probably where the biggest genuine risk is from for a rugby league point of view is. Players just very matter of fact about it, it's almost quite naive, even with education it's it's a lottery. We explain that to them and it's like 'well, everyone else does it' type thing and that's the, that's probably the big thing, and I suppose in a sport like ours, the fact that supplementation is so prevalent in the game cause of the the volume, size of ath size of athletes, volume of training, quantity of training, contact game, it's around you so they are exposed to the suggestion of taking supplements to improve prove your performance therefore performance enhancing, I suppose is one step on. #00:56:31-8#

MT: Could supplementation be a gateway at all to performance enhancing drugs? #00:56:36-9#

: I think, I thought I thought that's what I was suggesting #00:56:39-6#

MT: Yeah. #00:56:39-5#

: Until I started talking to you, I wasn't really thinking about it before but yeah, reality is if I take regular supplements anyway and I get used to taking supplements and I take this and I take that and, y'know, it's one step but it's just another supplement I suppose. #00:56:55-6#

MT: Ok. #00:56:57-9#

END OF INTERVIEW

Appendix 3: The Adolescent Sport Doping Inventory

This questionnaire measures factors that are related to attitudes about Performance Enhancing Drugs (PEDs). There are no wrong or right answers, and it is important that you answer all questions as honestly as possible. Please answer each question by circling the appropriate number, which represents how you feel. PEDs = Performance Enhancing Drugs		**Strongly disagree**			**Neither agree nor disagree**			**Strongly Agree**
1)	In order to be successful in my sport, I need to take PEDs	1	2	3	4	5	6	7
2)	Legalising PEDs would benefit my sport	1	2	3	4	5	6	7
3)	You have to take PEDs to play at the highest level in sport	1	2	3	4	5	6	7
4)	Making PEDs legal would improve sport	1	2	3	4	5	6	7
5)	I would suffer serious health complications if I took PEDs	1	2	3	4	5	6	7
6)	If I took a PED, it could make me very ill many years later	1	2	3	4	5	6	7
7)	PEDs can cause sexual dysfunction problems in males and infertility in females	1	2	3	4	5	6	7
8)	Taking a PED could cause a serious illness	1	2	3	4	5	6	7
9)	Taking PEDs could help me earn more money in the future	1	2	3	4	5	6	7
10)	Taking PEDs could help me keep my place in the team or training squad	1	2	3	4	5	6	7
11)	Taking PEDs could help me become famous by helping me perform at a much higher level	1	2	3	4	5	6	7
12)	Taking PEDs could help me get sponsored by leading sports firms	1	2	3	4	5	6	7
13)	Taking PEDs might help me become a celebrity	1	2	3	4	5	6	7
14)	I am worth being in the team/squads that I am currently involved with	1	2	3	4	5	6	7
15)	I am at least as good as others in my team/squad	1	2	3	4	5	6	7
16)	I feel positive about training for my sport	1	2	3	4	5	6	7
17)	I feel positive about competing in my sport	1	2	3	4	5	6	7

18)	I believe I have the talent to be successful in my sport	1	2	3	4	5	6	7
19)	I would cheat if I thought it would help me win	1	2	3	4	5	6	7
20)	If other athletes cheat, I think it is ok for me to cheat too	1	2	3	4	5	6	7
21)	I would cheat if my coach encouraged me to do so	1	2	3	4	5	6	7
22)	I would cheat if I know I won't get caught	1	2	3	4	5	6	7
23)	Winning is more important than playing by the rules	1	2	3	4	5	6	7
24)	Drug testing authorities make sure they look after all samples they take	1	2	3	4	5	6	7
25)	Samples taken by drug testers are securely looked after	1	2	3	4	5	6	7
26)	Drug tests are very thorough	1	2	3	4	5	6	7
27)	I think the analyses of samples are accurate	1	2	3	4	5	6	7
28)	Drug testers are likely to catch those who take PEDs	1	2	3	4	5	6	7
29)	What other people think about PEDs influences my decision on whether I would ever take them or not	1	2	3	4	5	6	7
30)	What my coach thinks about PEDs would influence my decision about whether I would take them or not	1	2	3	4	5	6	7
31)	What my friends thinks about PEDs would influence my decision about whether I would take them or not	1	2	3	4	5	6	7
32)	What my teammates thinks about PEDs would influence my decision about whether I would take them	1	2	3	4	5	6	7
33)	What others think about PEDs influences my views on them	1	2	3	4	5	6	7
34)	Competing in sport makes me feel anxious or worried	1	2	3	4	5	6	7
35)	I usually think that the outcome of matches/competitions will be negative	1	2	3	4	5	6	7
36)	Playing in competitions can be threatening or worrying	1	2	3	4	5	6	7
37)	I feel stressed when performing in my sport	1	2	3	4	5	6	7
38)	There is lots of pressure when I play sport	1	2	3	4	5	6	7
39)	I would be tempted to take PEDs if my coach tells me to	1	2	3	4	5	6	7
40)	I would be more likely to take PEDs if my parents or guardians encouraged me to	1	2	3	4	5	6	7

41)	I would be tempted to take PEDs, because I know they will increase my performance	1	2	3	4	5	6	7
42)	I would be tempted to take PEDSs if I had a bad injury	1	2	3	4	5	6	7
43)	I would be tempted to take PEDs if my coach put pressure on me to do so	1	2	3	4	5	6	7

Appendix 4: Scoring of the ASDI

Attitudes: 1, 2, 3, 4
Threat: 5, 6, 7, 8
Benefit: 9, 10, 11, 12, 13
Esteem: 14, 15, 16, 17, 18
Cheating: 19, 20, 21, 22, 23
Legitimacy: 24, 25, 26, 27, 28
Ref Group: 29, 30, 31, 32, 33
Stress: 34, 35, 36, 37, 38
Susceptibility: 39, 40, 41, 42, 43