UNIVERSIDADE FEDERAL DE SANTA CATARINA
CENTRO DE DESPORTOS
PROGRAMA DE PÓS-GRADUAÇÃO EM EDUCAÇÃO FÍSICA

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Student-Athletes' Identity and Motivation Toward Dual-Career

Florianópolis (SC)
2021

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Thesis submitted to the Graduate Program in Physical Education of the Federal University of Santa Catarina as a requirement for the doctoral degree.
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Florianópolis (SC)
2021

Ficha de identificação da obra elaborada pelo autor,
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Quinaud, Ricardo
Student-Athletes' Identity and Motivation Toward Dual Career / Ricardo Quinaud ; orientador, Humberto Carvalho, coorientador, Carlos Gonçalves, 2021.
146 p.

Tese (doutorado) - Universidade Federal de Santa Catarina, Centro de Desportos, Programa de Pós-Graduação em Educação Física, Florianópolis, 2021.

Inclui referências.

1. Educação Física. 2. Athlete. 3. Student. 4. Higher education. 5. Psychometric. I. Carvalho, Humberto. II. Gonçalves, Carlos. III. Universidade Federal de Santa Catarina. Programa de Pós-Graduação em Educação Física. IV. Título.

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Florianópolis (SC)
2021

I dedicate this work to all people who, directly or indirectly, are involved in the development, maintenance and advancement of sport.

AGRADECIMENTOS/ ACKNOWLEDGMENTS

Ao meus pais, Ronaldo e Maria Cristina, irmãs, Juliana e Paula e companheira, Itiane, por serem meus suportes de vida e serem as pessoas que me fazem querer acordar cada dia para ser uma pessoa melhor ao lado de cada um.

Ao meu orientador, Humberto Carvalho, por acreditar, se dedicar, aconselhar, orientar, compreender e ser um amigo neste processo de doutoramento e aperfeiçoamento profissional.

Ao meu coorientador, Carlos Gonçalves, por todo suporte e reflexões que, mesmo de longe fisicamente, se mostrou sempre presente.

Ao amigos de laboratório que foram fundamentais para minha formação acadêmica, profissional e pessoal. Citar nomes de todos que foram fundamentais não caberia nesta tese.

To professor Laura Capranica, thank you for all your advice and support. Thank you for contributing to the quality of this work and to my academic development.

Aos membros da banca pelas contribuições e aprimoramento com o trabalho.

À Confederação do Desporte Universitário por oportunizar a coleta de dados e minha inserção ao esporte universitário.

À Universidade Federal de Santa Catarina por ser minha casa desde minha formação inicial.

À Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) pela oportunidade de receber bolsa de estudos e assim poder me dedicar integralmente ao meu doutorado.

Por fim, às pessoas que passaram pela minha vida, que contribuíram com novas aprendizagens e com o processo de me tornar um melhor profissional e uma melhor pessoa.

RESUMO

Estudantes-atletas são individuos que agregam as carreiras atlética e educacional. Durante as suas vidas, os estudantes-atletas enfrentam desafios sociais, psicológicos, culturais e individuais. Durante a graduação os estudantes-atletas são mais afetados pelo aumento dos compromissos e demandas esportivas e educacionais, que podem levar ao abandono de uma das carreiras. Para evitar tal situação, torna-se relevante investigar a identidade e motivação para uma dupla carreira e questionar sobre as razões e soluções para o desenvolvimento da dupla carreira estudante-atleta. Consequentemente, o presente estudo tem como objetivo investigar a identidade e motivação do estudante-atleta para a dupla carreira. Considerando que a inexistência de questionários válidos (em português) para avaliar a identidade e motivação dos estudantes-atletas, foram traduzidos conceitualmente e semanticamente dois questionários para o português: *Baller Identity Measurement Scale* (BIMS) e o *Student Athlete Motivation Toward Sport and Academic Questionnaire* (SAMSAQ). Froam avaliados 862 participantes brasileiros nos jogos universitários catarinenses e brasileiros em 2018 e 2019. Adicionalmente, foram recolhidas observações repetidas em 134 em estudantes atletas nos anos de 2018 e 2019, com 12 meses de intervalo. Os dados também foram recolhidos em Portugal, com 197 participantes. Foram considerados estudantes-atletas internacionais (4), sendo entrevistados com base em uma entrevista semiestruturada baseada nos construtos dos questionários. Para investigar as evidências de validade dos questionários foram aplicadas análise fatorial exploratória e confirmatória. Para investigar a variação da identidade e motivação dos estudantes-atletas em relação às características educacionais, esportivas e individuais foram utilizados modelos multinível e pós-estratificação. Por fim, a análise temática foi aplicada para analisar as falas dos participantes. Ambos os questionários se mostraram validade e confibilidade para avaliar a identidade e motivação de estudantes-atletas brasileiros. Não foi observada variação substancial para a identidade associada ao gênero e tipo de esporte praticado, No entanto, observou-se uma variação substancial associada contexto educacional e esporte na identidade de estudante-atleta. As estimativas de motivação indicaram uma variação associada ao gênero, nível competitivo e tipo de universidade na motivação para carreira e motivação esportiva. As predições dos valores do SAMSAQ-PT ao longo de um ano acadêmico indicam uma tendência de estabilidade da motivação, ajustando para o gênero, contextos acadêmico e esportivo. Para a identidade foi observado uma pequena diminuição após o primeiro ano de universidade. No entanto a variação nas estimativas foi substancial aconselhando a uma interpretação conservadora. Adicionalmente, quando comparando os estudantes-atletas brasileiros com os atletas portugueses, as estimativas indicaram que o contexto cultural provavelmente tem uma influência substancial na identidade e motivação dos estudantes-atletas. As declarações dos participantes sugerem uma mudança na identidade de acordo com as circunstâncias em que vivem. Globalmente, os questionários apresentaram robustez e confiabilidade para contextos de língua portuguesa. As presentes observações indicam a necessidade de considerar as características individuais e contextuais ao investigar e compreeder a dupla carreira de estudantes-atletas. Adicionalmente, potenciais interessados e intervenientes de ambos os contextos (por exemplo, esporte e educacional) devem cooperar para implementar regulamentos e políticas que promovam o desenvolvimento da dupla carreira para apoiar estudantes-atletas na combinação dos compromissos esportivos e acadêmicos.

Palavras-chave: Atleta. Estudante. Psicometria. Inferência baseada em modelo. Esporte. Educação. Ensino superior.

RESUMO EXPANDIDO

Introdução

Estudantes-atletas são individuos que agregam as carreiras atlética e educacional. Durante as suas vidas, os estudantes-atletas enfrentam desafios sociais, psicológicos, culturais e individuais. Durante a graduação os estudantes-atletas são mais afetados pelo aumento dos compromissos e demandas esportivas e educacionais, que podem levar ao abandono de uma das carreiras. Com a intenção de evitar esta situação e auxiliar estudantes-atletas durante a jornada da dupla carreira, as organizações internacionais desenvolveram políticas de suporte, que continuam em fase de implementação e aprimoramento em diversos contextos. Entretanto, a investigação sobre o tema é escassa em países da América Latina, como por exemplo o Brasil. Para auxiliar no desenvolvimento da dupla carreira, inicialmente as pesquisas tiveram foco na identidade e motivação de estudantes-atletas. Identidade é um atributo psicológico em que o indivíduo se sente em relação a si mesmo e em relação a sociedade, sendo ela desenvolvida de acordo com os contextos em que a pessoa está inserida. Para avaliar a identidade de estudante-atleta foi construída o questionário *Baller Identity Measurement Scale* (BIMS). Esta questionário foi desenvolvido e validado nos Estados Unidos e também teve sua validade transcultural estabelecida para contextos europeus. Juntamente com a identidade, a motivação tem sido largamente estudada. A motivação pode ser considerada como o que "move" as pessoas a realizarem suas tarefas. Neste sentido, foi construído e validado o questionário *Student Athlete Motivation Toward Sport and Academic Questionnaire* (SAMSAQ). O questionário também foi desenvolvimento nos Estados Unidos e encontra-se com diversas validações transculturais em diferentes continentes. Torna muito relevante a avaliação da identidade e motivação de estudantes-atletas para o entendimento e desenvolvimento de políticas de suporte a dupla carreira. No Brasil, as primeiras manifestações do esporte universitário foram apenas em 1941, sendo o sistema do esporte universitário brasileiro (confederação e federações) ligado com as instituições de ensino superior, sendo estas estabelecidas como as promotoras do esporte. Entretanto, pouco se sabe e pouco é estudado efetivamente sobre estudantes-atletas brasileiros e o que pode influenciar em sua identidade e motivação para dupla carreira.

Objetivos

Considerando o problema de pesquisa e as lacunas observadas na literatura, o presente estudo teve como objetivo investigar a identidade e motivação de estudante-atletas universitários brasileiros em relação a dupla carreira. Especificamente, o presente estudo teve por objetivos: (i) explorar a validade da versão traduzida para o português (Brasil) da BIMS e estimar a variação de identidade em estudantes-atletas universitários brasileiros em relação as características individuais, esportivas e contextuais; (ii) analisar a identidade de estudantes-atletas universitários de elite em relação as características educacionais, geográficas e esportivas; (iii) examinar a identidade de estudantes-atletas ao longo da graduação; (iv) examinar as evidências de validade do SAMSAQ em estudantes-atletas brasileiros; e (v) examinar a variação de identidade e motivação entre estudantes-atletas universitário portugueses e brasileiros de acordo com as características individuais, esportivas e contextuais.

Metodologia

Inicialmente, o projeto de pesquisa foi aprovado pelo Comitê de Ética em Pesquisas com Seres Humanos da Universidade Federal de Santa Catarina. Considerando que não havia questionários válidos (em português) para investigar a identidade e motivação dos estudantes-atletas, traduzimos conceitualmente e semanticamente o BIMS e o SAMSAQ para o português. Os questionários foram aplicados a participantes nos Jogos Universitários de Santa Catarina e

Jogos Universitários Brasileiros – Fase Final de 2018 e 2019, totalizando uma amostra de 862 participantes. Medidas repetidas também foram recolhidas, em um total de 134 participantes. Os dados também foram recolhidos em Portugal, com 197 participantes. Além disso, quatro estudantes-atletas internacionais foram entrevistados com base nos constructos dos questionários. Análises fatorais exploratória e confirmatória foram utilizadas para investigar as evidências de validade dos questionários. Para estimar os valores e as variações em relação a identidade e motivação dos estudantes atletas em relação as características educacionais, esportivas e individuais nas amostras transversais e longitudinais foram aplicados modelos de regressão multinível e pós-estratificação. As entrevistas foram transcritas e devolvidas aos participantes para validação das declarações. Foi empregada a técnica de análise temática para análise das declarações dos participantes. Além disso, foi utilizado o papel do "amigo crítico" durante o processo de análise das declarações.

Resultados e Discussão

Inicialmente foram verificadas as evidências de validade de ambos questionários. A BIMS apresentou ser uma escala válida com a redução de itens e alteração na estrutura fatorial. A escala original apresenta a distribuição dos itens em 4 fatores, mas a versão para o Brasil apresentou dois fatores (afetividade e identidade social), além de redução de itens. As alterações nas estruturas dos questionários são consideradas normais em validações psicométricas. Esta mesma estrutura, de dois fatores, foi observada na versão italiana e portuguesa. Ao analisar as estimativas em amostras transversais, observou-se que características educacionais (por exemplo, tipo de universidade) e esportivas (por exemplo, nível competitivo) apresentaram uma variação substancial na identidade do estudante-atleta. Além disso, quando estudantes atletas brasileiros e portugueses foram comparados, a característica cultural (tipo de país) também apresentou uma influencia substancial na identidade. Já as estimativas com base na amostra longitudinal não foi observado alteração substancial ao longo do tempo em relação a identidade de estudante-atleta, apesar de ser observado um pequeno decréscimo nos valores de identidade do primeiro para o segundo ano. Com base nas declarações dos estudantes-atletas entrevistados, parece que a identidade se altera dependendo das necessidades, situações e circunstâncias que eles estão vivenciando nos diferentes momentos da sua carreira. Os estudos transversais também têm mostrado influência de características esportivas na identidade do estudante-atleta. Entretanto, as características educacionais são poucas exploradas. Além disso, poucos estudos longitudinais foram conduzidos. No entanto os dados disponíveis indicam que a identidade de estudante-atleta diminui ao longo do tempo. Os presentes resultados indicaram que as estruturas educacionais em que o esporte tende a ser mais valorizado parece favorecer a valores mais elevados de identidade. Além disso, as estruturas em que o esporte universitário parece oferecer uma maior participação pode favorecer a valores mais elevados de identidade, especialmente na afetividade. Em relação à validade do SAMSAQ, foi observada uma estrutura de três fatores no questionário original (desenvolvido no contexto dos Estados Unidos da América), bem como de outras versões validadas para o italiano, coreano, português e árabe. Com base na amostra transversal, a variação associada às características educacionais e esportivas teve uma influência substancial na motivação. Além disso, o sexo também teve uma pequena associação com a motivação. A variação asociada ao tipo de país também se mostrou relevante para a motivação, especialmente a motivação acadêmica. Quando analisada longitudinalmente, a motivação não teve variação ao longo de um ano. Os estudos internacionais demonstram a influência de características esportivas na motivação de estudantes-atletas. As características educacionais são pouco exploradas, mas tende estudado que as razões de sua influência na motivação são semelhantes das apresentadas para identidade. As estruturas esportivas em que o esporte universitário ainda não é tão competitivo parecem favorecer a motivação acadêmica. A motivação constante após um ano de observação parece indicar que o ambiente do esporte

universitário acaba por não motivar seus praticantes ao longo do tempo, o que pode resultar no abandono da dupla carreira ao longo do tempo.

Considerações Finais

Globalmente, ambos os questionários se mostraram robustez e confiabilidade, podendo ser usados em países de língua portuguesa. As presente observações indicam claramentea necessidade de de considerarem as características individuais e contextuais ao investigar a dupla carreira de estudantes-atletas, especialmente a identidade e motivação. O contexto investigativo, os questionários utilizados e a utilização da análise de regressão multinível e pós-estratificação apresentam-se como uma das potencialidades e inovação do estudo. Com base nos resultados do presente estudo, as instituições de ensino superior, as federações esportivas e as organizações governamentais deverão assumir o seu papel fundamental para o desenvolvimento da dupla carreira, necessitando de trabalhar em conjunto para o aprimoramento de ações e políticas de suporte aos estudante-atletas. Através da elevanção da identidade e motivação dos estudantes-atletas ao longo do tempo será possível ter um contexto em que a dupla carreira não será mais tão desafiante aos seus participantes e o abandono poderá ser reduzido. Como principais limitações do presente estudo indicaca-se a sobre-representação de estudantes-atletas competindo nos eventos da Confederação Brasileira do Desporto Universitário, a maior presença de participantes da região do sul do Brasil e a presença de estudantes-atletas treinando menos de cinco horas por semana. Recomenda-se que futuros estudos realizem observações longitudinais ao longo do período da graduação, sendo de quatro a seis anos. Adicionalmene, será relevante que sejam investigados estudantes-atletas competindo em outros eventos esportivos, estudantes-atletas em diferentes períodos educacionais (ensino fundamental e médio) e que seja investigado as interrelações entre os contextos.

Palavras-chaves: Atleta. Estudante. Psicometria. Inferência baseada em modelo. Esporte. Educação. Ensino superior.

ABSTRACT

Student-athletes are those people with major force on athletic and student careers. During their lives, they face social, psychological, cultural, and individual challenges combining a dual-career. During the college degree, student-athletes are most affected due to the increase of sport and educational commitments and demands, which can lead to dropping out from one of the careers. Therefore, it is important to investigate their identity and motivation toward a dual-career and speculate on its reasons and solutions. Therefore, the present study aims to examine the student-athlete identity and motivation toward dual-career. Considering there were no valid questionnaires (in Portuguese) to measure student-athletes identity and motivation, we conceptually and semantically translated the Baller Identity Measurement Scale (BIMS) and the Student-Athlete Motivation Toward Sport and Academic Questionnaire (SAMSAQ) to Portuguese. We collected 862 Brazilian participants in the Santa Catarina and Brazilian university games of 2018 and 2019. Additionally, 134 repetitive measures were collected from these events. Data was also collected in Portugal, with 197 participants. International student-athletes (4) were also interviewed following a semi-structured interview based on the questionnaires' constructs. We applied exploratory and confirmatory factor analysis to investigate the questionnaire's validity evidence. Multilevel regression and poststratification modeling were applied to examine the variation of student-athletes identity and motivation with educational, sport, and individual characteristics. Lastly, thematic analysis was applied to analyze the participates' statements. Both questionnaires presented being valid and trustable to measure student-athletes' identity and motivation. We observed no substantial identity variation in gender and sport type. Still, there was a substantial influence of the educational (e.g., university type) and sport (e.g., competitive level) context on student-athletes identity. The motivation estimates indicated the influence of gender, competitive level, and university type on career and sport motivation. Predictions of SAMSAQ-PT scores variation across an academic year and BIMS-PT2 estimates across graduation showed a trend of stability in the scores, adjusting for gender, academic, and sports contexts. Additionally, comparing Brazilian student-athletes to Portuguese student-athletes, the predictions showed that cultural (e.g., type of country) context likely has a substantial influence on student-athletes identity and motivation. Participants' statements might indicate a change in identity according to the circumstances that they are living. Overall, both questionnaires proved robust and useful, which could be used in Portuguese-speaking countries. The finds urge to consider individual and contextual characteristics when investigating dual-career of student-athletes. Furthermore, stakeholders from both contexts (e.g., sport and educational) should cooperate in implementing regulations and policies fostering the development of dual-career for supporting student-athletes in combining sports and academic commitments.

Keywords: Athlete. Student. Psychometric. Model-based inference. Sport. Education. Higher education.

FIGURES

TABLES

CHAPTER III

CHAPTER IV

CHAPTER V

CHAPTER VI

CHAPTER VII

PUBLICATIONS

The results of the present study are published and were submitted to peer-reviewed scientific journals, as follows:

QUINAUD, R. T. et al. Factors Influencing Student Athletes' Identity: A Multilevel Regression and Post-stratification Approach. **Perceptual and Motor Skills**, v. 127, n2, p. 432-447, 2020.

QUINAUD, R. T. et al. Variação da identidade do estudante-atleta de elite: análisenos Jogos Universitários Brasileiros. **Revista Brasileira de Psicologia do Esporte**, v. 10, n. 4, p. 431-448, 2020.

QUINAUD, R. T. et al. Validity and usefulness of the student-athletes' motivation toward sport and academics questionnaire: a Bayesian multilevel approach. **PeerJ**, v. 9, p. e11863, 2021.

QUINAUD, R. T. et al. Student-Athletes' Motivation and Identity: Variation Among Brazilian and Portuguese University Student-Athletes. **Psychological Reports**, v. 123, n. 5, p. 1703-1723, 2020.

CONTENTS

1 INTRODUCTION

The United Nations Organization has recognized sport as an important tool to promote education, health, development, and peace worldwide, inspire people, break down racial and political barriers, combat discrimination, and defuse conflict (UNITED NATIONS, 2018). Athletes are the symbols of sports, in which people identify them as examples to be followed, often adopting their behavior (BROWN; BASIL; BOCARNEA, 2003). In some stage of their sports life, Athletes participate in the dual-career pathway as students and athletes. The student-athlete terminology refers to this dual-career, which these people have their major foci on sport and work (STAMBULOVA; WYLLEMAN, 2014). In several countries of the European Union, the thematic has shown significant consent with the protection of athletes concerning education and training, as well as in their insertion in the job market after an athletic career (AQUILINA; HENRY, 2010). To ensure athletes' right to combine their academic and sports careers (EUROPEAN COMMISSION, 2012; GUIDOTTI; CORTIS; CAPRANICA, 2015; STAMBULOVA; WYLLEMAN, 2019) and the understanding and supporting student-athlete mental wellness (BROWN et al., 2014; NCAA, 2020), a dual career cultural discourse has emerged in Europe and North America. However, the discussion is still lacking in other continents.

Student-athletes face social, cultural, and individual challenges (PINKERTON; HINZ; BARROW, 1989; CONZELMANN; NAGEL, 2003; CAPRANICA; MILLARD-STAFFORD, 2011; RYBA; RONKAINEN; SELÄNNE, 2015; CONDELLO et al., 2019). It is a daunting task to balance the demands in the classroom and training while being successful as a student and as an athlete. Furthermore, the combination of academic and sporting performance often implies creating psychological, social, family, and legal harmony for athletes (EUROPEAN COMMISSION, 2012), however many difficulties are still encountered in the combination of educational and sporting commitments (CAPRANICA; MILLARD-STAFFORD, 2011).

Student-athletes paths have been mostly considered at the university level, as the start of the college degree has been noted as a key milestone of adjustments on their careers (SIMONS; VAN RHEENEN; COVINGTON, 1999; AQUILINA, 2013; GASTON-GAYLES; BAKER, 2015). Some student-athletes may identify themselves mainly as students who are involved in the sport (student-athletes), like athletes who are studying in higher education institutions (student-athlete) or both (YUKHYMENKO–LESCROART, 2014). The identity and social identity theories may be useful to understand this self-perception. Briefly, the social identity theory is the person's perception of belonging to a group and, the identity theory is the

role that this person plays or incorporates into the self (STETS; BURKE, 2000). The student-athletes identity is developed and sustained in the contexts of academic institutions, sports teams, and friends, being involved in social contexts, and being able to have student and athlete identities simultaneously (STURM; FELTZ; GILSON, 2011). Although an individual's identity contains several dimensions, a specific dimension can become dominant or preferred, meaning they can assume identities as students in certain situations and as athletes in others (LALLY, 2007). Additionally, when student-athletes have difficulties balancing both contexts, it can cause the dropout of one context in favor of the other (WYLLEMAN; REINTS, 2010a).

To measure psychological characteristics, such as identity, for the initial understanding of how university student-athletes perceive themselves within the dual career, measurement scales have been developed. One of the questionnaires initially used to measure athletic identity was the "Athletic Identity Measurement Scale" (AIMS; BREWER; RAALTE; LINDER, 1993), which assesses social and cognitive elements and affective identity. After demonstrating its applicability, other cultures adapted and validated the AIMS for their contexts (LI; ANDERSEN, 2008; VISEK et al., 2008; CABRITA et al., 2014) and even a new structure for the original context (BREWER; CORNELIUS, 2001); however, this questionnaire measures only the athletic identity. Another questionnaire that was developed to measure identity, but this time focused on the identity of student-athletes, was the "Baller Identity Measurement Scale" (BIMS; HARRISON et al., 2010). This questionnaire assesses student-athlete identity through 10 items subdivided into the dimensions of Social Identity, Exclusivity, Positive Affectivity, and Negative Affectivity. BIMS has also shown great acceptance in the scientific community, resulting in cross-cultural adaptations and validations for other countries, such as Italy (LUPO et al., 2017), Portugal (FERNANDES; MOREIRA; GONÇALVES, 2019), and Brazil (QUINAUD et al., 2020) and transnational validation between Brazil and Portugal (QUINAUD et al., 2019b).

In addition to constructing and validating questionnaires, identity is also studied and associated through empirical research, whether quantitative, qualitative, or mixed methods. Available data allows to understand how identity can be associated with mental health (MILLER; HOFFMAN, 2009), sports behavior (YUKHYMENKO–LESCROART, 2014), understanding of its limits (COKER-CRANNEY et al., 2018), cognitive-motivational factors (PILARSKA, 2017), decision making about the dual-career (LALLY; KERR, 2005), changes of identity (LALLY, 2007), and other domains. The study of the identity of populations is of great importance for the deep understanding of university student-athletes.

On the other hand, motivation for a dual career has emerged as a milestone in the studies of university student-athletes, with the study of identity and motivation being considered on the border to deepen the dual-career (STAMBULOVA; WYLLEMAN, 2019). Based on a review of human motivation theories, motivation can be summarized as “what moves people to action”, concerning energy and direction underlying action (RYAN; BRADSHAW; DECI, 2019). Therefore, understanding student-athletes' academic and sports motivation is necessary for sports development (LUPO et al., 2012; GUIDOTTI et al., 2013; PARK; HONG; LEE, 2015). The most used and disseminated questionnaire within the motivation studies for dual-career of university student-athletes is the “Student-athletes’ motivation toward sport and academics Questionnaire” (SAMSAQ). Initially validated in the United States (GASTON-GAYLES, 2005), the questionnaire consists of 30 items that assess Student Athletic Motivation, Career Athletic Motivation, and Academic Motivation. In addition, several other versions have been validated and adapted for Italy (GUIDOTTI; CAPRANICA, 2013), Portugal (FERNANDES; MOREIRA; GONÇALVES, 2019), Brazil (QUINAUD et al., 2019a), Slovenia (LUPO et al., 2012), and Korea of the South (PARK; HONG; LEE, 2015). In addition, transnational validations were carried out between six European Union countries (LUPO et al., 2015), between Italy and Slovenia (LUPO et al., 2012), and between Brazil and Portugal (QUINAUD et al., 2019b).

Although there is no consensus, it is generally observed that men are more motivated to sports success, while women are more motivated to academic success (GASTON-GAYLES, 2005). In addition, elite student-athletes are more motivated by their career within the sport and receive funding (LUPO et al., 2017). Students living in countries with a less political structure related to student-athletes are more motivated in their sports careers (LUPO et al., 2015). Therefore, motivational factors can sometimes be related to the government incentives and the importance that student-athletes give for both careers.

In Brazil, the manifestations of university sports were initially developed through academic, athletic associations, regulated by law nº. 3.617 of September 15, 1941 (BRASIL, 1941) and the establishment of the Brazilian Confederation of University Sports (CBDU). The Brazilian university sports system is linked to the Higher Education Institutions (HEI), and the state university federations (FUEs) are linked to the CBDU. Placing the HEIs as promoters of sports, it is natural that they seek performance for having their names associated with the participation of university athletes in sporting events. To meet the expectations of the HEI, college athletes start to face, along with academic demands, the intensity of life as an athlete (dual-career). Although several Olympic athletes came from university sports, it is not receiving

too much attention from the State, guaranteed by legislation (CAMARGO; MEZZADRI, 2018). Due to the lack of specific legislation for the student-athlete, there are no directions to support the student-athletes. It is observed that most of the investment in sport is for athletes already in international competitions, as well as with exclusive dedication, which causes low financing to athletes who do not meet these criteria (ALMEIDA; MARCHI JÚNIOR, 2010). Concerning the athletes in higher education institutions, there are programs from the federal government that they can apply to receive financial aid. However, the attention is focused on student-athletes who meet social vulnerability criteria or need special educational activities (BRASIL, 2012).

The studies of student-athlete identity and motivation have been the major psychological measures that affect the development of a dual-career. Therefore, research on student-athlete identity and motivation has been conducted worldwide to advance the understanding of the student-athlete dual-career. Furthermore, these countries also provided student-athlete support (AQUILINA; HENRY, 2010). Thus, studying student-athlete identity and motivation is essential for dual-career development. Unfortunately, however, there is no consistent research in the Brazilian context, which leaves the student-athletes behind in developing a dual-career and, consequently, with a continuing lack of understanding in developing support policies for student-athletes.

Considering the preceding observations, the present study addresses the following question: What are the identities and motivations of Brazilian university student-athletes toward dual-career? Specifically:

- How do Brazilian university student-athletes, in particular those from elite levels in their sport, perceive their student-athlete identity considering their individual, sport, and contextual characteristics?
- Is the student-athlete identity the same across the undergraduate period?
- How motivated are student-athletes toward dual-career?
- How does the identity and motivation of Brazilian student-athletes compare with others from a country with established legislation for supporting them?

It is hypothesized that student-athletes identity and motivation are influenced by their characteristics, sports contexts, and academic environment. Overall, the present study aimed to investigate the identity and motivation of Brazilian university student-athletes. The present thesis fills a gap in knowledge by providing new contents never measured and never explored in the Brazilian context. Furthermore, the thesis uses recent advances in analytical methods that illustrate how research needs to be explored to understand the complexities of student-athletes. Finally, practical implications are presented and discussed at the end of the thesis.

1.1 RESEARCH AIM

To explore the psychometric properties of the BIMS and the SAMSAQ and investigate the identity and motivation of Brazilian university student-athletes toward dual-career.

1.2 SPECIFIC OBJECTIVES

To explore the psychometric properties of the BIMS and SAMSAQ;

To explore the validity of a Portuguese translated version of the BIMS and to estimate identity variation among Brazilian university student-athletes considering their individual, sport, and contextual characteristics;

To examine elite university student-athlete identity adjusting for potential variation associated with educational, geographical, and sports characteristics;

To examine Brazilian university student-athletes identity across the undergraduate period;

To examine the evidence of validity and usefulness for the student-athletes motivation toward sport and academics questionnaire (SAMSAQ-PT) in Brazilian student-athletes;

To examine the variation of student-athletes identity and motivation across Portuguese and Brazilian universities student-athletes, adjusting for the potential variation associated with the individual, sport, and contextual characteristics.

1.3 THESIS STRUCTURE

The present thesis was structured in eight chapters. The first chapter introduces the thesis and the subjects of identity and motivation of student-athletes, and the second chapter gives a summary overview of the methodological approach. Then, the five empirical studies conducted are presented. The third chapter is a study about the Brazilian student-athletes identity. The importance of studying student-athlete identity is that in the presence of concomitant sport and education challenges, student-athletes experience identity conflict leading to dropping out in sports or academics to maintain a dominant identity.

Furthermore, given the importance of competitive level on student-athlete identity, we examined the student-athletes competing at the Brazilian University Games “Final Phase”,

considering that these student-athletes were the elite Brazilian university sports (fourth chapter).

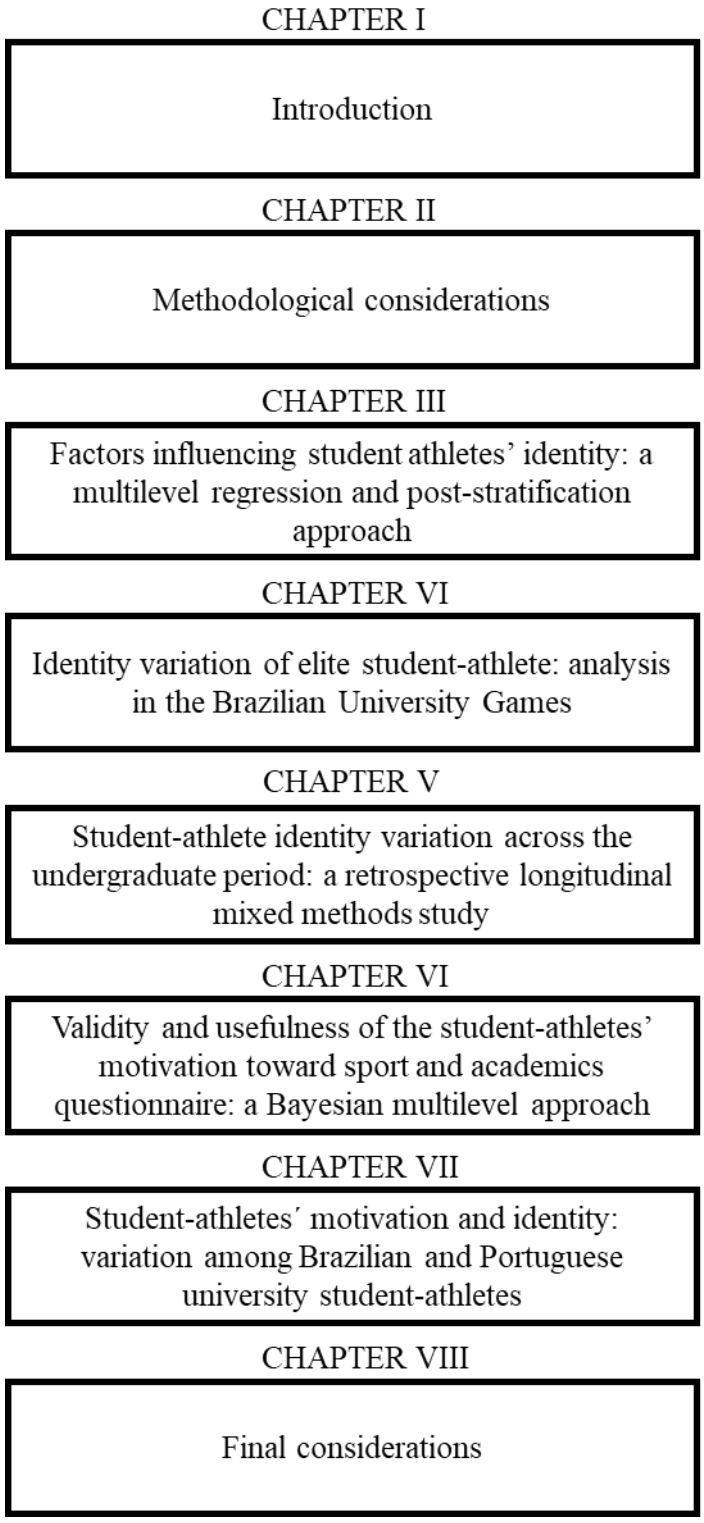
Finally, to complete and improve the understanding of student-athlete identity, we conducted, in the fifth chapter, a longitudinal retrospective mixed-methods study to examine the identity variation across the undergraduate period.

The sixth chapter considers Brazilian student-athlete motivation. Motivation is considered a major psychological construct that contributes to understanding student-athletes engagement in the dual-career. Furthermore, based on previous studies, we identified that the context might influence student-athletes identity and motivation.

Portugal has comprehensive legislation about school sport and strong links in culture and language with Brazil. Given a more liberal and laissez-faire stance regarding sport in Brazilian universities, the seventh chapter was composed of a cross-national study of Brazilian and Portuguese student-athletes identity and motivation.

Lastly, the final chapter (eighth chapter) presents a general discussion, considerations, and practical applications. The studies were organized to explore Brazilian student-athletes identity and motivation and compare Brazilian student-athletes and student-athletes from a country with established legislation on student-athletes. Figure 1 summarizes in a flowchart the chapters of the present thesis.

Figure 1 - Flowchart of the thesis chapters.



1.4 TERMINOLOGY DEFINITION

University student-athlete: A person in higher education who has major foci on education and sports (STAMBULOVA; WYLLEMAN, 2014).

Motivation: It is what “moves” people to action; motivation concerns both the energy and direction underlying actions (RYAN; BRADSHAW; DECI, 2019).

Identity: Identity is an individual’s subjective assessment of who she or he is and how she or he fits with the social world with others and developed around key life roles, reflecting levels of commitment to and investment in those roles (STETS; BURKE, 2000).

Sport motivation: The extent to which student-athletes are motivated to excel at athletic-related tasks (GASTON-GAYLES, 2004).

Academic motivation: The extent to which student-athletes are motivated toward academic-related tasks (GASTON-GAYLES, 2004).

Career motivation: The extent to which student-athletes are motivated toward a professional career in athletics (GASTON-GAYLES, 2004).

Social identity: Student-athlete identity related to the point of view of others (HARRISON, 2010; BEAMON, 2012).

Affectivity: The degree to which an individual identifies with the student-athlete role (HARRISON, 2010; BEAMON, 2012).

2 METHODOLOGICAL CONSIDERATIONS

2.1 EXPERIMENTAL APPROACH TO THE PROBLEM

The ethics committee of the Federal University of Santa Catarina approved the present project (nº 2.949.805). The project focuses on university student-athletes' identity and motivation towards sport and education and a holistic view of social, sport, and educational characteristics that might influence student-athletes in a dual-career pathway. To investigate student-athletes identity and motivation, we translated and validated the BIMS and the SAMSAQ and examined student-athletes identity and motivation. Additionally, we conducted semi-structured interviews with a sample of university student-athletes.

2.2 BAYESIAN APPROACH

Sports Sciences research and related fields, such as Psychology, often deal with complex interactions, noisy measurements often expected between-individuals heterogeneity and non-representative and imbalanced samples. To account for different sources of inferential uncertainty, Bayesian methods allow combining the information known before seeing the data (i.e., the prior uncertainty concerning a parameter or hypothesis expressed as a probability distribution) with what is learned from the observed data (i.e., the likelihood of the data conditioned on the parameter or hypothesis) to update knowledge expressed as the posterior distribution (LEE; WAGENMAKERS, 2013; KENNEDY; GELMAN, 2020). The bayesian thinking is simple and intuitive, used in everyday reasoning by reallocating credibility across possibilities (KRUSCHKE; LIDDELL, 2018). In our lives, we add more information to previous ones to make our judgments, and the Bayesian analysis does the same. The Bayesian approach is already used in various contexts across Sports Sciences (SANTOS-FERNANDEZ; WU; MENGERSEN, 2019), albeit sparingly, and its use in Psychology's subfields is growing (VAN DE SCHOOT et al., 2017).

2.2 PARTICIPANTS AND DATA COLLECTION

All participants needed to be enrolled in a higher education institution to collect the quantitative data. Furthermore, all participants were engaged in formal sports activities (regulated by the Brazilian Confederation of University Sports). Participants under 18 years old

or that did not complete the questionnaires were excluded. Questionnaires' data collection first occurred in the Santa Catarina University Games (Lages, Santa Catarina) in July 2018 and in the Brazilian University Games (Maringá, Paraná) in November 2018. Based on these data collections, we comprised a sample of 506 student-athletes. In the first year of data collection, we considered sex, institution, age, sport meaning (first job, second job, refund job, voluntary), major, training hours per week (1 to 5 hours, 6 to 9 hours, more than 10 hours) and if the student-athlete had formal support from her/his institution categorized as student-athlete status. We re-collected data in the Santa Catarina University Games in July 2019 (Joinville, Santa Catarina) and the Brazilian University Games in October 2019 (Salvador, Bahia).

The second data collection sample comprised 294 student-athletes. The total cross-sectional sample of the study included 862 student-athletes. We were able to retain repeated measures from 134 student-athletes. It was planned to follow up in 2020 but was not possible given the COVID-19 pandemic.

We also considered comparable data from the Portuguese higher education context, provided by Professor Carlos E. Gonçalves from the University of Coimbra, Portugal. The data allow us to explore cross-cultural comparisons between the Brazilian and the Portuguese contexts. The Portuguese cross-sectional data were collected during the Portuguese University Games of 2018, comprising 197 student-athletes.

We also considered qualitative data. The inclusion criteria for the interviews were part of the repeated measures sample; to represent the Brazilian national team within their sport or participate in international competitions and dedicate at least 20 hours per week for their sport. Based on a sample of 12 elite student-athletes with repeated measures from our sample, four accepted our invitation to participate in the study. We focused on elite student-athletes because the literature highlights that the group is the most influenced by the dual-career challenges, tends to present the higher values of identity (AQUILINA, 2009; LI; SUM, 2017). We conducted semi-structured interviews following the literature recommendations, audio-recorded to further transcription and analysis. We also asked the participants to draw a modified Rappaport timeline (RAPPAPORT; ENRICH; WILSON, 1985) to represent important events in their lives that could contribute to their current perception of identity. To ensure methodological integrity, fidelity to the subject matter and utility in achieving research goals were the focus of the entire research process (LEVITT et al., 2018). We planned to collect the interviews again in 2020. Still, we did not collect data during that COVID-19 pandemic due to the social isolation and the abstention of competition and training that could severely impact student-athletes identity and motivation. Therefore, although it could be interesting data (the

influence of COVID-19 pandemic on student-athletes identity and motivation), it was out of the scope of this study.

2.3 DATA ANALYSIS

2.3.1 Questionnaires' constructs evidence

Initially, we examined the reliability and validity of the factor structure of the Portuguese version for Brazilian and Portuguese student-athletes. The exploratory factor analysis was estimated adopting the criteria of values ≥ 0.40 (Principal Axis Factor; Direct Oblimin Rotation with Kaiser Normalization) for an item loading on factor and no less than three items in a factor (HAIR et al., 2009). To examine the internal consistency of each factor, the Cronbach alpha coefficients higher than 0.70 were considered acceptable. Confirmatory factor analysis was estimated using the "lavaan" package, available in the R statistical language (R CORE TEAM, 2018). We adopted factor loadings cut-off point of 0.7 (HAIR, et al., 2009) and followed the indexes and their respective cut-off points according to the specialized literature (JACKSON; GILLASPY JR; PURC-STEPHENSON, 2009).

We also conducted a Bayesian exploratory factor analysis (BEFA). We set our minimum posterior means in 3, and our Metropolis-Hasting acceptance rate was used to retain items' posterior probabilities of being different from zero. To conduct this analysis, the package "BayesFM" was used (CONTI et al., 2014) in R (R CORE TEAM, 2018). We ran at least 60,000 iterations with a burn-in period of 5,000 iterations. We also applied Bayesian confirmatory factor analysis (BCFA) to confirm or not the evidence found in BEFA. We ran BCFA using the package "blavaan" (MERKLE; ROSSEEL, 2018), in the R (R CORE TEAM, 2018) with two chains for 8,000 iterations with 2,000 burn-in iterations and regularized using normal prior (0,10) for the manifest variable (intercept) and normal prior (0,1) for latent variable. Posterior latent variables closer to 0.5 were considered good validity evidence (MERKLE; ROSSEEL, 2018). Moreover, Bayesian root mean square error of approximation (BRMSEA), Bayesian Gamma Hat (BGammaHat), Adjusted Bayesian Gamma Hat (adjBgammahat), and Bayesian McDonald's centrality index (BMc) were also applied to confirm the model fit (MONTENEGRO-MONTENEGRO, 2020).

2.3.2 Multilevel regression and post-stratification

Multilevel regression modeling provides a flexible and robust research design that considers data hierarchically (GELMAN; HILL, 2007). It provides a flexible alternative, where single-level models fail, that intuitively considers the data structure and the different sources of variation, providing trustable estimations and predictions for a target population (GELMAN; HILL, 2007). The framework has been noted as valuable to advancing cross-culture studies in psychology (VAN HOORN, 2015).

The multilevel model considers group-level effects, which are the weighted average between the total sample estimate and a group estimate (GELMAN; HILL, 2007). It is important to mention that instead of using significant tests, Bayesian methods interpretations are on confidence intervals and visual analysis of models' predictions. Additionally, to deal with unbalanced samples, multilevel regression and post-stratification allow partial pooling of information across similar groups and provide aggregated estimates of a target population (GELMAN; HILL, 2007) for groups with limited or even nonexistent data (GHITZA; GELMAN, 2013).

The first step used with Bayesian multilevel regression in the study analysis was to model individual scores as a function of individuals, group, or context characteristics, partially pooling individuals´ responses towards the group mean (GELMAN; HILL, 2007). Hence, we estimated each student-athlete identity and motivation toward individual, sports, and academic characteristics as a function of his or her responses. The terms after the intercept are modeled as group effects from normal distributions with variances to be estimated from the data.

2.3.3 Thematic analysis

Thematic analysis (BRAUN; CLARKE, 2019) was chosen due to its advanced understanding of the constitutive role in athlete identity formation and its widespread use in thematic studies (RONKAINEN; KAVOURA; RYBA, 2016; GEARY et al., 2021). Transcripts were given back to interviewees, so they could confirm, add, exclude or even modify their statements. The interviews lasted between 46 to 78 minutes, and the transcription comprised 62 pages with a single space in Microsoft Word 2013. Two authors did the analysis separately. First, we read the transcripts several times and listened to the audio-recorded to familiarize the interviews. Then, we began to deepen the interpretation to generate the initial coding. After that, we searched for emerging themes linked by similarities and generated them. After generating the initial themes, the authors compared the congruent and pertinent themes, and one more reding was conducted for defining the themes. With the themes defined, another

reading was carried out to define the sub-themes. When the coding and categorization were finalized, participants' statements were re-read for confirmation, readjustment, or exclusion. After each analysis stage, the authors compared their analysis, and just when both agreed, they started the next stage. Participants' statements were semantic and contextually translated to English.

"Critical friends" challenged both researchers that did the analysis by asking for explanations of their interpretations and did a friendly discussion based on the literature (SMITH; MCGANNON, 2018). Lastly, to ensure methodological integrity, fidelity to the subject matter and utility in achieving research goals were the focus of the entire research process (LEVITT et al., 2018).

3 FACTORS INFLUENCING STUDENT ATHLETES' IDENTITY: A MULTILEVEL REGRESSION AND POST-STRATIFICATION APPROACH[1]

3.1 INTRODUCTION

Elite athletes face multiple demands and challenges when combining their elite sport and higher education careers (e.g., dual-career), requiring about 20-30 hours/˙week and 30 hours/week, respectively (AQUILINA, 2013; CONDELLO et al., 2019). In the last decade, a dual career focus has been recognized as an athlete's right (EUROPEAN COMMISSION, 2012; EUROPEAN PARLIAMENT, 2015; 2017), even though major differences exist between and within countries in the degree of help given to athletes to optimize these combined commitments. While in the United States, student-athletes are well recognized and benefit from sports embedded within both private and public academic systems (NCAA, 2018), in many other countries, sports are organized at the club level, with little or no formal relationship to the educational system (AQUILINA; HENRY, 2010; HENRY, 2013; AMSTERDAM UNIVERSITY OF APPLIED SCIENCES et al., 2016). In Brazil, recent policies promoting health to enhance physical activity (MALTA; SILVA, 2012) and sports participation (MEZZADRI et al., 2015) have been introduced; but there is still a need for dual career support to help with athletes' holistic development and managing transitions to the labor market at the end of their sport career (BRANDÃO; VIEIRA, 2013). In fact, a substantial growth of sports within public and private Brazilian universities has led to an increased number of Brazilian student-athletes competing in the Olympic Games (CAMARGO; MEZZADRI, 2018).

Simultaneously engagement in academic, sports, and social contexts presents several concurrent dimensions to the development of the student-athlete's identity (STURM; FELTZ; GILSON, 2011). In presence of concomitant sport and education challenges, student-athletes might experience identity conflict leading to dropping out in sports or academics to maintain a dominant student or athlete identity (LALLY; KERR, 2005; LALLY, 2007; WYLLEMAN; REINTS, 2010b; YUKHYMENKO–LESCROART, 2014; STAMBULOVA et al., 2015).

The Baller Identity Measurement Scale (BIMS) has been developed and validated with student-athletes from the United States (HARRISON et al., 2010). Based on the Athletic Identity Measurement Scale (BREWER; CORNELIUS, 2001) and the Student Athletes'

1 QUINAUD, R. T. et al. Factors Influencing Student Athletes' Identity: A Multilevel Regression and Post-stratification Approach. **Perceptual and Motor Skills**, v. 127, n.2, 432-447, 2020.

Motivation Toward Sports and Academics Questionnaire (GASTON-GAYLES, 2005), the original BIMS encompassed ten items to be answered on a 5-point Likert-type scale, ranging from one (strongly disagree) to five (strongly agree), organized in a four-factor structure of the student-athlete's motivation for performance (i.e., Social Identity: items 1, 2 and 3; Exclusivity: items 4 and 5; Positive Affectivity: items 6 and 7; and Negative Affectivity: items 8, 9, and 10) (HARRISON et al., 2010; HARRISON et al., 2014). Conversely, the validated Italian version of BIMS (BIMS-IT) resulted in a two-factor model (e.g., Social Identity and Identity Gain/Loss), probably due to a lack of dual career policies in place in the specific Italian socio-cultural context (LUPO et al., 2017a). From these findings, scholars are urged to validate the psychometric properties of the BIMS in different countries (LUPO et al., 2017a).

Several individual factors (e.g., age, gender) and contextual factors (e.g., academic, sports, and social levels) may influence student-athletes' identifies (STURM; FELTZ; GILSON, 2011), with traditional research having addressed single level considerations to simplify interpretation of scientific outcomes, despite several limitations to this approach (MCELREATH, 2015). Multilevel regression modelling provides a flexible and robust research design alternative that considers data hierarchically data (GELMAN; HILL, 2007). Moreover, multilevel regression and post-stratification (MRP) allows partial pooling of information across similar groups and aggregated estimates of a target population (Gelman & Hill, 2007) for groups with limited or even non-existent data (GHITZA; GELMAN, 2013). Used to estimate pre-election polls at state and national levels (GELMAN; LITTLE, 1997; PARK; GELMAN; BAFUMI, 2004), MRP outperformed empirical means and traditional regression models (LAX; PHILLIPS, 2009) and, more recently, has been applied to health science data (VAN DER HEYDEN et al., 2014; ZHANG et al., 2015; EKE et al., 2016; BARRINGTON-LEIGH; MILLARD-BALL, 2017; DOWNES et al., 2018).

In considering the need to have a measure scale based on the Brazilian context, we initially explored the validity of a Portuguese translated version of the BIMS. Then, we applied MRP to estimate identity variation among Brazilian university student-athletes´ in relation to their gender, sport type, competition level and university type.

3.2 METHOD

3.2.1 Experimental approach to the problem

The Research Ethics Committee of the Federal University of Santa Catarinaapproved thepresent cross-sectional study of voluntary student-athlete participants, all of whom were enrolled in a higher education degree program and were competing in organized sports of the National Federation of University Sports (inclusion criteria). Student-athletes that were not 18 years old at the time of the data collection or did not respond the entire questionnaire were excluded. At a state level, data were collected during the Santa Catarina University championships in July 2018; at the national level, data were collected during the Brazilian University championship in November 2018. The study was designed based on multilevel regression and post-stratification approach (GELMAN; HILL, 2007).

3.2.2 Participants

We recruited 506 (219 males and 287 females) student-athletes (M = 21.9, SD = 3.7 years) enrolled in public (49.6%) and private (50.4%) Brazilian universities who were competing in both team (79%: basketball, beach-volleyball, handball, field hockey, football, futsal, rugby and volleyball) and individual sports (21%; judo, rowing, swimming, tennis and track and field) at local (44.2%), state (19.0%) and national (36.8%) levels. All participants provided their informed consent for the study. Among those enrolled in private universities, 78.4% were competing at the national level and 57.3% were competing at the state level.

3.2.3 Translation and validation of the Portuguese version of BIMS

In accordance with prior literature (HERDMAN; FOX-RUSHBY; BADIA, 1997; SU; PARHAM, 2002), we produced a conceptually and semantically equivalent translation of the original BIMS by having two native Portuguese speakers independently perform and agree to a forward translation and then having an English reviewer back translate the instrument following a blind translation procedure. We then compared the original and backward translated BIMS versions to eliminate any misunderstandings and/or imprecisions in the translation process. Then, we administered the adapted 10-item BIMS-PT to a subsample of 74 Brazilian university student-athletes who individually indicated their level of agreement with the statements on a 6-point the Likert scale, ranging from 1 (strongly disagree), to 6 (strongly agree).We interviewed these respondents to verify the clarity of the instructions, the items, and responses options. Finally, we then considered the BIMS-PT suitable for administering to the Brazilian student-athletes in this study.

An exploratory factor analysis (Principal Component Extraction; Varimax Rotation with Kaiser's normalization) was used to examine the number of factors within the BIMS-PT, starting from the proposed four-factor model of the BIMS and testing different models (e.g., three-factor or two-factor) in case the original model was not confirmed. We adopted the criteria of values ≥ 0.40 for an item loading on factor and no less than three items in a factor (HAIR, et al., 2009). Overall, the exploratory factor analysis (Table 1) indicated that the BIMS-PT version presented a two-factor structure (Kaiser normalization = 0.84). Six items (e.g., number 1, 3, 6, 7, 8, and 10) loaded one factor only, whereas items number 2, 4, 5, and 9 loaded both factors. Overall, seven items loaded the factor named "Affectivity" (α = 0.80) and seven items in the factor named "Social Identity" (α = 0.74).

Table 1 - Exploratory factor analysis and reliability estimate of the Portuguese version of the Baller Identity Measurement Scale.

Item	Factors	
	Affectivity	Social Identity
1.I consider myself a student-athlete.		0.82
2. I have many goals related to being a student-athlete.	0.59	0.50
3. Most of my friends are considered more students than athletes.		0.63
4. Being a student-athlete is the most important part of my life.	0.72	0.43
5. I spend more time thinking about being a student-athlete than anything else	0.45	0.58
6. When I'm a student-athlete, I feel good about myself.	0.57	
7. Other people see me mainly as a student-athlete.		0.83
8. I feel bad about myself when I do poorly when I'm not a student-athlete.	0.73	
9. Being a student-athlete is the only important thing in my life	0.57	0.49
10. I would be very depressed if I were injured and could not be a student-athlete	0.74	
Alpha	0.80	0.74

To examine the internal consistency of each factor, the Cronbach`s alpha coefficients >70 was considered acceptable. Furthermore, a confirmatory factor analysis (CFA) was applied to examine the factorial structure of the model, using Chi-square (X^2), Chi square ratio (X^2/df), Turcker Lewis Index (TLI ≥ 0.95), Akaike Information Criteria (AIC), normed fit index (NFI ≥ 0.95), root mean square error of approximation (RMSEA ≤ 0.05), P of CLOSE fit (PCLOSE; p>0.05), and comparative fit index (CFI ≥ 0.95). The CFA indices showed to be acceptable: Chi-square (X^2) = 34.548; Chi-square ratio = 1.33; TLI = 0.992; AIC = 112.548; NFI = 0.981; RMSEA = 0.026; PCLOSE = 0.977; and CFI = 0.995.

3.2.4 Multilevel regression and post-stratification

Initially, we explored possible substantial variations among student-athletes´ identity responses when aggregated by gender, sport type (individual and team sports), competitive level (local, state and national level) and university type (public and private). In this process, we used variant intercept models assuming, student-athletes (level-1) nested by groups (level-2, e.g., gender) to measure the proportion of total variance that fell between-group (i.e., variance partition coefficients) (GOLDSTEIN, 2011). Variance partition coefficients > 0.05 derived from the varying intercept models were considered to reflect substantial variation between groups. Varying intercept models assuming student-athletes (level-1) nested by group (level-2, e.g. gender) were used. The group-level parameters were used to measure the proportion of total variance which fell between-group, i.e. variance partition coefficient (Goldstein, 2011). Variance partition coefficients >0.05 derived from the varying intercept models were interpreted as indicating a substantial variation for group. Using this method, no substantial variation between BIMS indicators grouped by gender and sport type emerged (Table 2).

Table 2 - Estimates and variance partition coefficients (95% confidence intervals) of BIMS-PT factors responses among Brazilian student-athletes by gender, competitive level, type of sports, and type of university.

	Affectivity		Social Identity	
	Estimations (95% CI)	Variance partition coefficient (95% CI)	Estimations (95% CI)	Variance partition coefficient (95% CI)
Gender		0.00 (0.00 to 0.19)		0.00 [a]
Male	3.30 (3.14 to 3.45)		4.77 (4.66 to 4.90)	
Female	3.10 (2.97 to 3.24)		4.76 (4.65 to 4.87)	
Competitive level		0.21 (0.06 to 0.55)		0.08 (0.02 to 0.32)
Local level	3.90 (3.75 to 4.04)		5.13 (5.00 to 5.25)	
State level	3.10 (2.91 to 3.30)		4.78 (4.60 to 4.96)	
National level	2.64 (2.51 to 2.77)		4.47 (4.36 to 4.59)	
Type of sports		0.16 (0.00 to 0.80)		0.00 [a]
Individual sports	3.32 (3.10 to 3.54)		4.69 (4.51 to 4.87)	
Team sports	3.15 (3.04 to 3.27)		4.79 (4.70 to 4.88)	
Type of university		0.25 (0.05 to 0.95)		0.11 (0.02 to 0.44)
Private	2.62 (2.50 to 2.74)		4.47 (4.36 to 4.58)	
Public	3.76 (3.64 to 3.87)		5.08 (4.97 to 5.19)	

[a]The 95% confidence intervals were too large and unreliable implying that no substantial variance was present at level-2, which means no differences between players when grouped at level-2

Hence, we estimated the student-athlete´s identity as a function of his/her individual characteristics, using the following formula:

$$\boldsymbol{y_i} = \boldsymbol{\beta^0} + \boldsymbol{\alpha}_{\boldsymbol{j[i]}}^{\boldsymbol{competitive\ level}} + \boldsymbol{\alpha}_{\boldsymbol{k[i]}}^{\boldsymbol{university\ type}}$$

where *"i"* indicates theindividual, "*j"* indicates the competitive level and "*k"* indicates university type. Terms after the intercept were modeled as group effects (also referred as random effects) drawn from normal distributions with variances to be estimated from the data:

$\boldsymbol{\alpha}_{\boldsymbol{j[i]}}^{\boldsymbol{competitive\ level}} \sim \boldsymbol{N}\ (\boldsymbol{0}, \boldsymbol{\sigma}^{\boldsymbol{2}}_{\boldsymbol{competitive\ level}})$, for j = 1, 2, 3

$\boldsymbol{\alpha}_{\boldsymbol{k[i]}}^{\boldsymbol{university\ type}} \sim \boldsymbol{N}\ (\boldsymbol{0}, \boldsymbol{\sigma}^{\boldsymbol{2}}_{\boldsymbol{university\ type}})$, for k = 1, 2.

The model estimates were used to predict the student-athletes´ identity variables for groups defined in a post-stratification dataset (i.e. university type and competitive level). The post-stratification dataset had an observation corresponding to each group defined for all combinations of the variables included in the model. Since, in the present study, models included two university types and three competitive levels, the post-stratification dataset encompassed six rows (two x six), including the population size, in each group. After predicting the outcome variable for each group, we aggregated estimates with respect to the type of university level (or other subgroup units) with the subgroup population sizes to determine their relative weights.

We regulated the estimates using weakly informative prior distributions, normal prior (0, 10) for population-level effect (intercept) and normal priors (0,1) for group-level effects (i.e., the standard deviations of varying intercepts). Two chains for 4,000 iterations with a warm-up length of 1,000 iterations were run to ensure convergence of the Markov chain. The trace plots to examine the convergence of Markov chains have been inspected, and posterior predictive checks to validate our models have been used (GELMAN et al., 2013). Bayesian estimations were performed using the No-U-Turn Hamiltonian Monte Carlo sampler in Stan (CARPENTER et al., 2017), obtained using brms package (BÜRKNER, 2017), available as a package in the R statistical language (R CORE TEAM, 2018).

3.3 RESULTS

Regression models for BIMS-PT factors considering the combined effects of competitive level and university type are summarized in Table 3. These data reveal that student-athlete participants in this study showed high values for social identity and low negative values for affectivity. For both private and public universities there was substantial variation between affective and social identity in relation to competition level. For both BIMS dimensions and type of university, student-athletes who attained higher levels of competition had substantially lower values of affectivity and social identity than those who attained lower levels of competition.

Table 3 - Fitted estimates of BIMS-PT factors considering the combined effects of competitive level and university type.

		Posterior estimates (95% credible interval)	
		Affectivity	Social identity
Private university	Local level	3.27 (3.07 to 3.48)	4.77 (4.57 to 4.96)
	State level	2.66 (2.45 to 2.87)	4.54 (4.34 to 4.73)
	National level	2.46 (2.33 to 2.59)	4.38 (4.26 to 4.51)
Public university	Local level	4.06 (3.92 to 4.20)	5.21 (5.08 to 5.34)
	State level	3.44 (3.24 to 3.65)	4.97 (4.78 to 5.15)
	National level	3.25 (3.05 to 3.44)	4.82 (4.64 to 5.00)

We plotted the estimates of each student athletes' identity dimensions of affectivity (Figure 1) and social identity (Figure 2). Data in these simulation models indicated that student-athletes from public universities presented a higher likelihood of affectivity and social identity compared with their peers from private universities.

Figure 1 - Posterior predictions of affectivity dimension of BIMS by university type (a) and competitive level (b).

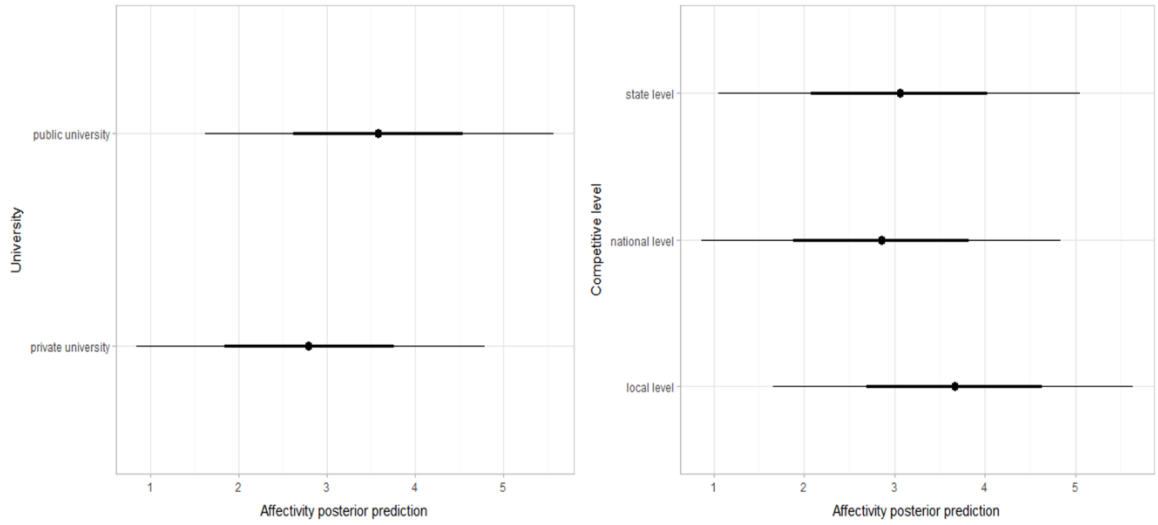
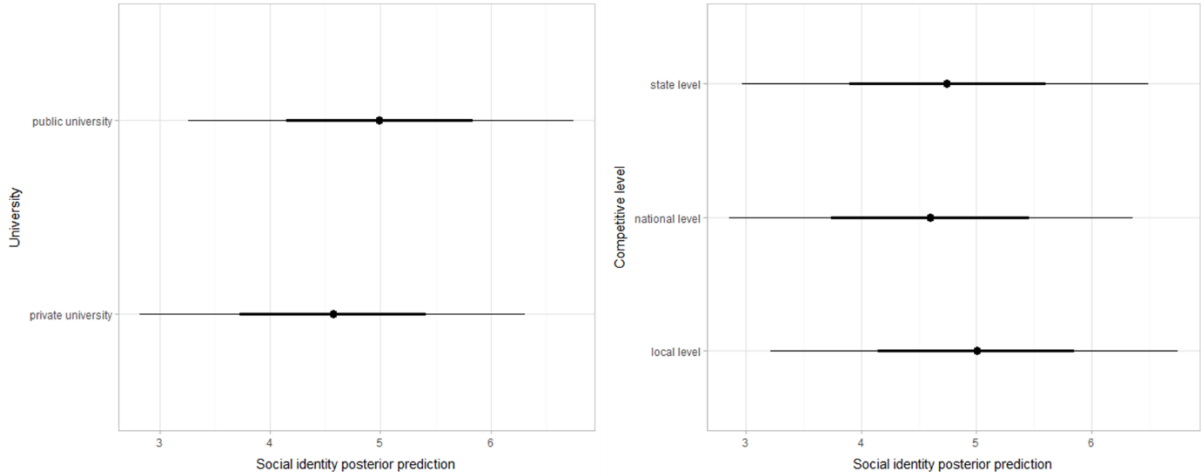


Figure 2 - Posterior predictions of social identity dimension of BIMS by university type (a) and competitive level (b).



3.4 DISCUSSION

After validating the BIMS-PT questionnaire for Brazilian participants, we considered estimates of variance in student-athletes´ identity as a function of their gender, sport type, competitive level and type of Brazilian university. The obtained variance partition analysis showed no substantial variation between student-athletes' BIMS indicators when participants were grouped by gender and sport type, but the models showed substantial variation between their affectivity and social identity as a function of competition level. Overall, the academic (university type) and sport (competitive level) had a substantial influence on Brazilian student-athletes´ affectivity and social identity dimensions.

Unlike the four-factor model of the original American BIMS (HARRISON et al., 2010), our BIMS-PT presented a two-factor "Social Identity" and "Affectivity" structure that was consistent with a version of the instrument previously validated for Italian student-athletes (LUPO et al., 2017a). Thus, these findings support the view that countries without formal support for a dual career path present similar cultural trends that differ from countries with a well-established dual career structure (SU; PARHAM, 2002).

We found no substantial variation between student-athletes´ identity when they were grouped by their participation in individual versus team sports. However, athletes' behaviour from both team and individual sports did diverge in some ways (MILLER; HOFFMAN, 2009; BRUNER et al., 2017; SLATER; HASLAM; STEFFENS, 2018). The present results suggest that university sports contexts may promote positive identity perceptions, independent of the type of sport, and Brazilian female and male student-athletes shared a similar, moderate level

of belonging and seemed to have similarly high student and athlete identities. These observations are consistent with findings from previous studies reporting no gender-related difference in student-athletes´ identity (YUKHYMENKO–LESCROART, 2014; LUPO et al., 2017a). The identity similarity between athletes of different genders` in the university context may be due to a development of women's sports in the shared opportunities across different institutions of higher education. Considering the positive link between social identity and positive individual identity development through youth sports participation (BRUNER et al., 2017), the present observation of high social identity values in both female and male student-athletes, independent of type of sport, adds a potential benefit of engagement in organized sports within university contexts.

The predictions of the present models indicate a high probability that student-athletes from public universities present higher values for affectivity and social identity compared with their peers from private universities. Higher values for affectivity and social identity were also predicted in the model for student-athletes in the lower competition level. However, there was large uncertainty in these predictions, suggesting a need for caution in interpreting these results. Differences in student-athletes' identity (LUPO et al., 2017a) and motivation (LUPO et al., 2015; LUPO et al., 2017) based on their competition level were previously observed among Italian university student-athletes, although those engaged in higher levels of competition scored higher than those engaged in lower levels of competition. These findings may reflect differences in the sport culture across Brazil, given its different demographic dimensions, cultural and social variability (HOFSTEDE et al., 2010). Since most national and state level student-athletes in this study were from private universities, variation in both identity factors in relation to different academic typology may be due to different facilities and support policies offered by public and private universities (AQUILINA; HENRY, 2010).

In Brazil, about eight million students attend graduate courses (INSTITUTO NACIONAL DE ESTUDOS E PESQUISAS EDUCACIONAIS ANÍSIO TEIXEIRA, 2018), with about two million enrolled in public universities that do not require tuition fees, and about six million paying tuition fees to attend private institutions. Private universities in Brazil are mainly comprised of smaller university centres and faculties, with smaller teaching units and educational resources, in contrast with public universities (INSTITUTO NACIONAL DE ESTUDOS E PESQUISAS EDUCACIONAIS ANISIO TEIXEIRA, 2004). Moreover, it is likely that private Brazilian universities follow similar models as North-American universities that use sports to promote their image and increase student enrolment (TEIXEIRA, 2010). Enrolment differences between public and private universities in Brazil may partially explain

our observations. Enrolment in public universities depends upon achieving a threshold score on national exams, and this may be a very difficult task given the limited number of entrance spots available. On the other hand, private universities in Brazil may recruit more competitive student-athletes. Based on data from this study, it is reasonable to assume that support for student-athletes and the relative importance of sports may vary substantially between public and private higher education structures in Brazil.

On the other hand, it has been noted that winning competitions is not the main goal for student-athletes, even though doing so positively impacts their athlete career and personal identity (COKER-CRANNEY et al., 2018). More relevant to personal identity than competitive results are a sense of personal fulfilment from engagement (COMEAUX; HARRISON, 2011; COKER-CRANNEY et al., 2018; MARTYN et al., 2019). Hence, it may be possible that student-athletes from public universities in Brazil may be more engaged in the academic and sport context of the university, and it may be related to student-athletes' satisfaction regarding sport and academic career development (DE BRANDT et al., 2017). Our observations suggest that student-athletes´ perceived identity may be influenced by the university's efforts to prepare them for the labour market, providing the means for them to meet academic requirements and combine both sport and academic commitments. However, to fully address this possibility, it might be useful to have more information regarding university policies in support of student-athletes´ development (FULLER, 2014).

Our findings show the important nuances of participation, as non-elite athletes express stronger feelings of belonging and self-awareness. University administrators, athletic managers and coaches should pay attention to the potential risks that their students might put too much focus on sports results. Sports titles and medals often bring media exposure to the institution, but this raises questions about the effects on student-athletes' affectivity and social identity. Of additional importance to the implications of this study, Portuguese is the seventh most spoken language in the world (MYERS, 2018), meaning that there are many practical applications for our new Portuguese version of the BIMS.

3.5 CONCLUSION

In summary, we estimated the variation in Brazilian university student-athletes´ identity as influence by these participants' gender, sport type, competition level and type of university. We used MRP to present university type-level estimates of students-athletes´ identity after accounting for such individual characteristics as the participants' current sport competition

level. We also established the reliability and validity of a translated Portuguese version of the BIMS that provides a valuable instrument for future research regarding student-athletes in Portuguese-speaking countries across different continents (e.g., Europe, Africa and South America) with different policies regarding the support of student-athletes. Overall, our models showed that the academic (university type) and sport (competitive level) contexts are likely to have a substantial influence on Brazilian student-athletes´ identity. Our observations highlight the need for further research, especially to better interpret the presumed difficulties experienced by student-athletes in countries with no formal dual career policies in their institutions of higher education. Additionally, future studies should focus on identity development among student-athletes who are attending different levels of academic study (high-school, undergraduate and graduate) while also considering the degree of dual career support offered to student-athletes by different educational programs. Major limitations lie in the cross-section design and the sample just from the university games, which interpretations cannot be extrapolated to the entire population and take as a fact of these results would be the same over time.

4 ELITE STUDENT-ATHLETE IDENTITY VARIATION: ANALYSIS OF THE BRAZILIAN UNIVERSITY GAMES[2]

4.1 INTRODUCTION

Elite student-athletes present several challenges when combining sports (athlete) and educational (student) careers, whether in managing their time (SUBIJANA; BARRIOPEDRO; CONDE, 2015) with high training and study loads (AQUILINA, 2013), psychological stress (KRISTIANSEN, 2017) or greater chances of dropping out of one of the careers (BARON-THIENE; ALFERMANN, 2015). Due to these several barriers to developing dual careers, the student-athlete sometimes finds himself/herself in an identity conflict (athlete, student, or student-athlete).

Research of student-athletes identity is considered a relevant issue to dual careers and their respective resources and barriers (STAMBULOVA; WYLLEMAN, 2019). In addition, the research may contribute to the development of international policies (EUROPEAN COMMISSION, 2016; EUROPEAN PARLIAMENT, 2017), which standardization of the measure is important. A questionnaire supporting the study of student-athlete identity is the Baller Identity Measurement Scale (BIMS), which is validated in countries such as the United States (HARRISON et al., 2010), Italy (LUPO et al.,2017), Portugal (FERNANDES; MOREIRA; GONÇALVES, 2019) and Brazil (QUINAUD, et al., 2020). The Brazilian version has ten items subdivided into two factors: Affectivity (four items) and Social Identity (six items). The affectivity factor reflects the feeling of belonging or loss of this student-athlete identity. On the other hand, the Social Identity factor represents their perception of themselves and their perception in the context in which they are inserted.

Based on studies on student-athlete identity, it was observed that the perception of identity could be influenced by different variables, which can be related to sporting characteristics (LUPO et al., 2017; QUINAUD et al., 2020), personal (LUPO et al., 2017) and educational (FERNANDES et al., 2019; QUINAUD et al., 2020). The influence of different contexts on the student-athlete identity, and even the understanding of the coexistence of contexts, is already supported in the literature with traditional analysis models (one level). However, such analyzes provide simplified and limited interpretations (MCELREATH, 2015).

2 QUINAUD, R. T. et al. Variação da identidade do estudante-atleta de elite: análise nos Jogos Universitários Brasileiros. **Revista Brasileira de Psicologia do Esporte**, v. 10, n. 4, p. 431-448, 2020.

Therefore, the multilevel analysis provides greater robustness when considering data grouped in a hierarchical manner (GELMAN; HILL, 2007). Furthermore, multilevel analysis and post-stratification provide partial information sharing between similar groups and aggregated estimates of a target population (GELMAN; HILL, 2007). Thus, this study is the first to use this type of analysis in Sports Science to disseminate knowledge in Brazil, published in a national journal and Portuguese.

Brazil has different sociocultural and educational contexts according to the geographic location to be investigated in the country, which leads to new questions. From this perspective, elite student-athletes of Brazilian university sports lack more detailed information about their identity development and personal, sporting, and educational characteristics. Therefore, this study examined the variation of the identity of the elite Brazilian university student-athletes associated with sex, region of the country, academic context (type of higher education institution and area of knowledge [course]), and sports context (hours of weekly training and type of sport).

4.2 METHODS

4.2.1 Experimental approach to the problem

The Ethics Committee for Research with Human Beings of the Federal University of Santa Catarina approved this study (No. 2.949.805), which included the voluntary participation of university student-athletes from the 2018 and 2019 Brazilian University Games held in the cities of Maringá and Salvador, respectively. Student-athletes who were not 18 years old at the data collection or did not respond to the entire questionnaire were excluded. Data were collected through the BIMS questionnaire in its version validated for the Brazilian context (QUINAUD et al., 2020). All participants provided their consent. With a quantitative approach, this study is characterized as exploratory descriptive (GIL, 2008).

4.2.2 Participants

A total of 311 (172 women) student-athletes (22.18 ± 3.85 years), regularly enrolled in a higher education institution, participated in the research. Approximately 77% were from private institutions (University Center: 48, Faculty: 89, University: 103) and 33% from public institutions (University: 71). Additionally, 51.4% of students were from the area of knowledge

of Health Sciences and 48.6% from other seven areas of knowledge (agricultural sciences, biological sciences, exact and earth sciences, human sciences, applied social sciences, engineering, and linguistics, letters, and arts), which competed in the Brazilian University Games (JUBS), in team (77%: basketball, futsal, soccer, handball, volleyball and beach volleyball) and individual (33%: athletics, judo, and swimming) sports. The categorizations of areas of knowledge respected the classification of the *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* (CAPES).

The data covered the five Brazilian regions (Midwest: 43, Northeast: 56, North: 53, Southeast: 79, and South: 80 participants). Approximately 39% of student-athletes practiced more than 10 hours a week, 33% between 6 and 9 hours, and 28% between 0 to 5 hours. Descriptive analysis, stratified by sex and hours of training, region, and type of institution, are presented in Table 1.

Table 1 - Participants according to sex, hours of training, region, and institution.

	Sex		Training hours		
Region	Female	Male	0 to 5	6 to 9	More than10
North	26	27	34	15	04
Northeast	28	28	19	24	13
Midwest	23	20	06	20	17
Southeast	36	43	16	32	31
South	59	21	14	10	56
Institution					
Public university	38	33	33	29	09
Private university	64	39	12	30	61
Private university center	22	26	15	19	14
Private college	48	41	29	23	37

Source: From study.

4.2.3 Multilevel regression analysis and post-stratification

First, the responses of the student-athlete identity considering sex (male and female), type of higher education institution (public university, private university, private university center, and private college), training hours were modeled. Then, varying intercept models assuming student-athletes (level 1) aggregated by groups (level 2, e.g., sex) were used to measure the proportion of total variance between groups, i.e., variance partition coefficient (GOLDSTEIN, 2011). Partition coefficients of variance > 0.05 derived from the models were

interpreted as indicating substantial variation between groups. Finally, student-athlete identity was estimated using the formula:

$$\boldsymbol{y_i} = \boldsymbol{\beta^0} + \boldsymbol{\alpha}^{\boldsymbol{sex}}_{\boldsymbol{s[i]}} + \boldsymbol{\alpha}^{\boldsymbol{institution}}_{\boldsymbol{e[i]}} + \boldsymbol{\alpha}^{\boldsymbol{training\ hours}}_{\boldsymbol{h[i]}} + \boldsymbol{\alpha}^{\boldsymbol{region}}_{\boldsymbol{r[i]}} + \boldsymbol{\alpha}^{\boldsymbol{educational\ area}}_{\boldsymbol{a[i]}} + \boldsymbol{\alpha}^{\boldsymbol{type\ of\ sport}}_{\boldsymbol{u[i]}}$$

Where "i" indicates the individual, "s" indicates sex, "e" type of educational institution, "h" hours of weekly training, "r" region, "a" educational area, and "m" type of sport. The terms after the intercept were modeled as group effects (also referred to as random effects) extracted from normal distributions with variances to be estimated from the data:

$\boldsymbol{\alpha}^{\boldsymbol{sex}}_{\boldsymbol{s[i]}} \sim \boldsymbol{N}\ (\boldsymbol{0}, \boldsymbol{\sigma}^{\boldsymbol{2}}_{\boldsymbol{sex}})$, for s = 1, 2

$\boldsymbol{\alpha}^{\boldsymbol{institution}}_{\boldsymbol{e[i]}} \sim \boldsymbol{N}\ (\boldsymbol{0}, \boldsymbol{\sigma}^{\boldsymbol{2}}_{\boldsymbol{instituion}})$, for *h* = 1, 2, 3, 4

$\boldsymbol{\alpha}^{\boldsymbol{traininghours}}_{\boldsymbol{h[i]}} \sim \boldsymbol{N}\ (\boldsymbol{0}, \boldsymbol{\sigma}^{\boldsymbol{2}}_{\boldsymbol{training\ hours}})$, for *s* = 1, 2, 3

$\boldsymbol{\alpha}^{\boldsymbol{region}}_{\boldsymbol{r[i]}} \sim \boldsymbol{N}\ (\boldsymbol{0}, \boldsymbol{\sigma}^{\boldsymbol{2}}_{\boldsymbol{region}})$, for *t* = 1, 2, 3, 4, 5

$\boldsymbol{\alpha}^{\boldsymbol{educationalarea}}_{\boldsymbol{a[i]}} \sim \boldsymbol{N}\ (\boldsymbol{0}, \boldsymbol{\sigma}^{\boldsymbol{2}}_{\boldsymbol{educational\ area}})$, for *k* = 1, 2, 3, 4, 5, 6, 7, 8

$\boldsymbol{\alpha}^{\boldsymbol{typeofsport}}_{\boldsymbol{a[i]}} \sim \boldsymbol{N}\ (\boldsymbol{0}, \boldsymbol{\sigma}^{\boldsymbol{2}}_{\boldsymbol{type\ of\ sport}})$, for *k* = 1, 2.

Model estimates were used to predict student-athlete identity variables for defined groups in a post-stratification dataset (university type and competitive level). The post-stratification dataset had an observation corresponding to each defined group for all combinations of variables included in the model. The present study included two levels for sex, four for the institution, three for training hours, five for the region, eight for the educational area, and two for the type of sport. Hence, the post-stratification dataset covered 1,920 lines (two x four x three x five x eight x two), including the population size in each group.

Estimates were regularized using non-informative prior distributions, normal distribution (0, 10) for population-level effect; normal distribution (0, 1) for group-level effects. Two Markov chains with 4,000 iterations were used, considering an initial conditioning phase of the chains of 1,000 iterations to ensure the Markov chain's convergence and estimate the models. Trace plots were evaluated to examine the convergence of Markov chains, and further predictions were verified to validate the models (GELMAN et al., 2013). Bayesian methods were implemented in Stan (CARPENTER et al., 2017), obtained using the brms package

(BÜRKNER, 2017), available as a package in the statistical language R (R CORE TEAM, 2018).

4.3 RESULTS

Table 2 shows the results of the models adjusted by sex, type of higher education institution, weekly training hours, region of the country, educational area (course), and type of sport, respectively. When considering the overall results of the questionnaire, there is a substantial influence of the type of higher education institution, hours of training per week, educational area, and type of sport on student-athlete identity. Regarding the Affectivity dimension of the BIMS, the higher education institution, hours of training per week, and educational area substantially influenced the outcome scores. For the Social Identity dimension of BIMS, it was noted a substantial influence of hours of training per week, educational area, and type of sport.

Table 2 - Estimates (90% confidence intervals) of BIMS-PT factors responses among Brazilian student-athletes by sex, type of university, region, training hours, educational area, and type of sport.

	Affectivity	Social Identity
Sex		
Female	3.44 (2.01 to 4.87)	4.94 (3.46 to 6.36)
Male	3.45 (2.01 to 4.87)	4.92 (3.44 to 6.34)
Type of university		
Public university	2.95 (1.36 to 4.52)	4.87 (3.16 to 6.47)
Private university	3.51 (1.94 to 5.04)	4.90 (3.18 to 6.48)
Private university centre	3.65 (2.06 to 5,17)	4.90 (3.19 to 6.51)
Private college	3.67 (2.08 to 5.18)	5.04 (3.31 to 6.64)
Region		
North	3.41 (1.76 to 5.03)	4.96 (3.23 to 6.59)
Northeast	3.31 (1.63 to 4.91)	4.85 (3.10 to 6.45)
Midwest	3.54 (1.88 to 5.17)	4.91 (3.17 to 6.54)
Southeast	3.58 (1.90 to 5.18)	5.03 (3.29 to 6.66)
South	3.35 (1.63 to 4.96)	4.87 (3.10 to 6.50)
Training hours		
0 to 5	3.18 (1.70 to 4.66)	4.70 (3.16 to 6.18)
6 to 9	3.33 (1.83 to 4.79)	4.85 (3.32 to 6.33)
More than 10	3.79 (2.30 to 5.25)	5.22 (3.70 to 6.70)
Educational area		
Agrarian sciences	3.78 (2.05 to 5.61)	5.04 (3.28 to 6.67)
Biological sciences	3.31 (1.61 to 4.98)	4.88 (3.12 to 6.50)
Health sciences	3.65 (1.99 to 5.25)	5.10 (3.36 to 6.72)
Exact Sciences	3.39 (1.70 to 5.03)	5.06 (3.28 to 6.69)
Human sciences	3.57 (1.90 to 5.22)	4.92 (3.18 to 6.55)

Applied social science	3.29 (1.59 to 4.88)	4.76 (3.03 to 6.36)
Engineering	3.34 (1.67 to 4.95)	4.76 (3.05 to 6.38)
Arts and linguistics	3.23 (1.46 to 4.90)	4.90 (3.12 to 6.53)
Type of sport		
Individual	3.38 (2.02 to 4.74)	4.46 (3.55 to 5.94)
Team	3.51 (2.15 to 4.85)	5.14 (3.94 to 6.28)

3.4 DISCUSSION

Based on the models, there is a substantial influence of the sporting and educational context on the identity of the elite Brazilian university student-athlete. Furthermore, there was no difference between the sexes, which corroborates with results already identified on the identity of the Brazilian student-athlete when considering different competitive levels (QUINAUD et al., 2020) and also in another international study in which the focus was only on elite university students-athletes (LUPO et al., 2017). Therefore, the high values of both sexes, especially for Social Identity, can demonstrate equality in the perception of the identity of the student-athlete within the context of Brazilian university sports, favoring a more egalitarian development.

The student-athlete identity did not show substantial differences, despite small variations compared to the Southeast and Northeast regions. This result may represent a certain homogeneity about the identity of Brazilian elite student-athletes. Furthermore, it can indicate the rotation of student-athletes in different higher education institutions for representation in games, especially when it is observed that most JUBS participants come from private institutions. Nevertheless, despite this result, the country's regions have cultural particularities that can influence the development of different contexts of society (HOFSTEDE, et al., 2010).

Regarding the typology of sport (team or individual), there was a higher influence of the type of sport for Social Identity, with student-athletes in team sports showing higher values. This result differs from previous studies that demonstrated non-variability between types of sports (LUPO et al., 2017; QUINAUD et al., 2020). However, the present study did not consider in its model different sports levels, as all athletes were from the same stage of the university games. The results imply that student-athletes of team sports have higher values because they are likely more recognized and disseminated (BAUER; SAUER; SCHMITT, 2005) in society, which makes these student-athletes assume a higher role and social identity within their contexts.

When considering the educational characteristics of student-athletes, the educational area showed substantial variability related to the global responses of the BIMS and the

Affectivity dimension, which indicates that the type of educational area influences the identity of the student-athlete. However, interpretations about the educational area are inconclusive despite substantial variability due to the high number of categories and the reordering in the different dimensions examined. However, it was observed that student-athletes in the areas of health sciences and agricultural sciences are the ones who presented, in general, higher values of identity, and student-athletes in social sciences and engineering those who presented lower values of identity. The use of the educational area in analysis models is still little used and difficult to interpret, even if substantial variations were found between the findings (BRUSTIO, et al., 2019). However, the result of the present study is consistent with the literature identifying higher values on the dual career in the educational area of Health Sciences (e.g., Sports Sciences).

Another educational characteristic of the student-athletes was the type of higher education institution, which showed substantial variability in the global responses and the Affectivity factor. The variability comparing higher education institutions has already been observed in other countries (FERNANDES et al., 2019). In the case of Brazil, the variability was observed from a more generic look at the typology of the institution (public vs. private) and considering student-athletes from different sporting levels (QUINAUD et al., 2020). At this time, with a deeper look at the academic organization of institutions and with only elite athletes, it was observed that student-athletes from public universities had substantially lower values when compared, for example, with student-athletes from private universities. However, there was no difference between institutions in the dimension of student-athlete Social Identity.

The results of the present investigation indicate that the type of institution might not influence student-athletes social identity at a high competitive level, which may be because the student-athletes are recognized as talented in their sports. On the other hand, the type of institution influenced the affectivity dimension. Lower affectivity values may indicate instability in their decisions, such as pursuing a student, athlete, or student-athlete career.

In addition to their own decisions, institutional support can guarantee fewer challenge paths to follow a dual career or have to choose to abandon one of them (BRUSTIO et al., 2019; DEFRUYT et al., 2019; FERNANDES et al., 2019). It seems that private universities provide conditions to support student-athletes (college tuition assistance, support with equipment, paying the travel to a competition, among others) that allow them to continue in a dual career and higher self-assertion. This model seems to meet North American models in which universities use the athlete's image for self-promotion and as an attractive means for future student-athletes (TEIXEIRA, 2010).

Finally, hours of training per week substantially influenced student-athlete identity. Although hours of training per week have not yet been investigated in other studies on student-athlete identity, it is observed that sports characteristics tend to influence it (LUPO et al., 2017; QUINAUD et al., 2020). This result indicates that engaging in sports activities makes the student-athlete more aware of their identity and can favor maintaining the dual-career (COKER-CRANNEY, et. al., 2018). However, despite identifying the influence of this variable on student-athlete identity, concerns arise when verifying that 28% of the elite student-athletes investigated train up to five hours a week. Based on this information, some speculations arise, such as the reflection on whether the sporting level of elite Brazilian student-athletes is high compared to other countries, or even whether the internationally represented student-athletes participate in university competitions.

In summary, the results show that the student-athlete identity is a complex construct, determined by different contexts, which demonstrates the need for a set of variables analyzed using robust and reliable analysis techniques. The process of identity formation is continuous and influenced by determinants that are still little explored outside the sporting context, as is the case presented on the type of university. In addition, new challenges and risks arise when performing analyses of instruments from the United States, even if validated for the new context (QUINAUD, et al., 2020).

4.5 CONCLUSION

Based on the models, it can be concluded that academic and sporting contexts substantially influence the elite student-athlete identity. More specifically, regarding the educational context, the type of higher education institution seems to be a variable that has a higher influence on the perception of identity. Thus, this information demonstrates that our educational system influences the identity of student-athletes and seems to be a major player in asserting a dual career or a unilateral choice, which may be decisive in its entire process of professional development and training. In addition, this study demonstrates the effectiveness and robustness of a data analysis technique not yet published in national journals of Sports Science.

Concerning the study's limitations, it is noteworthy that all of the student-athletes investigated came from the same competition (JUBS), even if in different years, which may demonstrate reality in only one of the contexts of university student-athletes. Nevertheless, as the main practical implication, this study demonstrates the need for greater interaction between

the education and sports sectors for the integral development of students, athletes, and student-athletes. National changes and improvements in the two systems can be expected to be slow, gradual, and with several divergences. However, it is suggested that educational institutions start this process of dialogue and implementation that can benefit those involved from their granted autonomy and sports organizations. Furthermore, it is suggested that future studies investigate the development of student-athlete identity at different levels of education.

5. STUDENT-ATHLETE IDENTITY VARIATION ACROSS THE UNDERGRADUATE PERIOD: A RETROSPECTIVE LONGITUDINAL MIXED METHODS STUDY

5.1 INTRODUCTION

Identity is one of the most interesting topics of study in student-athlete dual-career (STAMBULOVA.; WYLLEMAN, 2019). It is noteworthy that student-athletes face several challenges combining their dual-career (STAMBULOVA et al., 2015). International organizations are focused on helping these student-athletes in their dual-career development (EUROPEAN COMMISSION, 2016; NCAA, 2020). Due to having their major foci on sport and study (STAMBULOVA; WYLLEMAN, 2014), student-athletes identities are developed over the years in a dual-career position (LALLY, 2007). Furthermore, student-athletes identities are constantly changing, depending on the circumstancing that the student-athletes are in their lives (LALLY; KERR, 2005). Since the start of a combination of educational and sports activities, these people have gone through unique experiences that influence their self-identity and how people see them in society (WOODRUFF; SCHALLERT, 2008). Student-athletes are being positively influenced by two contexts (educational and sports); however, the dualistic personality or the uncertainty of a specific personality can cause psychological tensions and uncertainty about their future careers (BROWN; GLASTETTER-FENDER; SHELTON, 2000).

The use of psychometric instruments is well recognized in student-athlete literature, helping researchers conduct surveys in different countries (GUIDOTTI; CORTIS; CAPRANICA, 2015; STAMBULOVA.; WYLLEMAN, 2019; STEELE; VAN RENS; ASHLEY, 2020). The Baller Identity Measurement Scale (BIMS) is one of these instruments (HARRISON et al., 2010) and the few ones that measure student-athletes identity in only a single questionnaire (not athletic identity and student identity, separately). This questionnaire was first developed in the United States (HARRISON et al., 2010; HARRISON et al., 2014) and then adapted and validated to other cultures, such as Italy (LUPO et al., 2017a), Portugal (FERNANDES; MOREIRA; GONÇALVES, 2019) and Brazil (QUINAUD et al., 2020) as well as cross-national validation between Brazil and Portugal (QUINAUD et al., 2019). For example, the questionnaire was validated in the Brazilian culture with ten items distributed in a two-factor structure (Affectivity and Social Identity dimensions). Affectivity measures the degree of student-athletes identity self-perception. On the other hand, social identity measures

how student-athletes feel about their identity in a social context. Studies found no sex and type of sport relation to student-athletes identity, but educational context, age, and competitive level seemed to influence it (LUPO et al., 2017; QUINAUD et al., 2020).

Not only questionnaires have been used to study student-athletes identity. Several studies conducted interviews to provide a deeper understanding of the development of student-athletes perceptions (STEELE; VAN RENS; ASHLEY, 2020). In addition, studies have been conducting semi-structured interviews to make participants share their educational and sport experiences and engage in a self-reflection process. Although we can point out many studies on the topic of student-athlete, systematic reviews (GUIDOTTI; CORTIS; CAPRANICA, 2015; STAMBULOVA.; WYLLEMAN, 2019; STEELE; VAN RENS; ASHLEY, 2020) have demonstrated major gaps in the literature, for example, the scarce number of longitudinal mixed methods studies. Such studies increase understanding of the complex phenomenon and enrich the interpretations based on two approaches (PLANO CLARK et al., 2015). Additionally, there is a lack of studies from Latin American countries on student-athletes, which a study of Brazilian student-athletes can fulfill this gap contributing to a worldwide investigation.

At best, there is limited information about the changes in student-athletes identity across the undergraduate years. In this study, we considered a mixed-longitudinal design to examine the changes in student-athletes identity across the undergraduate years. We collected responses of student-athletes from all regions of Brazil, given the several different cultures all over its territory (HOFSTEDE et al., 2010). We initially verified the construct validity of BIMS to our sample. Then, we examined the influence of individual and contextual characteristics on student-athletes identity and then explored the variation across the undergraduate years. Lastly, we explored semi-structured interviews with international student-athletes to provide a deeper insight into the student-athletes' identity across the undergraduate years.

5.2 METHODS

5.2.1 Experimental approach to the problem

The first author university ethics committee approved the present study. All student-athletes in the study were voluntary and informed of their consentient agreement. Although the BIMS was already validated in the Brazilian context (QUINAUD et al., 2020), we conducted a Bayesian exploratory and confirmatory factor analysis to ensure the evidence of validity (Appendix B), which was considered a valid questionnaire, and its Portuguese translated

version is presented in Appendix B. Additionally, we conducted semi-structured interviews and then applied the thematic analysis. We adopted a critical realism perspective in the present study, enabling a rich standpoint in mixed methods studies (RYBA et al., 2020). The Bayesian approach and a critical realism perspective seem to fit well. The Bayesian approach considers the prior information available and the information contained in the data to update and interpret a phenomenon (KRUSCHKE; LIDDELL, 2018). The critical realism perspective considers empirical effectiveness to inform and understand a phenomenon (BANIFATEMEH et al., 2018).

Additionally, we conducted a retrospective longitudinal mixed-methods study. This type of study is when qualitative data is collected just in one time point and after the last time point of quantitative longitudinal data (VAN NESS; FRIED; GILL, 2011). The use of longitudinal mixed methods studies is recommended to identity issues to anticipate and address challenges that are likely to occur (PLANO CLARK et al., 2015).

5.2.2 Participants and data collection

5.2.2.1 Quantitative data

Questionnaire data were collected in the Santa Catarina University Games in July 2018 and 2019 (state game) and the Brazilian University Games in November 2018 and October 2019. Unfortunately, we did not collect data from 2020 because of the COVID pandemic. The total cross-sectional sample comprised 862 participants. All participants needed to be enrolled in a higher education institution and compete in the Brazilian Confederation of University Sports (inclusion criteria). Participants under 18 years old and that did not fully complete the questionnaire were excluded. For conducting the longitudinal analysis, 102 participants with repetitive measures were considered. Participants' descriptive characteristics are presented in Table 1.

Table 1- Participants' descriptive characteristics.

	Total sample (n= 862)	Longitudinal sample – first measure (n=102)	Longitudinal sample – second measure (n=102)
Age group			
18 to 19 years	226	34	20
20 to 21 years	266	39	36
22 to 23 years	184	17	28

24 years or older	186	12	18
Gender			
Female	490	79	79
Male	372	23	23
Competitive level			
University	373	37	45
States	160	25	20
National	270	30	28
International	59	10	9
Sport type			
Individual	145	4	4
Team	717	98	98
Student-athletes status			
No	581	59	68
Yes	281	43	34
Educational area			
Agrarian sciences	14	2	2
Applied social science	143	13	13
Arts and linguistics	10	1	1
Biological sciences	24	-	-
Engineering	166	23	23
Exact Sciences	31	2	2
Health sciences	414	57	57
Human sciences	60	4	4
University type			
Private	461	54	54
Public	401	48	48
Undergraduate period			
Freshman	-	47	14
Sophomore	-	14	30
Junior	-	11	25
Senior	-	30	33
Interviews			
Sophy	Female, 19 years old, 100 meters hurdles		
Samuel	Male, 21 years old, hockey field		
Marcus	Male, 23 years old, rugby		
Penny	Female, 25 years old, race walking		

4.2.2.2 Qualitative data

The inclusion criteria for recruitment of participants for the interview also encompassed: repetitive measures have been collected; to be in the Brazilian team of their sport; to participate in international competitions and dedicate at least 20 hours per week for their sport. We selected just the international student-athletes because the literature points out that they are the most influenced by the challenges of a dual-career and these participants presented the higher values of identity (AQUILINA, 2009; LI; SUM, 2017). It is important to mention that there were 12 international student-athletes with repetitive measures in our sample, and just four accepted our invitation to participate in the study. Our first plan was to collect the interviews in 2019 and 2020, but because of the COVID pandemic, we just collected the interviews in 2019. We decided not to collect data during the COVID pandemic because social isolation and the abstention of competition and training could severely impact student-athletes identity.

The first author contacted the participants that met all criteria and accepted participating in the study. Then, we conducted semi-structured interviews to improve the understanding of the participants' experiences and standpoints on the issues. This type of interview allows the emergence of unexpected ideas and phenomena that can be added to the interview and allows the interviewer to express the events experienced with emotion and more detail (SPARKES; SMITH, 2014). The data collection occurred according to the participant's chosen place, day, and hour. To guarantee the confidentiality and anonymity of all participants, pseudonyms were given to them.

For each interview, the study purpose, assurance of confidentiality, and right to withdraw at any time were explained initially. Interview themes and questions were developed through a literature review, past events contributing to their identity; social interactions; and life experiences. Each interview began with a general question (e.g., could you describe when and why you started playing your sport?). Although previous themes and questions were developed, other questions were asked during the interview, based on the students' answers, and all the participants were free to express their opinions.

We also asked the participants to draw a modified Rappaport timeline (RAPPAPORT; ENRICH; WILSON, 1985) to represent important events in their lives that could contribute to their current perception of identity (an example of participant's timeline is presented in Appendix B). In addition, the RTL has been used in sport psychology to stimulate participants' reflections and insights into their experiences (KRAFT; SEGUIN; CULVER, 2021). Participants' descriptive characteristics are presented in Table 1.

5.2.3 Data analysis

5.2.3.1 Multilevel linear regression modeling – cross-sectional data

Participants were aggregated by age group (18 to 19 years old, 20 to 21 years old, 22 to 23 years old, and 24 years old or older), sex (female and male), sports competitive level (international, national, state and university), sport type (team and individual), student-athlete status (yes and no), educational area (agricultural sciences, applied social science, arts, and linguistics, biological sciences, engineering, exact sciences, health sciences, human sciences), and university type (public and private). The student-athlete status (not exactly with this name) is a document from the higher education institution that guarantees support for student-athletes. Majors were grouped in educational areas based on the *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* (CAPES; English translation, Coordination for the Improvement of Higher Education Personnel). Predictions of individual scores are based on the available information of individuals characteristics and using additional "random" predictors such as group or context characteristics (for individual i, with indexes, a, s, c, t, a, e and u for, age group, sex, competitive level, sport type, student-athlete status, major type, and university type, respectively). "Random" or "group-level" effects are related to each other by their grouping structure, and the individuals´ responses are partially pooled towards the group mean (Gelman & Hill, 2007), as follows:

$$y_i = \beta^0 + \alpha_{a[i]}^{age\ group} + \alpha_{s[i]}^{sex} + \alpha_{c[i]}^{competitive\ level} + \alpha_{t[i]}^{sport\ type} + \alpha_{a[i]}^{student-athlete\ status} + \alpha_{m[i]}^{educational\ area} + \alpha_{u[i]}^{university\ type} + \epsilon_i$$

$\alpha_{a[i]}^{age\ group} \sim N\ (0, \sigma^2_{age\ group})$, **for s = 1, 2, 3, 4**

$\alpha_{s[i]}^{sex} \sim N\ (0, \sigma^2_{sex})$, **for s = 1, 2.**

$\alpha_{c[i]}^{competitive\ level} \sim N\ (0, \sigma^2_{competitive\ level})$, **for l = 1, 2, 3, 4.**

$\alpha_{u[i]}^{sport\ type} \sim N\ (0, \sigma^2_{sport\ type})$, **for u = 1, 2.**

$\alpha_{a[i]}^{student-athlete\ status} \sim N\ (0, \sigma^2_{student-athlete\ status})$, **for a = 1, 2.**

$\alpha_{u[i]}^{educational\ area} \sim N\ (0, \sigma^2_{educational\ area})$, **for u = 1, 2, 3, 4, 5, 6, 7, 8.**

$\alpha_{u[i]}^{type\ of\ university} \sim N\ (0, \sigma^2_{type\ of\ university})$, **for u = 1, 2.**

$\epsilon_i \sim N\ (0, \sigma^2_{y_i})$

We used weakly informative prior distributions, normal prior (0, 10) for population-level effects, and normal prior (0, 1) for group-level effects to regularize our varying intercept multilevel models' estimations. We run two chains for 4,000 iterations with a warm-up length of 1,000 iterations to ensure convergence of the Markov chains. Models were fitted with the "brms" package (BÜRKNER, 2017) in R (R CORE TEAM, 2018). For computational convenience, we standardized the outcomes. Trace plots and posterior predictive were used to check models' convergence (Markov chains) and validate models' estimations (Gelman et al., 2013).

5.2.3.2 Multilevel linear regression modeling – repeated measures

Repeated measures of the BIMS-PT2 dimensions, taken with a 12-month interval, were fitted using multilevel regression. We considered varying intercepts (i.e., baseline values) and slope (changes in individual´s outcomes across the observation period) by age group, competitive level, educational area, undergraduate period, and student-athlete status. In addition, the variables with two levels (sex, student-athlete status, and university type) were considered as population-level effects. The variables with three or more levels were considered as group-level effects (for individual *i*, with indexes, a, *c*, e, u, for age group, competitive level, educational area, undergraduate period, respectively). Models are characterized as follows:

$$y_i = \beta^0 + measure + sex + student - athlete\ status + university\ type + \alpha_{a[i]}^{age\ group.id} + \alpha_{c[i]}^{competitive\ level.id} + \alpha_{e[i]}^{educational\ area.id} + \alpha_{u[i]}^{undergraduate\ period.id} + \alpha_{a[i]}^{age\ group} + \alpha_{e[i]}^{educational\ area} + \alpha_{c[i]}^{competitive\ level} + \alpha_{u[i]}^{undergraduate\ period} + \epsilon_i$$

$$\alpha_{a[i]}^{age\ group.id} \sim N\ (0, \sigma^2_{age\ group.id}),\ \text{for s = 1, 2…408}$$

$$\alpha_{c[i]}^{competitive\ level.id} \sim N\ (0, \sigma^2_{competitive\ level.id}),\ \text{for l = 1, 2…408}$$

$$\alpha_{u[i]}^{educational\ area.id} \sim N\ (0, \sigma^2_{educational\ area.id}),\ \text{for u = 1, 2…816}$$

$$\alpha_{a[i]}^{undergraduate\ period.id} \sim N\ (0, \sigma^2_{undergraduate\ period.id}),\ \text{for s = 1, 2…408}$$

$$\alpha_{a[i]}^{age\ group} \sim N\ (0, \sigma^2_{age\ group}),\ \text{for s = 1, 2, 3, 4}$$

$$\alpha_{c[i]}^{competitive\ level} \sim N\ (0, \sigma^2_{competitive\ level}),\ \text{for l = 1, 2, 3, 4}$$

$$\alpha_{u[i]}^{educational\ area} \sim N\ (0, \sigma^2_{educational\ area}), \text{ for u = 1, 2, 3, 4, 5, 6, 7, 8}$$

$$\alpha_{a[i]}^{undergraduate\ period} \sim N\ (0, \sigma^2_{undergraduate\ period}), \text{ for s = 1, 2, 3, 4}$$

$$\epsilon_i \sim N\ (0, \sigma^2_{y_i})$$

We regularized the models estimates using normal prior (0, 5) for population-level effect (intercept) and normal priors (0,1) for group-level effects. We ran four chains for 2,000 iterations with 1,000 warm-up iterations. We fit the models using the "brms" package (BÜRKNER, 2017).

5.2.3.3 Thematic analysis

Interviews were audio-recorded to further transcription and analysis. Thematic analysis (BRAUN; CLARKE, 2019) was chosen due to its advanced understanding of the constitutive role in athlete identity formation and its widespread use in thematic studies (RONKAINEN; KAVOURA; RYBA, 2016b; GEARY et al., 2021). Transcripts were given back to interviewees, so they could confirm, add, exclude or even modify their statements. The interviews lasted between 46 to 78 minutes, and the transcription comprised 62 pages with a single space in Microsoft Word 2013. Two authors did the analysis separately. First, we read the transcripts several times and listened to the audio-recorded to familiarize the interviews. Then, we began to deepen the interpretation to generate the initial coding. After that, we searched for emerging themes linked by similarities and generated them. After generating the initial themes, the authors compared the congruent and pertinent themes, and one more reding was conducted for defining the themes. With the themes defined, another reading was carried out to define the sub-themes. When the coding and categorization were finalized, participants' statements were re-read for confirmation, readjustment, or exclusion. After each analysis stage, the authors compared their analysis, and just when both agreed, they started the next stage. Participants' statements were semantic and contextually translated to English.

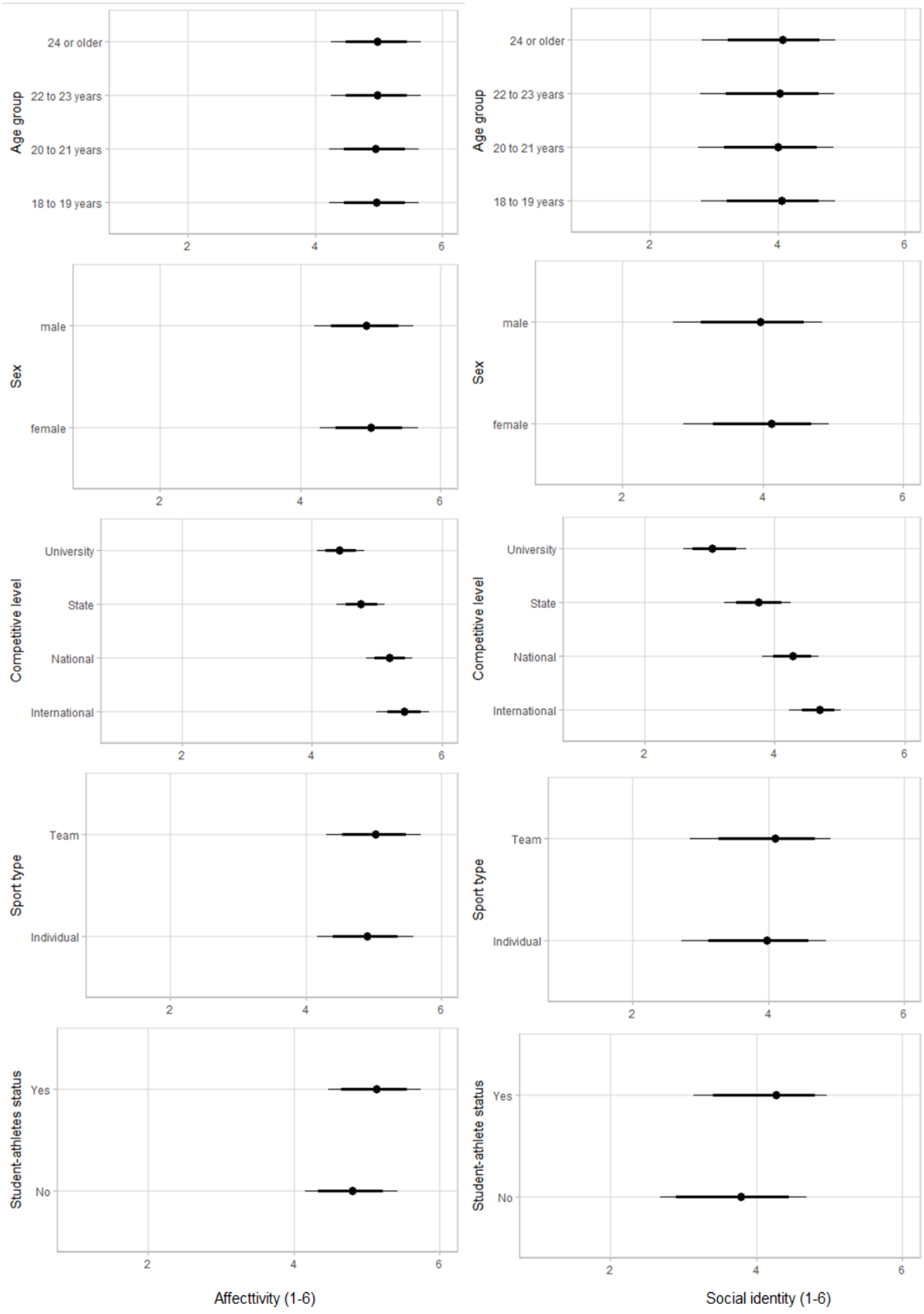
"Critical friends" challenged both researchers that did the analysis by asking for explanations of their interpretations and did a friendly discussion based on the literature (SMITH; MCGANNON, 2018). Lastly, to ensure methodological integrity, fidelity to the subject matter and utility in achieving research goals were the focus of the entire research process (LEVITT et al., 2018).

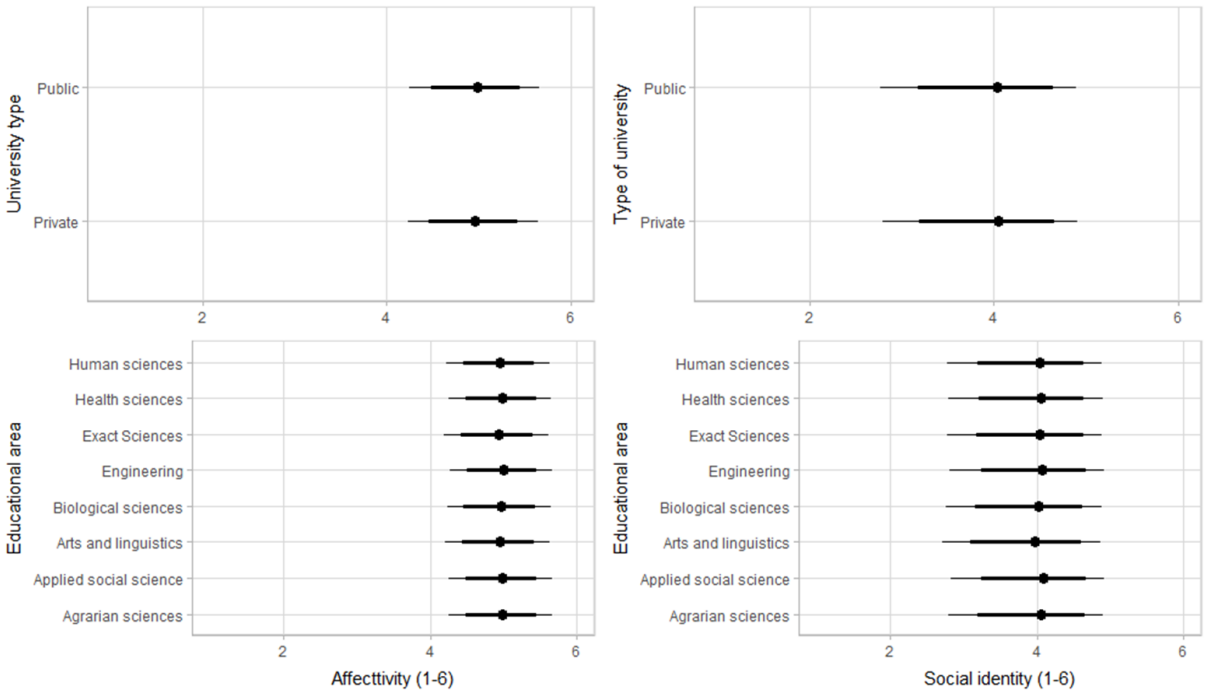
5.3 RESULTS

5.3.1 Cross-sectional modeling

Figure 1 shows the estimates of BIMS-PT2 when grouped by age group, sex, competitive level, sport type, student-athlete status, educational area, and university type. The estimates and uncertainty (90% confidence intervals) are also presented in Appendix B. The competitive level presented a substantial influence on affectivity and social identity. Student-athletes from the international level showed the highest estimates, and student-athletes from the university level showed the lowest estimates. Student-athletes status presented a small influence on affectivity and social identity. Student-athletes that responded "yes" were the ones that presented higher estimates. Age group, sex, sport type, university type, and the educational area did not show substantial variation in any factors.

Figure 1. Estimates and variance partition coefficients (90% confidence intervals) of BIMS-PT2 factors responses among Brazilian student-athletes by age group, sex, competitive level, sport type, student-athlete status, educational area, and university type.

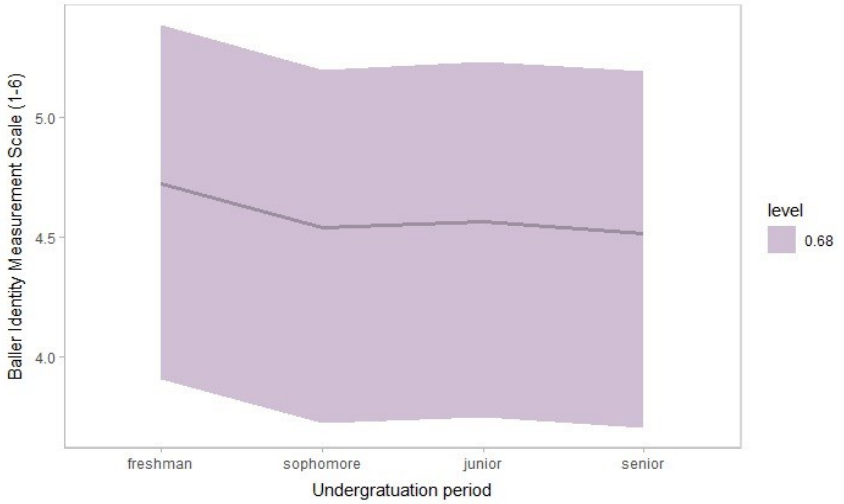

Age group
24 or older
22 to 23 years
20 to 21 years
18 to 19 years
Sex
male
female
Competitive level
University
State
National
International
Sport type
Team
Individual
Student-athletes status
Yes
No
2
4
6
Affecttivity (1-6)
Social identity (1-6)

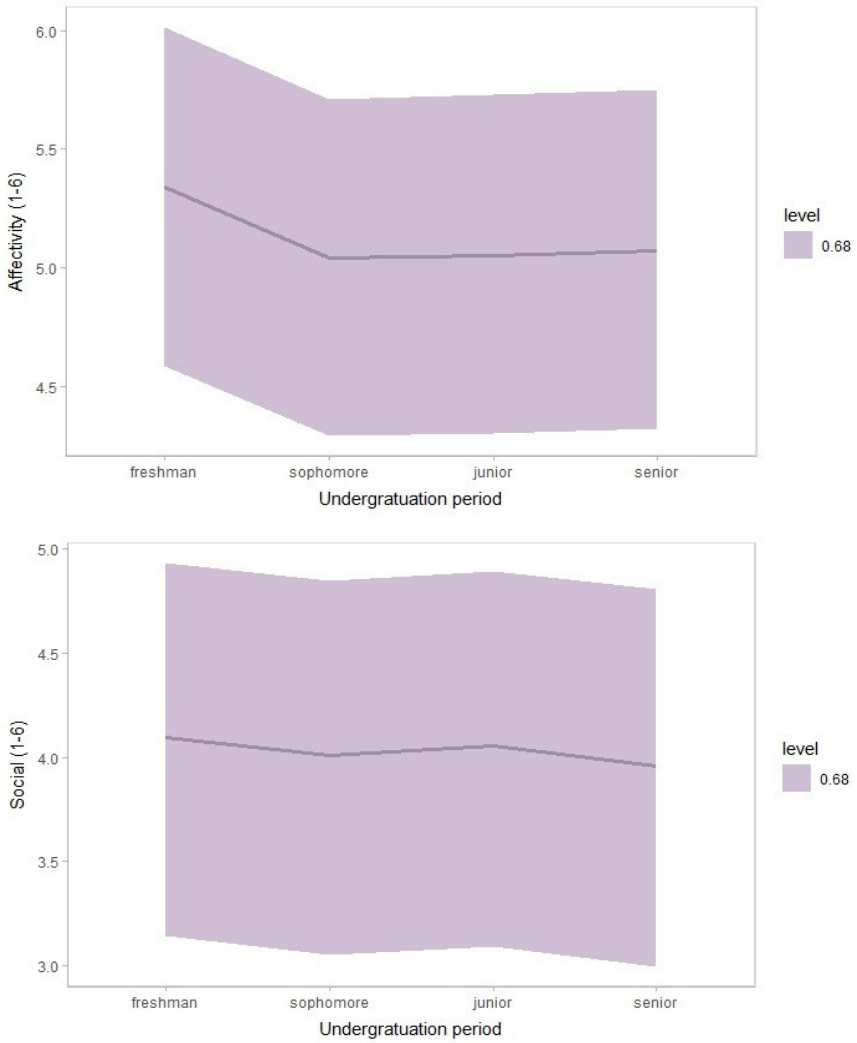


5.3.2 Longitudinal modeling

Longitudinal posterior estimates of the BIMS-PT2 and its factors were plotted in Figure 2. Although a large variability is observed, the results indicate a small variability across the undergraduate period. Thus, student-athlete identity seems to be higher at the beginning of the university.

Figure 2 - Posterior estimates of the BIMS and its dimensions.

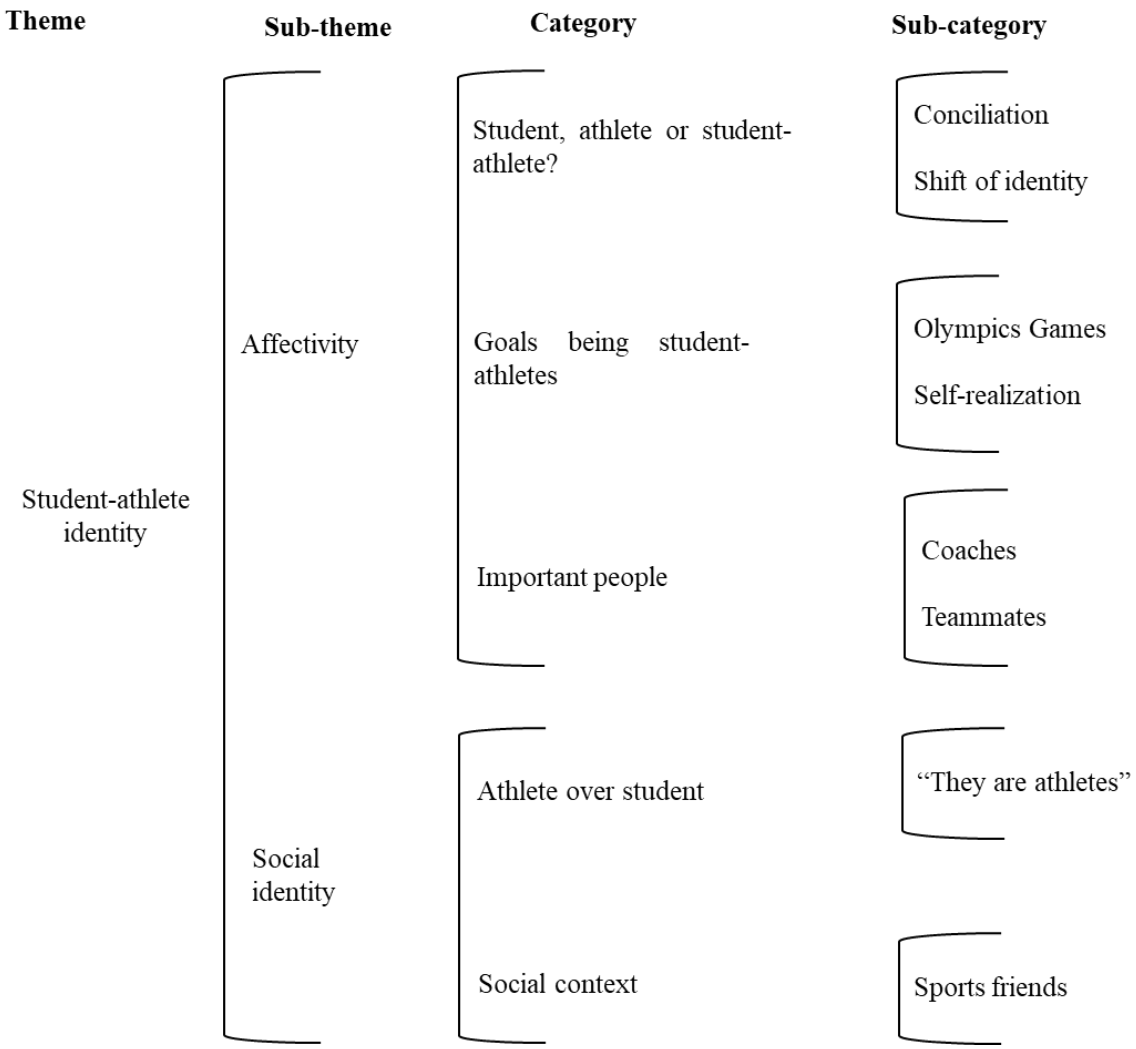




5.3.3 Thematic analysis

Participants' short reports and an example of the Rappaport timeline drawn by a participant are presented in Appendix B. Thematic analysis is presented in Figure 3. The major theme, "student-athlete identity," was observed in the participants' statements. Sub-themes were named Affectivity and Social identity as they are constructs of the questionnaire previously applied. In the Affectivity sub-theme, three categories and six sub-categories emerged. Concerning the Social identity sub-theme, two categories and two sub-categories emerged.

Figure 3 - Themes' hierarchical structure.



5.3.3.1 Affectivity

5.3.3.1.1 Student, athlete, or student-athlete?

Although we did not find variation in the longitudinal mixed models' estimates, when we interpreted individual scores, it seemed to vary depending on the stage in which the participant is in her/his life. For example, Samuel's scores for affectivity highly increased from three to six. In the year of the first measure, Samuel was returning to university and was not conciliating all commitments well. In the second measure, Samuel felt more able to conciliate those commitments, "I can separate things very well. When I compete, I forget about my university commitments. Just when I go back, I see what I need to do and if I can do". Although Marcus almost did not change his scores over the year, he shares similar thoughts about how to conciliate his commitments, "I shared my attention in this aspect. Sometimes I had my time just

for the university, sometimes just for training. Sometimes it was more for one; sometimes it was more for the other, it depended a lot on the season". Based on these statements, we observe that affectivity is more related to athletic self-perception than a student-athlete self-perception.

Additionally, we observe a shift in identity. Participants stated that it was impossible to keep a student-athlete identity all the time. Depending on the circumstancing, they have to shift their identity to just as athletes or students. For example, Sophy and Penny almost did not change their scores over a year. According to their statement, it seems that their feelings about sport are always over their feelings of being a student, "My plan was always studied. I always wanted to study, I always liked to study, but what makes me happy is training" (Penny).

5.3.3.1.2 Goals being student-athletes

To the student-athletes that preparing for the Olympic sports but did not achieve the qualification yet, the main goal was to go to the Olympic Games, "The Olympics is so close now and I almost getting the time that I need to get a chance to go to the Olympics. So, my goal now is to decrease my time and go to the Olympics" (Penny). For the student-athlete with Olympic Games experience (the one that increased his affectivity of student-athlete), it was observed a goal also related to the education:

> "I think I already achieved my goal. I played in the Olympics Games...there is not such a word to describe this feeling. We did not have any chance to win, but...When I started playing, I did not imagine that I could get here. My goal now is to keep playing as much as I can, conciliating the university. After done with school, I might go abroad again to play." (Samuel)

Lastly, his "[…] goal is not a result to the student-athlete who does not play Olympic sport. I think we need to enjoy the process of over-focusing just on the final result. It is not where you can go; it is how much you enjoy this process. My goal during the process was not just to get my certificate or to play in the first division. I did all these because I wanted because it was good for me." (Marcus).

5.3.3.1.3 Important people

During the journey, participants mentioned important people contributing to their self-perception as student-athletes. Sports coaches and teammates were the main agents. Samuel self-perception as a student-athlete was increased because his teammates were the people that he just lived with, "We were a family, we spent a lot of time together. We lived in a hostel all together. So, every single situation was with them. Situation during the competition and outside

of it". The sports coach was the other agent who contributed to the participants' self-perception by stimulating them to reflect on their choices and reflect on what they want to be, "I learned a lot from coaches. Once one said whatever you do, you have to do it well and be proud of it. Coaches showed that if you want something, you have to sacrifice your time and sometimes your well-being because a high-performance life is complicated. It isn't easy to keep the body and mind always performing at their best. But, I want it" (Marcus).

5.3.3.2 Social identity

5.3.3.2.1 Athlete over student

Participants' scores on Social identity almost did not have any major changes over a year. Participants' perception of what people think they spend their time thinking was most on the athletic identity. Although the BIMS is focused on student-athlete identity, we did not observe an overthinking of being student-athlete. What we did observe, based on the statements, was a perception of time spent thinking about being only an athlete. According to Sophy, people think that she is just an athlete all the time, but she knows that it is the impression that she gives to people, "I am a person-focused and dedicated to athletics. My goal is to make an Olympic time. This is what I think since I wake up and go to bed. If I am not training, I am watching videos of Olympic athletes. People's perception would not be different than that because I am like that". This perception is also confirmed when she adds, "A sport club in Portugal asked me if I would like to train there, but if I went there, it was just for competing. They did not offer me study, which would be much more interesting. Penny also shares this feeling of how people see her when she says: "I identify myself as an athlete that is always thinking about sport, living the sport. If I think like that, why would people think different?".

5.3.3.2.2 Social context

Just Samuel presented a major change in his Social identity score. Maybe because he had a long time just focused on his sport, his identity as an athlete is decreasing, and his social identity as a student-athlete is still increasing. There was observed that being in a social context, in which other people also were student-athletes or people that encourage the dual-career, contribute to student-athletes social identity. The participants see their teammates as the main agents to influence them in this feeling. According to Samuel, "I still want to play, I like it. But

now it is more self-motivation to be in the team. We all know that we need to get done with graduation and move on". Penny's social identity score almost did not change. According to her, it did change because of her teammates, "This is the best part, inspiration. You see a teammate doing well, and you think: So, I can also do it. Let do it! The integration is also good. They are on the same path as me, so why I cannot do the same?". Sophy that had a small decrease in her social identity scores, also adds saying, "I have two older friends that are almost done with their graduation. I talk a lot with them because they have already passed from what I will pass. They give me advice. They said that it is not easy to do both, but they are my examples that it is possible". Lastly, Marcus presented an increase of his social identity scores and, for him, it is because "Almost 100% from my team sport are my friends for a long time. I have friends from the university, but just those people that are also in sports… I did not realize it before; it is funny".

5.4 DISCUSSION

Based on the present retrospective longitudinal mixed-methods study, we aimed to investigate the Brazilian student-athletes identity across the undergraduate period. First, we found evidence of construct validity of the BIMS-PT2, based on the Bayesian approach. Second, our cross-sectional sample found a substantial influence of competitive level on both BIMS's dimensions and a small influence of student-athletes status on both dimensions. Third, a small decrease of identity across the undergraduate period was observed in our longitudinal sample, although large variability is presented. Additionally, participants' thematic analysis revelated student-athlete identity in a going process of development, change and support.

The results indicated a small decrease across the undergraduate period, especially after the first year of university. It might represent that entering higher education, the feeling of belonging and recognition are brought from another context (e.g., high school), or student-athletes at be beginning of higher education are stimulated by being in a new environment. After being used to the new environment and facing its challenges (MATEU et al., 2020), student-athletes might become a conflict of identity. Student-athletes get faced with the challenges of being in higher education, but their mindset starts to change. In high school, student-athletes are encouraged to enter higher education (AUNOLA et al., 2018). However, after entering higher education, the context changes, and now the student-athlete needs to start thinking about how her/his professional career will be after ending university (WYLLEMAN;

LAVALLEE, 2003). There is not enough time to plan the decision during the undergraduate period, and the interviews reinforce our interpretation.

Based on the participants' statements and the themes and codes that emerged, participants have set their priorities and identity on sport commitments. After entering the university, participants, such as Samuel and Penny, stated challenges combining a dual-career and dropping out from one of the contexts. Interestingly, Penny reported a strong athletic identity before entering the university, but she dropped out from sport. If the dedication to sports commitments decreases, the feeling of belongingness to an environment and recognition from partners and supporters also decreases (CABRITA et al., 2014; LI; SUM, 2017). Being committed with sport context probably makes them feel in a dual-career path of student-athlete even with all challenges imposed by the dual-career (MATEU et al., 2020). Elite student-athletes could easily drop out from study (BARON-THIENE; ALFERMANN, 2015) and dedicate exclusively to the sport because higher education is not an obligation that they must do or complete. Thus, decreasing the student-athlete identity across the undergraduate period might make them drop out from the dual-career (GEARY et al., 2021).

Our findings suggest that the participants do not combine identities but switch from one identity to the other given the moment of their lives. As a result, it might be difficult to give the same amount of time and dedication to both careers in the current university sports structure. The difficulty in combing both identities during the undergraduate period also lies in the fact that student-athlete identity might be in development years before entering the university (RONKAINEN; KAVOURA; RYBA, 2016a) and, in the present research, we did not investigate participants' athletic and academic identity when adolescents. Additionally, it also may indicate that the university sport contexts are still not prepared for high-level athletes.

To prepare university sport and higher education to high-level athletes, the development of student-athletes support policies is where countries, such as Portugal (PORTUGAL, 2019), put their major foci (EUROPEAN COMMISSION, 2016; 2017; STAMBULOVA.; WYLLEMAN, 2019) and, based on the present results, is where Brazil also need to focus. Although there are different levels of support (EUROPEAN COMMISSION, 2016; HENRIKSEN et al., 2020), we investigated in the present research the support given by the higher education institution. Universities can be considered the best places for the development of dual-career. Financial, human, and facilities support can be given together and with a well-stated philosophy of dual-career development (HENRIKSEN et al., 2020). A problem of developing dual-career support policies directly and only in the higher education institutions in a large country as Brazil is the disparity between institutions that could be found over the years.

Participants showed a more athletic self-perception in the affectivity theme when setting their goals. Additionally, important people are also more related to the sport context. Although we expect an equal focus on sporting and educational career, student-athletes that prioritize sport is common (CARTIGNY et al., 2020). The literature points out that student-athletes in the latter year of college may permit a higher exploration of nonsport career options (LALLY; KERR, 2005). Thus, the participants of this study might decrease their student-athlete identity most because they are decreasing their athletic feeling. Lastly, in the social identity theme, people's perception of the participants also indicates an athletic identity and the context participants prefer. This feeling of social identity is related to how participants express their attitudes, beliefs, and values (STETS; BURKE, 2000); therefore, if the participants express a more athletic feeling, the social identity would not be different.

The university career stage presents an important role in the student-athletes career plans (LALLY; KERR, 2005). The present observations show that higher education is when student-athletes are confronted by choices that they need to take, which might influence their identity as student-athletes. It seems that student-athletes entering higher education present a high identity, but a stronger athletic identity may mask it. During the university years, student-athletes probably decrease their dedication to the sport to plan their future career, lowering their student-athlete identity.

5.5 CONCLUSION

Based on a retrospective longitudinal mixed-methods study, we examined student-athletes identity across the undergraduate years. There was a slight trend of decrease across the undergraduate years. Additionally, participants' statements indicated difficulty in combining both identities, in which student-athletes try to shift their identity depending on the circumstance, but athletic identity seems to be privileged. Because the athletic identity is privileged, the student-athletes have difficulty combining a dual-career in a context-oriented academic achievement and transition to professional life. At least in Brazil, the higher education context does not seem to be prepared to support student-athletes toward a dual-career.

Although we conducted a retrospective longitudinal mixed-methods study based on rigorous quantitative and qualitative approaches, we need to consider some limitations. First, the main barrier that impacted our study design was the COVID pandemic, which did not allow us to extend the repeated measures data collection. In addition, the quantitative analysis was performed at a single observation and with a limited sample size. Future research needs to

consider a longitudinal design across the graduation years, considering a mixed-methods approach. Given our observations, qualitative information about other significant stakeholders should be considered.

6. VALIDITY AND USEFULNESS OF THE STUDENT-ATHLETES' MOTIVATION TOWARD SPORT AND ACADEMICS QUESTIONNAIRE: A BAYESIAN MULTILEVEL APPROACH[3]

6.1 INTRODUCTION

At the university level, student-athletes present several social, cultural, and individual challenges to pursue their sport and education paths (i.e., dual-career), especially at the start of the college degree (SIMONS; VAN RHEENEN; COVINGTON, 1999a; AQUILINA, 2013; GASTON-GAYLES; BAKER, 2015; RYBA et al., 2015; CONDELLO et al., 2019). The attention in dual-career, defined as "a career with major foci on sport and study or work" (STAMBULOVA et al., 2015), has increased in the past years (STAMBULOVA.; WYLLEMAN, 2019). Considering the different sports and educational contexts and the various dual-career approaches in place in the European Member States, the European dual-career recommendations urge strategies to foster the student-athletes motivation to pursue their academic and sports achievements (EUROPEAN COMMISSION, 2012). Indeed, motivation is determinant to keep people involved in what they do (FERDINAND; CZERNOCHOWSKI, 2018; RYAN; BRADSHAW; DECI, 2019). Thus, understanding student-athletes motivation for dual-career is crucial to support their career development and transitions (STAMBULOVA; RYBA; HENRIKSEN, 2020).

In general, dual-career pathways depend on student-athletes' motivation, identity, health, lifestyle, and wellbeing (MARTIN, 2005; RYBA et al., 2016; LUPO et al., 2017; RYBA et al., 2017; AUNOLA et al., 2018; SORKKILA et al., 2018; BRESLIN et al., 2019; CARTIGNY et al., 2019; HARRISON et al., 2020). In studying the dual-career motivation of student-athletes from different cultures, the robustness of the psychometric instrument is crucial for cross-cultural comparisons and applied sport psychology (JOSHANLOO et al., 2014; SULLIVAN et al., 2020). Since the development of the Student-athletes' Motivation toward Sports and Academics Questionnaire (SAMSAQ) in the United States (GASTON-GAYLES, 2005) and its validation tested in European (LUPO et al., 2012; GUIDOTTI; CAPRANICA, 2013; LUPO et al., 2015) and Asian (PARK; HONG; LEE, 2015) contexts, the effects of different cultures and dual-career support policies have been hypothesized (FORTES;

3 QUINAUD, R. T. et al. Validity and usefulness of the student-athletes' motivation toward sport and academics questionnaire: a Bayesian multilevel approach. **PeerJ,** v. 9, p. e11863, 2021

RODRIGUES; TCHANTCHANE, 2010; LUPO et al., 2012; GUIDOTTI; CAPRANICA, 2013; GUIDOTTI et al., 2013; GASTON-GAYLES; BAKER, 2015; LUPO et al., 2015; PARK; HONG; LEE, 2015; FERNANDES; MOREIRA; GONÇALVES, 2019). However, a lack of knowledge for Latin America's countries is still present.

Brazil is the largest country in Latin America. In having a federal structure, Brazil presents contrasting demographic characteristics and cultural backgrounds (Hofstede et al., 2010). While the Brazilian regulation of sports at the federal level, including university sports, was established in 1941 (BRASIL, 1941), rules and criteria for the allocation of public resources to the sports sector were established in 1998, assigning responsibility to sports organizations concerning the educational system and vice versa (BRASIL, 1998). In particular, the Brazilian University Sports Confederation is responsible for organizing and developing university sports, whereas the Ministry of Education has the primary responsibility of the sports policies allowing athletes to combine their dual-career. Brazilian public higher education institutions enroll around two million students per year (INSTITUTO NACIONAL DE ESTUDOS E PESQUISAS EDUCACIONAIS ANÍSIO TEIXEIRA, 2018). As for private higher education institutions, around six million students enroll each year(INSTITUTO NACIONAL DE ESTUDOS E PESQUISAS EDUCACIONAIS ANÍSIO TEIXEIRA, 2018). Public universities often provide sports infrastructure for students and private universities offer financial support for athletes. However, federal regulation of dual-career policy for student-athletes in Brazil is still not warranted (CARVALHO; HAAS, 2015). In the absence of a clear dual-career policy in the Brazilian sports system, some sports areas tend to be privileged, and others may be left unattended, leaving gaps in public service coverage. Especially at the state and local levels, programs and actions appear to vary according to different political approaches (HOULIHAN, 2005). Therefore, differences among Brazilian states and the country´s federalism structure could provide a different level of dual-career support and influence student-athletes' motivation (GUIDOTTI; CORTIS; CAPRANICA, 2015).

There have been problems to replicate psychological results, also referred to as the crisis of confidence (OPEN SCIENCE COLLABORATION, 2015). With few exceptions (SCHWEIZER; FURLEY, 2016), sports psychology has overlooked this debate. One of the general debate consequences has been the increased awareness of the limitations and inappropriateness of testing null-hypotheses, establishing statistical significance and p-value use (AMRHEIN; GREENLAND, 2018; MCSHANE et al., 2019). Indeed, psychology research deals with complex interactions, noisy measurements, often expected between-individuals heterogeneity, and non-representative and imbalanced samples. To account for different sources

of inferential uncertainty, Bayesian methods allow combining the information known before seeing the data (i.e., the prior uncertainty concerning a parameter or hypothesis expressed as a probability distribution) with what is learned from the observed data (i.e., the likelihood of the data conditioned on the parameter or hypothesis) to update knowledge expressed as the posterior distribution (LEE; WAGENMAKERS, 2013; KENNEDY; GELMAN, 2020).

Furthermore, the analysis and interpretation in sports psychology research often deal with traditional single-level approaches, albeit with the limitations noted in several scientific areas (GELMAN; SHALIZI, 2013). A multilevel modeling framework provides a flexible alternative that intuitively considers the data structure and the different sources of variation, providing trustable estimations and predictions for a target population (GELMAN; HILL, 2007). The framework has been noted as valuable to advancing cross-culture studies in psychology (VAN HOORN, 2015). Another main advantage of multilevel modeling lies in the natural fit of repeated measures (SINGER; WILLETT, 2003). Considering the lack of longitudinal studies on student-athlete motivation (STAMBULOVA.; WYLLEMAN, 2019), multilevel modeling is highly recommended to improve our understanding of Brazilian student-athletes' motivation toward dual-career.

The present research made use of a Bayesian approach and conducted four studies to examine the validity of the Portuguese version of the harmonized Italian Student-athletes' Motivation toward Sports and Academics Questionnaire (SAMSAQ-IT/A;GUIDOTTI; CAPRANICA, 2013) and to assess its usefulness in discriminating the influence of academic and sport contexts as sources of variation in the scores in cross-sectional and longitudinal research approaches. In study one, we aimed to translate and explore the psychometric structure of the Portuguese version of the SAMSAQ-IT/A (SAMSAQ-PT) using Bayesian exploratory factor analysis. In study two, we tested the factor structure of the questionnaire that emerged from study one by applying a Bayesian confirmatory factor analysis with an independent sample. Based on the evidence of construct validity, in study three, we aimed to examine the construct validity of the questionnaire in a cross-sectional sample considering sex, sport level, the student-athlete status, and the type of university attended applying Bayesian multilevel regression. Lastly, in study four, we aimed to explore the student-athletes' motivation scores' sensitiveness. Hence, we considered a longitudinal measure design across an academic year to analyze changes in motivation scores adjusted for sex, sport level, student-athlete status, and type of university.

6.2 RESEARCH DESIGN

The research ethics committee of the Federal University of Santa Catarina approved the present research (no 2.949.805) and voluntary student-athlete provided written consent to participate in the study. The inclusion criteria for recruiting participants encompassed: 1) to be enrolled in a higher education degree; and 2) to compete in organized sports of the Brazilian University Sports Confederation. Data were collected during the Santa Catarina University Games in July 2018 and 2019 (i.e., state Games) and the Brazilian University Games in November 2018 and October 2019 (i.e., national Games). The state games had about 800 athletes, while the national games had about 2.000 athletes participating. Studies one, two, and three comprised participants only from cross-sectional observations. Study four comprised participants from repeated observations across an academic year (measured in 2018 and 2019). Supplementary materials including data and code are available at https://osf.io/cpwdv/.

6.3 STUDY ONE

This study aimed to translate and explore the psychometric structure of the SAMSAQ-PT using Bayesian exploratory factor analysis. Independent forward and backward Portuguese translations of the SAMSAQ-IT/A (GUIDOTTI; CAPRANICA, 2013) and cognitive interviews were performed to ensure a conceptually and semantic trustable instrument applied in the Brazilian context (HERDMAN; FOX-RUSHBY; BADIA, 1997; SU; PARHAM, 2002). Then, the SAMSAQ-PT was administered to a subsample of 74 Brazilian university student-athletes who individually completed the 30-item SAMSAQ-PT, indicating their level of agreement with the statements on a 6-point Likert scale, ranging from 1 (strongly disagree) to 6 (strongly agree). Interviews aiming to ascertain the reasons behind responses were performed to verify the instructions, items, and response options. Therefore, the SAMSAQ-PT was considered suitable to be administered to Brazilian student-athletes.

6.3.1 Methods

6.3.1.1 Participants

The total sample comprises 862 student-athletes from all five regions of Brazil; however, about 72.6% were from the same region (south). The total sample was split into two

independent samples generated through random numbers. In study one, we used the first 50% of the dataset. The sample comprised 248 female and 183 male student-athletes (M_{age} = 21.7, SD = 3.4 yrs) enrolled in public (n=200) and private (n=231) Brazilian universities and competing at international (n=33), national, (n=131), state (n=74) and university (n=193) levels. Descriptive analysis is presented in Table 1.

Table 1 - Items means and standard deviation.

Item	Mean	SD	Item	Mean	SD	Item	Mean	SD
Cross-sectional sample								
1	5.02	1.29	11	2.76	1.75	21	4.91	1.18
2	4.48	1.49	12	5.21	1.08	22	3.40	1.91
3	5.49	0.88	13	3.94	1.64	23	5.69	0.75
4	5.12	1.03	14	4.17	1.62	24	5.41	1.03
5	4.32	1.29	15	4.52	1.42	25	2.56	1.70
6	5.50	0.84	16	5.59	0.83	26	4.56	1.41
7	5.38	0.86	17	4.94	1.18	27	4.09	1.54
8	3.52	1.83	18	1.99	1.51	28	4.75	1.39
9	4.65	1.44	19	3.91	1.67	29	5.45	1.00
10	4.95	1.27	20	3.04	1.95	30	1.88	1.38
Longitudinal sample – first measure								
1	5.04	1.27	11	2.57	1.71	21	4.84	1.18
2	4.54	1.49	12	5.25	1.07	22	3.24	1.86
3	5.51	0.86	13	3.83	1.59	23	5.66	0.83
4	5.15	1.08	14	4.22	1.60	24	5.29	1.10
5	4.34	1.31	15	4.43	1.46	25	2.54	1.70
6	5.51	0.87	16	5.60	0.84	26	4.61	1.41
7	5.40	0.81	17	5.06	1.14	27	4.07	1.47
8	3.46	1.76	18	1.99	1.55	28	4.81	1.30
9	4.67	1.43	19	3.84	1.61	29	5.54	0.84
10	4.85	1.34	20	3.01	1.96	30	1.72	1.17
Longitudinal sample – second measure								
1	5.03	1.29	11	2.70	1.74	21	4.90	1.24
2	4.23	1.49	12	5.21	1.02	22	3.16	1.90
3	5.54	0.80	13	3.66	1.58	23	5.59	0.87
4	5.09	1.04	14	3.87	1.66	24	5.43	0.99
5	4.04	1.25	15	4.33	1.44	25	2.72	1.77
6	5.51	0.71	16	5.57	0.98	26	4.57	1.40
7	5.21	1.03	17	4.79	1.19	27	3.85	1.57
8	3.23	1.72	18	1.89	1.38	28	4.81	1.41
9	4.44	1.49	19	3.65	1.74	29	5.51	0.96
10	4.83	1.36	20	2.83	1.85	30	1.71	1.12

SD = Standard deviation.

5.3.1.2 Data analysis

A Bayesian exploratory factor analysis (BEFA) was conducted, with an initial four latent factors maximum (Kmax) constraint (GUIDOTTI; CAPRANICA, 2013). Then, different factor-structures testing different models were allowed if the original model factor-structure was not confirmed. A total of 60,000 iterations with a burn-in period of 5,000 iterations were run. Default identification restriction (Nid = 1) was used, which lies on the minimum number of manifest variables dedicated to each factor Metropolis-Hastings' acceptance rate was used to retain items' posterior probabilities of being different from zero. Considering it is an exploratory analysis, a minimum posterior mean of 3 (cut-off point) was set as an acceptable value to retain an item (PEETERS, 2012). Although there is no established recommendation of the minimum acceptable value to retain an item in BEFA, we set it as 3 for convenience (representing a closer interpretation of the frequentist factor loading "0.3"). Thus, items with factor values lower than three were excluded. The BEFA estimates were obtained using the “BayesFM” package (CONTI et al., 2014), available as a package in the R statistical language (R CORE TEAM, 2018).

6.3.2 Results

The SAMSAQ-PT presented a three-factor structure (Table 2). Due to low factor loadings (<3), items 11 (2.74), 18 (1.92), 25 (2.60), and 30 (1.92) were excluded. In particular, seven items loaded the factor named “Sport Motivation” (SM), sixteen items loaded the factor named “Academic Motivation” (AM), and three items loaded the factor named “Career Motivation” (CM).

Table 2 - Bayesian exploratory factor analysis (posterior means) of the Portuguese adapted version of the Student-Athletes' Motivation Toward Sports and Academics Questionnaire.

Item	Factors		
	SM	AM	CM
1. I am confident that I can achieve a high-grade point average this year (3.0 or above)		5.37	
2. Achieving a high level of performance in my sport is an important goal for me this year	4.93		
3. It is important to me to learn what is taught in my courses		5.87	
4. I am willing to put in the time to earn excellent grades in my courses		5.56	
5. Within an academic environment, I find it more challenging to face difficult tasks		4.72	
6. For me, studies are important to achieve knowledge and skills		5.89	

7. I will be able to use what is taught in my courses in different aspects of my life outside of school		5.75	
8. I chose to play my sport, because it is something I am interested in as a career			4.06
9. For me, it is important to train seriously to improve my performance	5.11		
10. I chose (or will choose) my major, because it is something I am interested in as a career		5.28	
11. Earning a high-grade point average (27/30 or above) is not an important goal for me this year		2.70*	
12. It is important to me to learn the skills and strategies taught by my coaches		5.61	
13. It is important for me to do better than other athletes in my sport	4.28		
14. The time I spend engaged in my sport is enjoyable to me		4.54	
15. It is worth the effort to be an exceptional athlete in my sport	4.91		
16. The achievement of a degree is important to enrich my knowledge		6.01	
17. In sport, I find stimulating those situations requiring high performances and being difficult to perform		5.22	
18. During the years, I compete in my sport, completing a college degree is not a goal for me	2.29*		
19. I am confident that I can be a star performer on my team this year	4.41		
20. My goal is to make it to the professional level or the Olympics in my sport			3.74
21. Situations that allow me to test my capacities stimulate me	5.27		
22. I am confident that I can make it to an elite level in my sport (Professional/Olympics)			4.01
23. I am confident that I can earn a college degree		6.07	
24. I will be able to use the skills I learn in my sport in other areas of my life outside of sports		5.75	
25. Achieving high performances in my sport is not an important goal for me this year		2.66*	
26. For me, it is important to achieve high performances and not to make mistakes	4.94		
27. I am willing to put in the time to be outstanding in my sport	4.54		
28. The content of most of my courses is interesting to me		5.14	
29. It is important for me to obtain a degree, because it will help me to find a job		5.84	
30. It is not worth the effort to earn excellent grades in my courses		1.96*	

SM = Sport Motivation, AM = Academic Motivation, CM = Career Motivation.
* Items excluded.

6.3.3 Discussion

Considering the translation and psychometric structure of the SAMSAQ-PT, we observed a three-factor structure. This structure is in line with the original American and the versions validated for Emirati, European, and Korean student-athletes (GASTON-GAYLES, 2005; FORTES; RODRIGUES; TCHANTCHANE, 2010; LUPO et al., 2015; PARK; HONG; LEE, 2015). In particular, SM items express the desire for sports performance and for continuing sports career (KESHTIDAR; BEHZADNIA, 2017), which is influenced by cultural and educational context for pursuing a sports performance (LUPO et al., 2015; FERNANDES; MOREIRA; GONÇALVES, 2019); the AM items mirror the academic commitment of student-athletes, measuring the Brazilian student-athletes´ engagement in an educational/ vocational path concerning a sport or a dual-career path (CARTIGNY et al., 2019), probably considering the academic degree relevant for future jobs and professional careers (FORTES; RODRIGUES; TCHANTCHANE, 2010); and the CM items present a desire for developing a professional sports career (GASTON-GAYLES, 2005). Thus, it could be speculated that the Brazilian student-athletes may perceive sport and academic commitments separately.

6.4 STUDY TWO

The purpose of study two was to test the 26-item of the 3-factor structure questionnaire emerging from study one by applying a Bayesian confirmatory factor analysis with an independent sample. Specifically, it was intended to provide evidence to allow an informed generalization of the questionnaire factor structure.

6.4.1 Methods

6.4.1.1 Participants

The participants considered in this study were the other half of the total cross-sectional sample. In particular, 242 female and 99 male student-athletes (Mage = 21.6, SD = 3.5 yrs) enrolled in public (n=201) and private (n=230) Brazilian universities and competing at international (n=26), national, (n=139), state (n=86) and university (n=180) levels.

5.4.1.2 Data analysis

A Bayesian Confirmatory Factor Analysis (BCFA) was applied to examine the model factorial structure. Two chains for 10,000 iterations with 2,000 used as warm-up, using probabilistic programming language Stan (CARPENTER et al., 2017). The model estimations were regularized using normal prior (0, 10) for the manifest variable (intercept) and normal prior (0, 1) for the latent variable were set. A posterior latent variable closer to 0.5 (MERKLE; ROSSEEL, 2018) was set as a satisfactory value to retain an item based on the literature. Moreover, Bayesian root mean square error of approximation (BRMSEA), Bayesian Gamma Hat (BGammaHat), Adjusted Bayesian Gamma Hat (adjBgammahat), and Bayesian McDonald's centrality index (BMc) were also applied to confirm the model fit (MONTENEGRO-MONTENEGRO, 2020). BRMSEA value close to 0.5 and BGammaHat, adjBGammaHat and BMc values close to one indicate a better fit. The BCFA was conducted using the "blavaan" package (MERKLE; ROSSEEL, 2018) in the R software (R CORE TEAM, 2018).

6.4.2 Results

In the BCFA, items 1 (0.28), 10 (0.45), 12 (0.47), 14 (0.25) and 21 (0.38) presented posterior values lower than 0.5 and were excluded. Additionally, this first model did not present good evidence of model fit (BRMSEA = 0.08; BGammaHat = 0.87; adjBgammahat = 0.84; BMc = 0.43). The new model (21 items) was further tested and four items [items 5 (0.30), 17 (0.35), 24 (0.33), and 29 (0.39)] with low factor load values were excluded. In this model, fit indexes were superior, but not well adequate (BRMSEA = 0.07; BGammaHat = 0.93; adjBgammahat = 0.89; BMc = 0.67). Thus, the resulting 17-item model presented factor loadings close or above 0.5 for all items (Table 3). Only item 13 presented factor loading (0.49) bellow 0.5. Thus, the item was retained. Additionally, fit indexes showed satisfactory adequacy (BRMSEA = 0.06; BGammaHat = 0.96; adjBgammahat = 0.93; BMc = 0.84).

Table 3 - Bayesian confirmatory factor loadings.

Item	Factors		
	SM	AM	CM
2	0.77		
9	0.76		
13	0.49		
15	0.67		
19	0.74		
26	0.65		

27	0.82		
3		0.76	
4		0.71	
6		0.69	
7		0.58	
16		0.50	
23		0.50	
28		0.53	
8			0.84
20			0.86
22			0.87

6.4.3 Discussion

In this study, we tested the factor structure of SAMSAQ-PT, which emerged from study one by applying BCFA. Our observations confirmed the three-factor structure but indicated a better structure composed of 17 items for SM (7 items), AM (7 items), and CM (3 items). The confirmatory factor analysis of the SAMSAQ-PT substantiated the three-factor structure (GASTON-GAYLES, 2005; FORTES; RODRIGUES; TCHANTCHANE, 2010; GUIDOTTI et al., 2013; LUPO et al., 2015; PARK; HONG; LEE, 2015), even though to avoid misinterpretations, the Bayesian inference based on strong similarities determined the substantial reduction of the item's distribution. Different factor structures can be expected due to dual-career policies and social-cultural contexts, as well as to the sport and educational levels of student-athletes (GASTON-GAYLES, 2005; STAMBULOVA; ALFERMANN, 2009; FORTES; RODRIGUES; TCHANTCHANE, 2010; GUIDOTTI et al., 2013; LUPO et al., 2015a; PARK; HONG; LEE, 2015; LUPO et al., 2017). Given the Brazilian miscegenation and the potential influence of European and other cultures on Brazilian student-athletes, both similarities and differences with other cultures were expected.

Regarding the similarities, the AM dimension presented stable comparing to other SAMSAQ validations (GASTON-GAYLES, 2005; STAMBULOVA; ALFERMANN, 2009; FORTES; RODRIGUES; TCHANTCHANE, 2010; GUIDOTTI et al., 2013; LUPO et al., 2015a; PARK; HONG; LEE, 2015), although in the present version we had a higher reduction of items. The results may indicate that the academic motivation of higher education student-athletes is a drive based on similar purposes, such as learning (item 3), get good grades (item 4), and the course content (item 28). There were divergences, such as item 16 (the achievement of a degree is important to enrich my knowledge) had loaded in a different dimension than the academic motivation (LUPO et al., 2017). However, this item has a clear academic motivation.

Our results were consistent with the other validations in the SM dimension, but there is less agreement about the items from this dimension across the validation studies (GASTON-GAYLES, 2005; LUPO et al., 2015; PARK; HONG; LEE, 2015; LUPO et al., 2017). The feeling of being better than other athletes (item 13) is an example of how it can vary between the validations. It represents a sport and career motivation (LUPO et al., 2017), sport motivation (GASTON-GAYLES, 2005; LUPO et al., 2015), or even academic motivation (PARK; HONG; LEE, 2015). In summary, there was a shift of items in SM and CM dimensions in the factor structure of the SAMSAQ-PT. The items with explicit statements focused on professional or athletic careers loaded in the CM. The results suggest that Brazilian student-athletes interpret their motivation for a high level of performance or athletic career as a priority.

5.5 STUDY THREE

6.5.1 Methods

In this study, we aimed to examine the construct validity of the questionnaire in a cross-sectional sample considering sex, sport level, student-athlete status, and the type of university. In particular, the student-athlete status was considered as any document from the higher education institution that guarantees support for student-athletes (e.g., flexible exam schedule when representing their university or their country in competitions).

6.5.1.1 Participants

The whole sample of 862 student-athletes (females: 56.8%; males: 43.4%) enrolled in public (n=401) and private (n=461) Brazilian universities and competing at international (n=59), national (n=270), state (n=160) and university (n=373) levels participated in this study.

6.5.1.2 Data analysis

Multilevel regression models were used to estimate SAMSAQ-PT and its dimensions among Brazilian student-athletes when grouped by sex (e.g., female and male), sports level (e.g., international, national, state and university), type of university (e.g., public and private) and student-athletes' status (e.g., yes and no). The multilevel models estimate the individual scores relying on the available information of individuals characteristics and using additional

"random" predictors such as group or context characteristics (for individual i, with indexes, s, a, l, and u for, sex, student-athlete status, sport level, and type of university, respectively). In Bayesian terms, these "random" or "group-level" effects are related to each other by their grouping structure, and the individuals´ responses are partially pooled towards the group mean (GELMAN; HILL, 2007), as follows:

$$y_i = \beta^0 + \alpha_{s[i]}^{sex} + \alpha_{a[i]}^{student-athlete\ status} + \alpha_{l[i]}^{sport\ level} + \alpha_{u[i]}^{type\ of\ university} + \epsilon_i$$

$$\alpha_{s[i]}^{sex} \sim N(0, \sigma_{sex}^2), \text{ for s = 1, 2.}$$

$$\alpha_{a[i]}^{student-athletestatus} \sim N(0, \sigma_{student-athletestatus}^2), \text{ for a = 1, 2.}$$

$$\alpha_{l[i]}^{sportlevel} \sim N(0, \sigma_{sportlevel}^2), \text{ for l = 1, 2, 3, 4.}$$

$$\alpha_{u[i]}^{typeofuniversity} \sim N(0, \sigma_{typeofuniversity}^2), \text{ for u = 1, 2.}$$

$$\epsilon_i \sim N(0, \sigma_{y_i}^2)$$

Weakly informative prior distributions, normal prior (0, 10) for population-level effect (intercept), and normal priors (0,1) for group-level effects (i.e., the standard deviations of varying intercepts) to regularize the multilevel model estimations were used. Two chains for 4,000 iterations with a warm-up length of 1,000 iterations to ensure convergence of the Markov chains were run. To check the models and estimations, trace plots to examine the convergence of Markov chains and posterior predictive checks to validate the models were used (GELMAN et al., 2013). The Bayesian multilevel models were fitted with the "brms" package (BÜRKNER, 2017), available as a package in the R statistical language (R CORE TEAM, 2018). The brms package implements Bayesian multilevel models using the probabilistic language Stan (CARPENTER et al., 2017). For computational and interpretation convenience, the outcomes were standardized (z-scores). This methodology is also described in previous studies (QUINAUD et al., 2020a; QUINAUD et al., 2020b).

6.5.2 Results

Figures 1, 2, and 3 present the standardized values of the SAMSAQ-PT's dimensions related to the respondents' sex, type of universities, sport levels, and student-athletes´ status. Male student-athletes presented higher effect scores for SM and CM dimensions. On the other hand, female student-athletes presented higher scores for AM, albeit with a small magnitude.

Student-athletes from private universities had substantially higher scores than student-athletes from public universities for SM, AM, and CM dimensions, but at best, the magnitude was small for AM. Considering sport level variation, student-athletes who competed at higher level of performance showed higher scores than those of lower competitive levels for SM and CM dimensions. Lastly, there was no substantial variation in the motivation scores by student-athlete status. Table 4 presents the SAMSAQ-PT estimates and uncertainty (90% confidence intervals).

Figure 1 - Posterior values for Sport Motivation dimension by genders, type of universities, competitive levels and student-athlete's status (67% and 90% credible intervals).

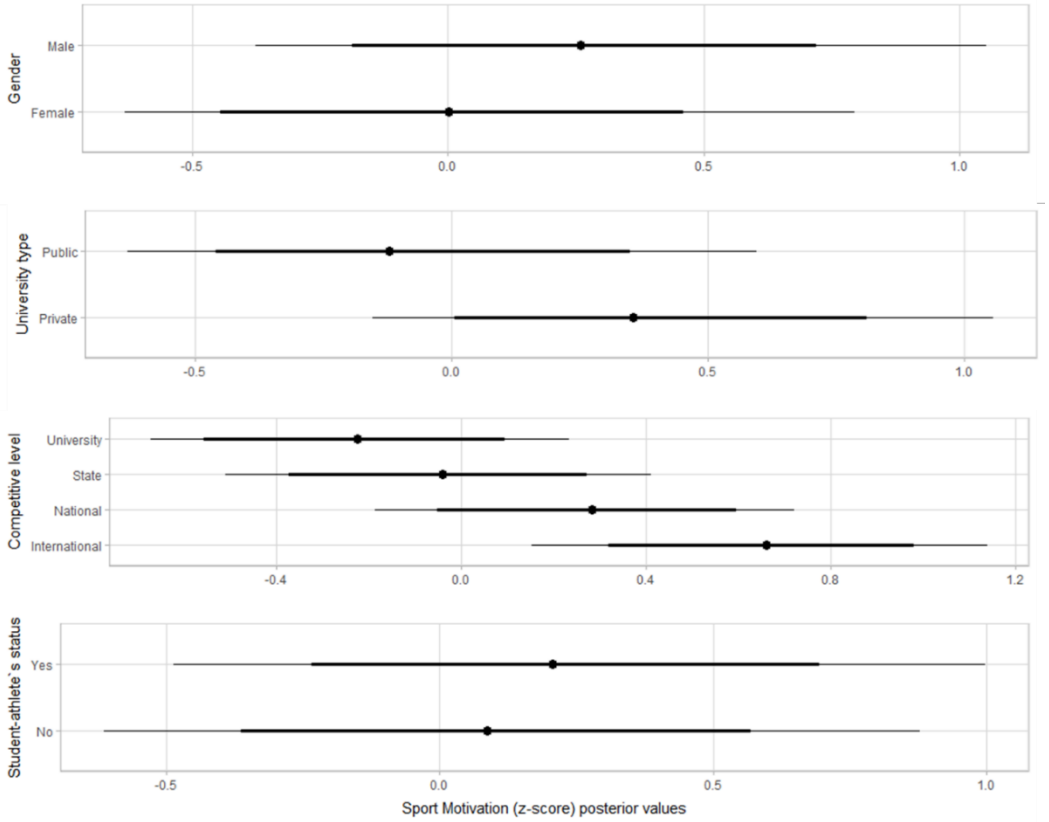


Figure 2 - Posterior values for Academic Motivation dimension by genders, type of universities, competitive levels and student-athlete's status (67% and 90% credible intervals).

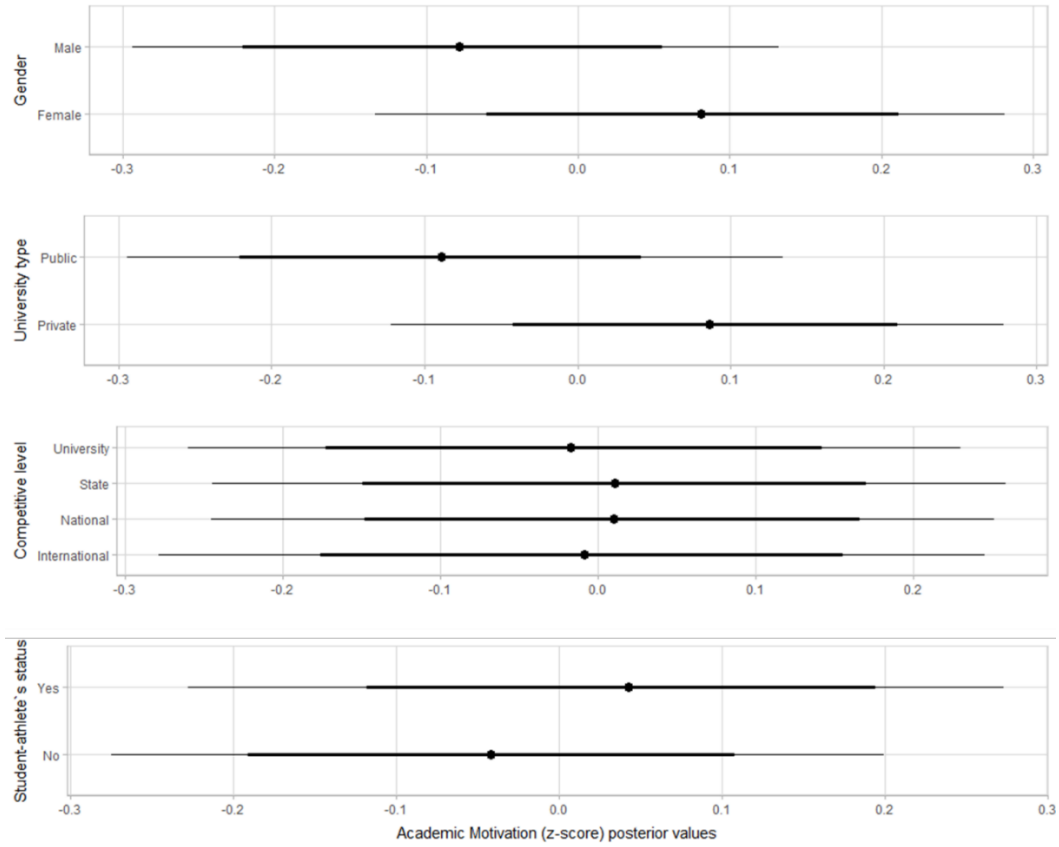


Figure 3 - Posterior values for Career Motivation dimension by genders, type of universities, competitive levels and student-athlete's status (67% and 90% credible intervals).

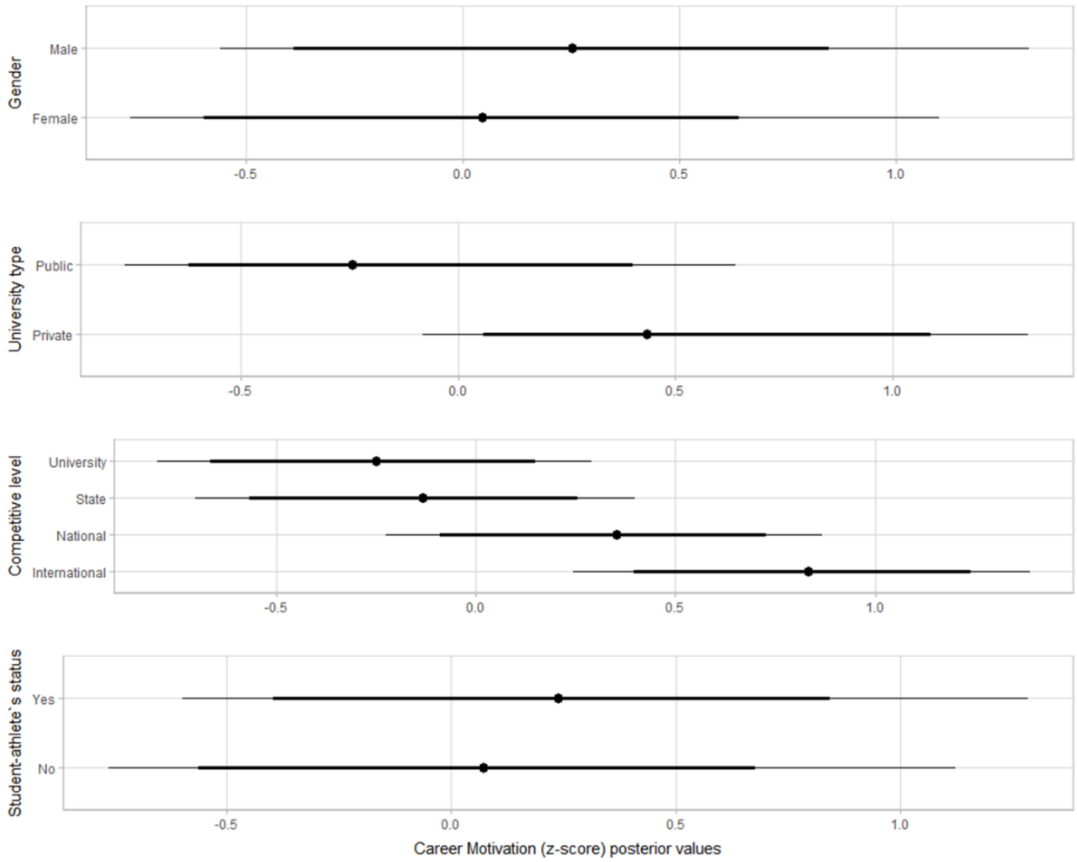


Table 4 - Estimates (90% confidence intervals) of SAMSAQ-PT factors responses among Brazilian student-athletes by sex, type of university, sport level, and student-athlete statute.

	Sport Motivation	Academic Motivation	Career Motivation
		Estimate (90% CI)	
Sex			
Female	0.02 (-1.33 to 1.34)	0.10 (-0.79 to 1.02)	0.10 (-1.29 to 1.55)
Male	0.28 (-1.07 to 1.60)	-0.05 (-0.95 to 0.86)	0.30 (-1.09 to 1.76)
Type of university			
Private	0.38 (-0.77 to 1.54)	0.10 (-0.82 to 1.04)	0.52 (-0.74 to 1.75)
Public	-0.08 (-1.24 to 1.07)	-0.06 (-1.00 to 0.87)	-0.16 (-1.43 to 1.08)
Sport level			
University	-0.24 (-1.68 to 1.17)	0.01 (-1.14 to 1.21)	-0.25 (-1.76 to 1.27)
States	-0.07 (-1.51 to 1.33)	0.03 (-1.13 to 1.24)	-0.15 (-1.66 to 1.37)
National	0.25 (-1.19 to 1.66)	0.03 (-1.14 to 1.24)	0.32 (-1.17 to 1.87)
International	0.63 (-0.82 to 2.05)	0.01 (-1.16 to 1.23)	0.82 (-0.69 to 2.36)
Student-athletes statute			
No	0.09 (-1.25 to 1.46)	-0.03 (-1.05 to 0.99)	0.11 (-1.32 to 1.57)
Yes	0.21 (-1.12 to 1.59)	0.04 (-0.97 to 1.07)	0.27 (-1.13 to 1.75)

5.5.3 Discussion

We tested the SAMSAQ-PT construct validity by exploring the variation in the motivation scores considering student-athletes' individual, sport, and academic characteristics. There was substantial variation in the SAMSAQ-PT dimension scores by sex, university type, and sport level. The observed substantial gender-related variation in SM and CM could be due to lower dual career support for Brazilian female athletes and limited economic opportunities for top-level women's sport (HARRISON et al., 2020). Coherently, during the academic path, the highest effect scores for AM emerged for female student-athletes, who might emphasize more their academic career concerning their sports career (TEKAVC; WYLLEMAN; CECIĆ-ERPIČ, 2015). These findings urge implementing sex-related dual careers at the sport and public education level, as envisaged by the European-funded Collaborative Partnership "Dual Career for Women Athletes" (DONA). Consistent with previous studies (GUIDOTTI et al., 2013; LUPO et al., 2017), the sport level resulted as a predictor of CM and SM scores. It seems reasonable to assume that student-athletes competing at a higher level might be more motivated to pursue their sports career compared to their pairs competing at lower levels, whereas it is plausible to assume that AM is linked to the academic motivation of the athlete (GASTON-GAYLES, 2005a; GUIDOTTI et al., 2013; LUPO et al., 2017).

To our knowledge, this is the first study investigating the student-athletes' motivation related to university type (e.g., public and private). Indeed, the social context of universities shapes the opinions of student-athletes (DRUCKMAN et al., 2014). The present findings highlight that Brazilian student-athletes' sports and education commitments vary between public and private universities. Concerning their peers from public universities, in the present models, student-athletes from private universities have a high probability of scoring higher values for CM and SM, probably due to dual-career financial and logistic support (AQUILINA; HENRY, 2010; AQUILINA, 2013). Enrolling 75% of the total undergraduate students (INSTITUTO NACIONAL DE ESTUDOS E PESQUISAS EDUCACIONAIS ANÍSIO TEIXEIRA, 2018), private Brazilian universities might employ marketing strategies incorporating student-athletes to increase the media attention leveraging the universities' profile (HARRISON et al., 2010; TEIXEIRA, 2010). Unlike private universities, Brazilian public universities do not require tuition fees and offer academic undergraduate and graduate degrees (e.g., master's and Ph.D.), opportunities for research, and internships, which might contribute to future professional advantages (ERPIČ; WYLLEMAN; ZUPANČIČ, 2004). Thus, compared to their counterparts enrolled in private universities, student-athletes attending public universities could show lower SM when prioritizing their academic careers to prepare for future job opportunities (AMARA; AQUILINA; HENRY, 2004; MCKENNA; DUNSTAN-LEWIS, 2004). Additionally, the Brazilian university sports facilitating sub-elite athletes' participation in public institutions are still in a developmental phase (STAREPRAVO et al., 2010).

At the international level, there is a call for awareness of the role and responsibilities of dual-career actors (CONDELLO et al., 2019), and the implementation of support policies for student-athletes is a priority of the European Union (AQUILINA; HENRY, 2010; EUROPEAN COMMISSION, 2012; EUROPEAN PARLIAMENT, 2015; 2017). Indeed, student-athletes should be informed about their rights, and the implementation of dual-career counseling has been strongly recommended to help them manage their academic and sports commitment (HANSEN; SACKETT, 1993; MARTIN, 2005; LÓPEZ DE SUBIJANA; BARRIOPEDRO; CONDE, 2015). During the academic path, a recognized student-athlete status could allow the monitoring of the academic and sport progresses to individualize necessary dual-career support. Although this status has been considered crucial to influence substantially the athlete's motivation to achieve an academic degree, especially for those determined to pursue a sports career, the present models do not support this hypothesis. Thus, it is likely needed to take a step

back and review the conceptions of support based on interactions at and across environmental levels (KNIGHT; HARWOOD; SELLARS, 2018).

6.6 STUDY FOUR

To explore the SAMSAQ-PT scores' sensitiveness, we considered repeated measures across an academic year was considered for the analysis of changes in motivation scores adjusted for sex, sport level, student-athlete status, and type of university. Given attrition expected in longitudinal observations, a Bayesian multilevel regression modeling and poststratification were used to predict the changes applied to all observations in the cross-sectional data. Bayesian multilevel regression and poststratification allow for improved estimations of small and sparse group data (in the present study, the longitudinal observations) and consequently predicts a target population (in the present study, the cross-sectional observations) (GELMAN; LITTLE, 1997; PARK; GELMAN; BAFUMI, 2004; KENNEDY; GELMAN, 2020).

6.6.1 METHODS

6.6.1.1 Participants

This study included 99 female and 35 male student-athletes enrolled in public (n=68) and private (n=66) Brazilian universities competing at international (n=12), national (n=39), state (n=25), and university (n=58) levels. Data were collected with a one-year interval (2018 and 2019) during the state and national University championships.

6.6.1.2 Data analysis

Due to the presence of non-representative and imbalanced data, with hierarchical sources of variation or cross-classified nesting, the first step of the analytical approach was to fit multilevel models to the repeated measures data, allowing for the possibility of varying intercepts (i.e., baseline values) and slope (changes in individuals outcomes across the period of observation) by sex, student-athlete status, sport level, and type of university (for individual i, with indexes, s, a, l, and u for, sex, student-athlete status, sport level, and type of university, respectively). Considering the homogeneity of slopes by group, we fitted varying intercepts

models with measurement time as a population-level effect. The multilevel model specification was as follows:

$$y_i = \beta^0 + time_i + \alpha^{sex}_{s[i]} + \alpha^{student-athlete\ status}_{a[i]} + \alpha^{sport\ level}_{l[i]} + \alpha^{type\ of\ university}_{u[i]} + \epsilon_i$$

$$\alpha^{sex}_{s[i]} \sim N(0, \sigma^2_{sex}), \text{ for s = 1, 2.}$$

$$\alpha^{student-athletestatus}_{a[i]} \sim N(0, \sigma^2_{student-athletestatus}), \text{ for a = 1, 2.}$$

$$\alpha^{sportlevel}_{l[i]} \sim N(0, \sigma^2_{sportlevel}), \text{ for l = 1, 2, 3, 4.}$$

$$\alpha^{typeofuniversity}_{u[i]} \sim N(0, \sigma^2_{typeofuniversity}), \text{ for u = 1, 2.}$$

$$\epsilon_i \sim N(0, \sigma^2_{y_i})$$

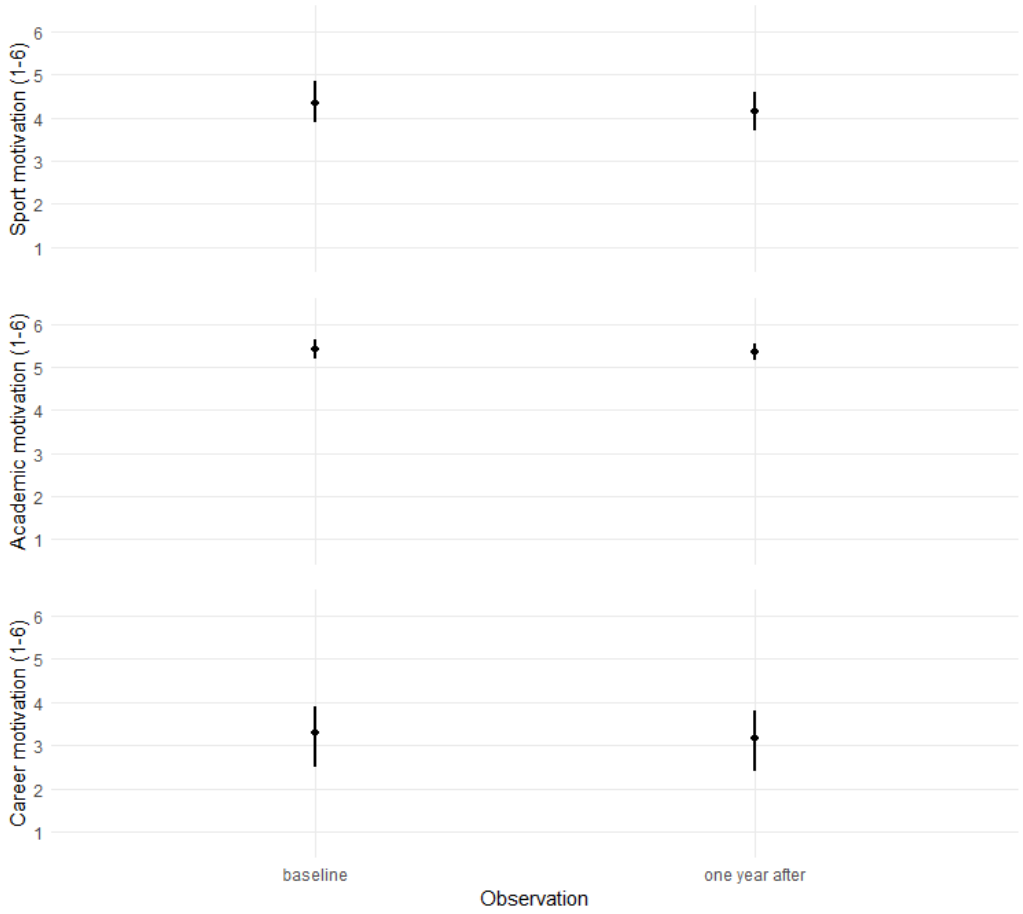
Then, the multilevel model estimates to predict the student-athletes´ outcomes for groups defined in a poststratification dataset (i.e., measurement time, sex, student-athlete status, sport level, and type of university) were used. The poststratification table considers the cross-sectional data sample in this research as a target population. The poststratification table has an observation corresponding to each group defined for all combinations of the variables included in the model. In this study, the poststratification table included two repeated measurement levels, two sex levels, two student-athlete status levels, four sport levels, and two type of university levels, encompassing 64 rows (2 x 2 x 2 x 4 x 2), including the sample size, in each group. After predicting the outcome variable for each group, estimates for measurement time with the subgroup sample sizes were aggregated. Hence, the method allowed full use of all available data to interpret the changes in student-athletes´ motivation scores, adjusted for individual and contextual characteristics. The model's estimates were regularized by using normal prior (0,10) for population-level effect (intercept) and normal priors (0,1) for group-level effects. Four chains for 4,000 iterations with 1,000 burn-in iterations were run. The models were obtained using the "brms" package (BÜRKNER, 2017).

6.6.2 Results

Predicted changes for SM, AM, and CM, after an academic year and adjusted for sex, type of university, sport level, and student-athletes' status are summarized in Figure 4. The influence of the individual and context characteristics was similar at the baseline and after and academic year. The post-stratified predictions for the total sample showed a trend of stability

for all student-athlete motivation scores after an academic year, although there was a slight decrease in SM.

Figure 4 - Predicted changes for SM, AM and CM, after an academic year, adjusted for gender, university type, competitive level and student-athletes' status (90% credible intervals).



6.6.3 Discussion

We explored the student-athletes' motivation scores' sensitiveness across an academic year adjusted for sex, sport level, student-athlete status, and type of university. The results showed that student-athletes' motivation was stable across an academic year. In addition to limited variations observed across an academic year, uncertainty estimates were narrow after adjusting for sex, type of university, sport level, and student-athletes' status. These findings suggest that SAMSAQ-PT may be sensitive to track individuals changes over time. Although sports burnout was beyond the aim of the present study, decreased SM over time could be considered an indicator in interpreting dual career paths (SORKKILA et al., 2018), monitoring

university dual-career social contexts, or in highlighting the needs of the dual-career implementation. The present predictive models indicate that the student-athletes' motivation could be influenced by the university context and how it cares about the requirements necessary to combine sport and academic commitments, especially when the academic requirements increase towards graduation. Based on the present longitudinal observations, the university sports contexts appear not to motivate student-athletes in their dual-career. Future studies focusing on support dual-career policies could contribute to a sound interpretation of how institutions and managers deal with dual-career needs and services.

While in some countries, a well-systematized relationship between education and high-performance sport seems to determine the high motivation for an athletic career (SIMONS; VAN RHEENEN; COVINGTON, 1999b; FORTES; RODRIGUES; TCHANTCHANE, 2010), in European countries with distinct academic and sports systems, athletes are confronted with the choice of one of the two paths (EUROPEAN COMMISSION, 2016). In Brazil, sports and educational systems are also distinct. In line with the development of university sports in Brazil, the awareness of the importance of supporting student-athletes dual-career increases (GUIDOTTI; CORTIS; CAPRANICA, 2015; STAMBULOVA.; WYLLEMAN, 2019). While the present results showed that student-athletes' motivation does not vary substantially across an academic year, further longitudinal studies are needed to verify whether student-athletes are motivated towards a dual-career till their graduation. Indeed, cooperation between the academic and sports sectors needs to be implemented for providing a supportive entourage for student-athletes.

6.7 GENERAL DISCUSSION

Considering that contexts influence the motivation towards dual-career of athletes and its specificities in the development of guidelines to support student-athletes, and contribute to the discussion on student-athletes' motivation (EUROPEAN COMMISSION, 2012). The four experimental studies encompassing BEFA, BCFA, and Bayesian multilevel regression models in cross-sectional and longitudinal samples validated the psychometric structure and assessed the sensitiveness of the SAMSAQ-PT instrument in a Brazilian context. Furthermore, the present study presents methodological and practical implications. Indeed, cross-cultural variation and confidence in the measured outcomes need to be established when adapting a psychometric scale to a specific context.

Given the debate concerning the limitations and inappropriateness of null-hypothesis testing, “statistical significance” and using p-values (AMRHEIN; GREENLAND, 2018; MCSHANE et al., 2019), the Bayesian statistics was deemed appropriate to provide a natural approach to account for different sources of inferential uncertainty (KENNEDY; GELMAN, 2020). Furthermore, in the present study, the analytical approach to validate a questionnaire using a multilevel modeling framework was considered appropriate to deal with common limitations of sports psychology research, such as noisy measurements, between-individuals heterogeneity, complex interactions between outcomes, and non-representative and imbalanced samples. The present data showed that the questionnaire scales were sensitive to the individual and contextual characteristics of the target population. Overall, the SAMSAQ-PT was a valid questionnaire for the Brazilian context and may be extended to Portuguese-speaking countries. Lastly, the study contributes to the propositions of career construction theories within university-student athletes (RUDOLPH; ZACHER; HIRSCHI, 2019). Finally, data and codes from the present research are available at (https://osf.io/cpwdv/).

Regarding the practical implications, the present findings provide a view of the Brazilian educational system and how it might be related to the student-athletes’ motivation towards a dual career. In particular, relevant higher education stakeholders should cooperate in implementing regulations and policies fostering the development of dual-career for supporting student-athletes in combining sports and academic commitments. Considering that no variation was observed across an academic year, sports counseling or dual-career developmental programs should focus on first-year students. Likely highly motivated student-athletes since their first year of university will be engaged in a dual-career during higher education and beyond. Local and national sports policies should also consider the need to decrease sex-related differences by providing more opportunities for women in sports.

Despite the advantages of a Bayesian multilevel modeling approach and a large sample of student-athletes, the present study presents some limitations. Only student-athletes competing in the University Sports Games were considered even though university students could compete in other Brazilian championships. Thus, further studies are needed to provide insights into the sport and academic development. Another limitation pertains to the lack of information on individual and contextual characteristics such as chronological age, academic course and year, or type of sport (team or individual) that prevented further in-depth analyses. Future research is envisaged to investigate the student-athlete background and transition from high school to higher education and their motivation to choose public or private universities related to their dual-career.

6.8 CONCLUSIONS

The present study assessed the validity of the Portuguese version of the SAMSAQ-IT/A for the Brazilian context and potentially can add to advance the understanding of the student-athletes' motivation for a dual-career in other Portuguese-speaking countries. The use of the Bayesian estimations for psychometric analysis, multilevel regression and poststratification added to the analysis of the validity of psychometric scales in the study of student-athletes, which might suggest the revision of scales used in other countries. Based on the findings, it is possible to assume that individual and contextual characteristics need to be considered when investigating dual-career motivation. Based on the Brazilian context, the academic (public and private universities) and the sport (sport level) contexts may substantially impact student-athletes' motivation. Although the student-athletes' motivation overtime did not present substantial variation, the motivation decreased with time. Thus, the present results highlight the need to monitor the athlete's motivation towards sports and academic achievements till graduation to develop optimal dual-career paths. The final translated and validated version of the SAMSAQ-PT is presented in the Appendix D.

7 STUDENT-ATHLETES´ MOTIVATION AND IDENTITY: VARIATION AMONG BRAZILIAN AND PORTUGUESE UNIVERSITY STUDENT-ATHLETES[4]

7.1 INTRODUCTION

The student-athletes dual career is a research topic of interest worldwide (GUIDOTTI; CORTIS; CAPRANICA, 2015), especially due to its cultural praxis (STAMBULOVA; RYBA, 2014) and the interest of its development by government agencies (EUROPEAN COMMISSION, 2012; EUROPEAN PARLIAMENT, 2015; 2017). The combination of academic and athletic commitments is a complex challenge to those engaged in dual-career (AQUILINA, 2013), even more at the early stages of a college degree (GASTON-GAYLES; BAKER, 2015). There are two main psychological attributes to balance athletic commitments with the academic duties (AQUILINA, 2013; DEBOIS; LEDON; WYLLEMAN, 2015), or vice versa: (i) how student-athletes identify themselves (e.g. student, athlete or both) (LALLY; KERR, 2005); (ii) how student-athletes feel about their motivation in both contexts (LUPO et al., 2017b). Furthermore, these psychological attributes are related to each other (PILARSKA, 2017) and likely have a major influence on student-athletes decision to pursue a dual career, or choose one career over other (YUKHYMENKO–LESCROART, 2014; STAMBULOVA et al., 2015; FERDINAND; CZERNOCHOWSKI, 2018).

Identity changes are mostly based on how someone perceives about himself/herself, and how this same one feels about being in his social environment (RONKAINEN; KAVOURA; RYBA, 2016a). In particular, for student-athletes, there may be an “identity crisis”, depending on the perspective that this individual may assume different identities in two contexts which often compete or conflict. To measure the academic and athlete’s identity, the Baller Identity Measurement Scale has been proposed and validated with student-athletes from the United States (HARRISON et al., 2010). The original scale consists of ten items with a four factors structure (social identity, exclusivity, positive affectivity, and negative affectivity). An Italian version of the questionnaire was validated recently (LUPO et al., 2017a), but with a two-factor structure (e.g., Social Identity and Identity Gain/Loss).

It has been noted that basic psychological needs (e. g, internal sources) that may shape the individual motivations are influenced by the context (e.g., external factors) (RYAN;

4QUINAUD, R. T. et al. Student-Athletes' Motivation and Identity: Variation Among Brazilian and Portuguese University Student-Athletes. Psychological Reports, v. 123, n. 5, p. 1703-1723, 2020.

BRADSHAW; DECI, 2019). In the context of the student-athlete dual-career, it has been proposed and validated a questionnaire to measure student-athletes´ motivation toward sports and academics, i.e. the Student-Athletes' Motivation toward Sports and Academics Questionnaire. The questionnaire is composed of 30-item with a three-factor structure, Student Athletic Motivation, Academic Motivation, and Career Athletic Motivation. Other versions of the questionnaire have been validated in different contexts, such as the United Arab Emirates version (FORTES; RODRIGUES; TCHANTCHANE, 2010), the Italian version (GUIDOTTI et al., 2013), the Italian harmonized version (GUIDOTTI; CAPRANICA, 2013), the Slovenia version (LUPO et al., 2012) and the South Korean version (PARK; HONG; LEE, 2015). There is substantial variability in the factor structures of the adapted versions compared to the original version, likely due to cultural variation between samples. Considering the potential cultural influence on student-athletes' identity and motivation, there is a need to have a measurement scale based on specific populations to have trustworthy data information.

The international students´ mobility triggered mainly by the European Union Erasmus program benefited also athletes that look for opportunities to develop abroad their skills and contacts with other training methods. In fact, the number of student-athletes moving around the world is increasing (RYBA et al., 2015) and the topic drew the attention from European scholars, practitioners, and political institutions and ignited an on-going debate. In 2012, the European Union Guidelines on the dual career of athletes expressed the need for development policies to increase student-athlete mobility, and efforts are being made to increase the mobility conditions of the student-athlete through scholarships and special programs. However, student-athletes are a global population and, in this particular field, it is important for sport sciences to attain true international collaboration and work together to discuss major concerns about them. Furthermore, it seems crucial to breaking out with the parochialism and ethnocentrism that characterizes part of sports research.

From this point of view, comparative studies are imperative in order to identify similarities and differences across cultures and enhance a better understanding of the perceptions, beliefs, and aspirations that shape the experience of being an athlete and a student. It is also necessary to move on from an ethnographic stance and assume methodological sophistication as a way to assimilate a body of knowledge that can subject of comparison and interpretation. Brazil and Portugal represent optimal contexts for a comparative empirical study. Portugal represents a paradigmatic case, belonging to the group of European Union countries that have comprehensive legislation about school sport. The Higher Education Institutes is responsible to provide opportunities for student-athletes through self-policies orientated by the

government (AQUILINA, 2009). Brazil has a more liberal and laissez-faire stance regarding sport in universities. According to Brettschneider and Brandl-Bredenbeck (2007), functional, conceptual, linguistic and sample equivalences are essential categories for cross-cultural comparative studies. In the present study, all the above conditions are respected. Constructs like university sport, motivation or identity are functionally and conceptually equivalent in both countries. We were especially careful about linguistic equivalence because, although the Portuguese language is common, the wording and significance can be different and we adapted the questionnaires to the specific populations and performed separated analysis. In any case, we avoided the dichotomy between cultural relativism and universalism because it has no sense, as we looked at the data without a priori interpretations.

Considering that student-athletes identity and motivation are influenced by individual characteristics and social context (GUIDOTTI; CORTIS; CAPRANICA, 2015), these pertain to different data levels, i.e., a hierarchical data structure with effects that likely vary between different sub-groups. On the other hand, in several areas of psychology research, there is an interest in effects that hold to some wider population (KENNEDY; GELMAN, 2019). Furthermore, estimations are often based on non-representative samples, likely with relatively sparse outcomes across subgroups. Often single-level analysis (e.g. analysis of variance), are used to deal with hierarchical data and infer to target populations of interest, although inappropriately. Multilevel regression and poststratification (GELMAN; LITTLE, 1997; PARK; GELMAN; BAFUMI, 2004) has been proposed for estimation of population-level quantities from a sparse and possibly non-representative population (KENNEDY; GELMAN, 2019). The first step of the approach is to use multilevel regression to model individual outcomes of interest as a function of individuals characteristics, demographic or contextual covariates. Then, the outcome estimates for each individual characteristic-demographic-contextual subgroup are weighted by the proportions of each subgroup in the actual population to derive an overall population-level estimate (DOWNES et al., 2018). In particular, the approach allows for improved estimates of small and sparse group data, and consequently predict a target population (GELMAN; HILL, 2007). Multilevel regression and poststratification has been used mainly to estimate the pre-election polls (GELMAN; LITTLE, 1997; PARK; GELMAN; BAFUMI, 2004) and recently has been presented in health research (VAN DER HEYDEN et al., 2014; ZHANG et al., 2015; EKE et al., 2016; BARRINGTON-LEIGH; MILLARD-BALL, 2017; DOWNES et al., 2018), and there is no available illustration in sports science surveys, to our best knowledge.

In the present study we considered multilevel regression and poststratification to estimate variation between Brazilian and Portuguese university student-athletes' motivation toward sports and academics, and identity, accounting for an individual (gender, hours of training and student-athlete status) and contextual characteristics (university type and country). Given the context of the observations, we initially explored the validity of Portuguese translated versions of the Baller Identity Measurement Scale and the Student-Athletes' Motivation toward Sports and Academics Questionnaire in both Brazilian and Portuguese contexts. We included these variables in our study to bring a broader point of view about student-athletes and be able to discuss and reflect how to integrate gender (TEKAVC; WYLLEMAN; CECIĆ-ERPIČ, 2015), training (LUPO et al., 2017a), support policies (EUROPEAN PARLIAMENT, 2017), educational system (AQUILINA; HENRY, 2010) and culture aspects (STAMBULOVA; RYBA, 2014) in the student-athletes' dual-career topic.

7.2 MATERIALS AND METHODS

7.2.1 Experimental approach to the problem

The sample comprised 765 student-athletes from Brazil (n= 568) and Portugal (n=197). Data was collected during the national university games in each country. The sample distribution between Brazilian and Portuguese student-athletes was unbalanced. This likely reflects the demographic differences between both countries. Also, the sample included both female (n=400) and male (n=365) student-athletes. Data included information about sports-type of participation: formal, i.e., student-athletes involved in structured training and competition within a club and under sports federation supervision; (ii) informal, student-athletes not involved in structured training or competition. The study adopts a cross-sectional design. Participants considered in this study were student-athletes enrolled in a higher education degree, and engaged in formal sports activities only within the universities or competing for organized sports competition (regulated by national sports federations). The study was approved by the Research Ethics Committee of the Federal University of Santa Catarina. Participation in the study was voluntary; all student-athletes were 18 years old or older and provided informed consent.

7.2.2 Validity of the factor structures of the Portuguese versions of the Baller Identity Measurement Scale and Student-Athletes' Motivation toward Sports and Academics Questionnaire

Initially, we examined the reliability and validity of the factor structure of the Portuguese version for Brazilian and Portuguese student-athletes. The factor analysis was estimated using the lavaan package, available as a package in the R statistical language (R CORE TEAM, 2018). We adopted the criteria of values ≥ 0.40 for the exploratory factor analysis (Principal Axis Factor; Direct Oblimin Rotation with Kaiser Normalization) for an item loading on factor and no less than three items in a factor (HAIR et al., 2009). To examine the internal consistency of each factor, the Cronbach alpha coefficients higher than 0.70 were considered acceptable. Furthermore, confirmatory factor analysis was applied to examine the factorial structure of the model adopting factor loadings cut-off point of 0.7 (HAIR et al., 2009) and following the indexes and their respective cut-off points according to the specialized literature (JACKSON; GILLASPY JR; PURC-STEPHENSON, 2009). To verify the scale's convergent validity, we analysed the Average Variance Extracted (AVE) with a cut of point of 0.5 (Hair et al., 2014). This analysis assesses the degree to which two measures of the same concept are correlated. Discriminant validity was assessed by comparing the AVE with the Average Shared Squared Variance (ASV), considered adequate if AVE>ASV. This comparison allowed us to identify the degree to which two conceptually similar concepts are distinct(Hair et al., 2014). Lastly, invariance tests were used to verify homogeneity across the countries (i.e., Brazil and Portugal). The first model (configural) tested if the constructs had the same pattern of free and fixed loadings. The second model (metric) constrained factor loadings to be equivalent in the two groups. Both models were compared (configural x metric) to verify the adequacy of the model when increasing in restrictiveness. To do so, we ran a CFA for each model (configural and metric). We used the "anova" function to compare both models (ROUDER et al., 2016), which takes the models objects as arguments. This method better addresses substantive questions in data analysis and offers a richer and more insightful view of nested data structure (ROUDER et al., 2016).

The Portuguese version of the Baller Identity Measurement Scale was translated in a pilot study (unpublished data). The Portuguese version for Brazilian and Portuguese student-athletes questionnaire is composed of 8-items and two factors structure (Affectivity and Social Identity), where participants state their level of agreement with the statements on a 6-point Likert scale, ranging from 1 (strongly disagree), to 6 (strongly agree). In the exploratory factor

analysis (Table 1; Kaiser normalization = 0.86) five items were grouped in factor Affectivity (α = 0.92) and five items in factor Social Identity (α = 0.73). Based on the Portuguese version of the Baller Identity Measurement Scale confirmatory factor analysis, we observed in the initial model (model 1) that eight items loaded into their factors with a magnitude greater than 0.70. Thus, two items were excluded (1 and 3) and the final model (model 2) achieved acceptable fit (Chi-square = 155.5; Degrees of freedom = 13; Tucker Lewis index = 0.91; Akaike information criterion = 18787.2; Normed fit index = 0.96; Root mean square error of approximation = 0.13; Expected cross-validation index = 0.29; Comparative fit index = 0.96; and Goodness-of-fit index = 0.95). Root mean square error of approximation value suggests a poor fit; however, other absolute fit measures were satisfactory as well as incremental fit measures, supporting with credibility the acceptance of model 2. AVE values were 0.63 and 0.58 for factor affectivity and social identity, respectively, meaning evidence of convergent validity. Additionally, AVE values were higher than ASV (0.49) showing evidence of discriminant validity. Additionally, the configural invariance was examined between Brazil and Portugal, with the model showing acceptable fit between the samples from the two countries, indicating that the proposed structure remained stable for both groups. The model with fixed constricted factor (metric) weights also showed acceptable fit. No difference was found when comparing the structural invariance of the models across the countries (X2= 0.09).

Table 1 - Exploratory factor analysis and reliability estimates of the Baller Identity Measurement Scale.

Item	**Factors**	
	Affectivity	**Social Identity**
1. I consider myself a student-athlete.		.741
2. I have many goals related to being a student-athlete.	.747	
3. Most of my friends are considered more students than athletes.		.503
4. Being a student-athlete is the most important part of my life.	.876	
5. I spend more time thinking about being a student-athlete than anything else		.565
6. When I'm a student-athlete, I feel good about myself.	.880	
7. Other people see me mainly as a student-athlete.		.703
8. I feel bad about myself when I do poorly when I'm not a student-athlete.	.855	
9. Being a student-athlete is the only important thing in my life		.512
10. I would be very depressed if I were injured and could not be a student-athlete	.863	
Alpha	**0.92**	**0.73**

The Portuguese version of the Student-Athletes' Motivation toward Sports and Academics Questionnaire was also translated in a pilot study, based on the Italian version (unpublished data). The Portuguese version for Brazilian and Portuguese student-athletes questionnaire is composed by 29-items and a three-factor structure (Sport Motivation, SM; Academic Motivation, AM; and Career Motivation, CM) where participants state their level of agreement with the statements on a 6-point Likert scale, ranging from 1 (strongly disagree), to 6 (strongly agree). The exploratory factor analysis (Table 2; Kaiser normalization = 0.98) showed that 20 items grouped in factor Academic Motivation, six in factor Sport Motivation and three in factor Career Motivation. An item was excluded (25) due to its low value. The Portuguese version of the Student-Athletes' Motivation toward Sports and Academics Questionnaire showed acceptable indicators in the confirmatory factor analysis (Chi-square = 2192.4; Tucker Lewis index = 0.90; Akaike information criterion = 66548.1; Normed fit index = 0.90; Root mean square error of approximation = 0.08; Expected cross-validation index = 3.06; Comparative fit index = 0.96; and Goodness-of-fit index = 0.87) as well as all factor loadings higher than 0.70.AVE values were 0.62, 0.58 and 0.75 for factor academic motivation, sport motivation and career motivation, respectively, meaning evidence of convergent validity. Additionally, AVE values were higher to the ASV (0.54, 0.48 and 0.47) showing evidence of discriminant validity. Additionally, the configural invariance was examined between Brazil and Portugal, with the model showing acceptable fit between the samples from the two countries, indicating that the proposed structure remained stable for both groups. The model with fixed constricted factor (metric) weights also showed acceptable fit. No difference was found when comparing the structural invariance of the models across the countries (X2= 0.06).

Table 2 - Exploratory factor analysis and reliability estimates of the Student Athletes' Motivation Toward Sports and Academics Questionnaire.

Item	**Factors**		
	AM	SM	CM
1. I am confident that I can achieve a high-grade point average this year (3.0 or above)	.827		
2. Achieving a high level of performance in my sport is an important goal for me this year		.425	
3. It is important to me to learn what is taught in my courses	.911		
4. I am willing to put in the time to earn excellent grades in my courses	.945		
5. Within an academic environment, I find it more challenging to face difficult tasks	.658		
6. For me, studies are important to achieve knowledge and skills	.895		

7. I will be able to use what is taught in my courses in different aspects of my life outside of school	.882		
8. I chose to play my sport, because it is something I am interested in as a career		.779	
9. For me, it is important to train seriously to improve my performance			-.413
10. I chose (or will choose) my major, because it is something I am interested in as a career	.720		
11. Earning a high-grade point average (27/30 or above) is not an important goal for me this year	-.570		
12. It is important to me to learn the skills and strategies taught by my coaches	.732		
13. It is important for me to do better than other athletes in my sport			-.425
14. The time I spend engaged in my sport is enjoyable to me	.417		
15. It is worth the effort to be an exceptional athlete in my sport	.451		
16. The achievement of a degree is important to enrich my knowledge	.835		
17. In sport, I find stimulating those situations requiring high performances and being difficult to perform	.593		
18. During the years, I compete in my sport, completing a college degree is not a goal for me	-.622		
19. I am confident that I can be a star performer on my team this year		.610	
20. My goal is to make it to the professional level or the Olympics in my sport		.877	
21. Situations that allow me to test my capacities stimulate me	.636		
22. I am confident that I can make it to an elite level in my sport (Professional/Olympics)		.874	
23. I am confident that I can earn a college degree	.860		
24. I will be able to use the skills I learn in my sport in other areas of my life outside of sports	.732		
25. Achieving high performances in my sport is not an important goal for me this year			
26. For me, it is important to achieve high performances and not to make mistakes			-.417
27. I am willing to put in the time to be outstanding in my sport		.532	-.406
28. The content of most of my courses is interesting to me	.777		
29. It is important for me to obtain a degree, because it will help me to find a job	.814		
30. It is not worth the effort to earn excellent grades in my courses	-.745		
Cronbach's alpha	**0.92**	**0.88**	**.85**

AM = Academic Motivation; SM = Sport Motivation; CM = Career Motivation

7.2.3 Multilevel regression and poststratification

The first step used with Bayesian multilevel regression and poststratification was to model individual scores as a function of individuals, group or context characteristics, partially pooling individuals´ responses towards the group mean (GELMAN; HILL, 2007). Hence, we estimated each student-athlete motivation toward sports and academics, and identity as a function of his or her individual characteristics and university country (for individual i, with indexes g, h, s, t, u and c for gender, hours of training per week, student-athlete status, sports-type, university type and university country, respectively):

$$\boldsymbol{y_i} = \boldsymbol{\beta^0} + \boldsymbol{\alpha}^{\boldsymbol{gender}}_{\boldsymbol{g[i]}} + \boldsymbol{\alpha}^{\boldsymbol{hours\ of\ training}}_{\boldsymbol{h[i]}} + \boldsymbol{\alpha}^{\boldsymbol{Student-athlete\ status}}_{\boldsymbol{s[i]}} + \boldsymbol{\alpha}^{\boldsymbol{sport-type}}_{\boldsymbol{t[i]}} + \boldsymbol{\alpha}^{\boldsymbol{university\ type}}_{\boldsymbol{u[i]}} + \boldsymbol{\alpha}^{\boldsymbol{country}}_{\boldsymbol{c[i]}}$$

The terms after the intercept are modelled as group effects (also referred to as random effects) drawn from normal distributions with variances to be estimated from the data:

$\boldsymbol{\alpha}^{\boldsymbol{gender}}_{\boldsymbol{g[i]}} \sim \boldsymbol{N}\ (\boldsymbol{0}, \boldsymbol{\sigma}^{\boldsymbol{2}}_{\boldsymbol{gender}})$, for $g = 1, 2$

$\boldsymbol{\alpha}^{\boldsymbol{hours\ of\ training}}_{\boldsymbol{h[i]}} \sim \boldsymbol{N}\ (\boldsymbol{0}, \boldsymbol{\sigma}^{\boldsymbol{2}}_{\boldsymbol{hours\ of\ training}})$, for $h = 1, 2, 3$.

$\boldsymbol{\alpha}^{\boldsymbol{student-athlete\ status}}_{\boldsymbol{s[i]}} \sim \boldsymbol{N}\ (\boldsymbol{0}, \boldsymbol{\sigma}^{\boldsymbol{2}}_{\boldsymbol{student-athlete\ status}})$, for $s = 1, 2$

$\boldsymbol{\alpha}^{\boldsymbol{sport-type}}_{\boldsymbol{t[i]}} \sim \boldsymbol{N}\ (\boldsymbol{0}, \boldsymbol{\sigma}^{\boldsymbol{2}}_{\boldsymbol{sport-type}})$, for $t = 1, 2$

$\boldsymbol{\alpha}^{\boldsymbol{university\ type}}_{\boldsymbol{u[i]}} \sim \boldsymbol{N}\ (\boldsymbol{0}, \boldsymbol{\sigma}^{\boldsymbol{2}}_{\boldsymbol{university\ type}})$, for $u = 1, 2$.

$\boldsymbol{\alpha}^{\boldsymbol{country}}_{\boldsymbol{c[i]}} \sim \boldsymbol{N}\ (\boldsymbol{0}, \boldsymbol{\sigma}^{\boldsymbol{2}}_{\boldsymbol{country}})$, for $c = 1, 2$.

In the final step, we used the model estimates to predict the student-athletes' motivation toward sports and academics, and identity variables for groups defined in a poststratification dataset (i.e. gender, hours of training, student-athlete status, sports-type university type and country). The poststratification dataset had an observation corresponding to each group defined for all combinations of the variables included in the model.

Estimations were made using Bayesian methods. Hence, we regularized the estimates using weakly informative prior distributions, normal prior (0, 10) for population-level effect (intercept) and normal priors (0, 1) for group-level effects, i.e., the standard deviations of varying intercepts. We run two chains for 4,000 iterations with a warm-up length of 1,000 iterations to ensure convergence of the Markov chain. We inspected the trace plots to examine the convergence of Markov chains and used posterior predictive checks to validate our models

(GELMAN et al., 2013). Bayesian estimations were performed using the No-U-Turn Hamiltonian Monte Carlo sampler in Stan (CARPENTER et al., 2017), obtained using brms package (BÜRKNER, 2017), available as a package in the R statistical language (R CORE TEAM, 2018).

7.3 RESULTS

First, we plotted the general estimates of student-athletes' identity (Figure 1) and motivation (Figure 2). Conditional on the data, the simulations based on our models indicate a substantial probability that student-athletes from Brazil present higher values of identity and motivation compared to Portuguese student-athletes. Furthermore, predictions suggest that the student-athletes from private universities and with more training hours per week have higher values of identity and motivation. There was no substantial variation in both identity and motivation indicators when considering student-athlete status.

Figure 1 - Posterior predictions of the Baller Identity Measurement Scale in relation to the country, university type, training hours per week and student-athlete status.

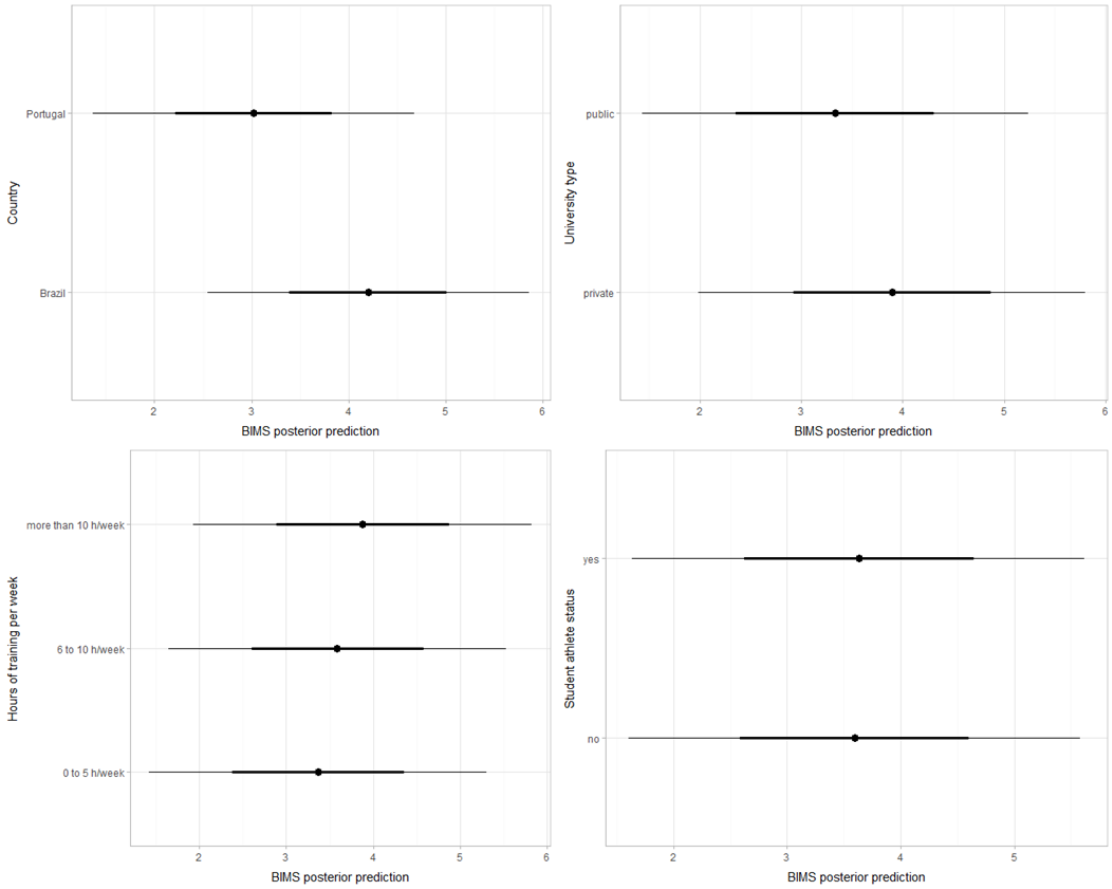
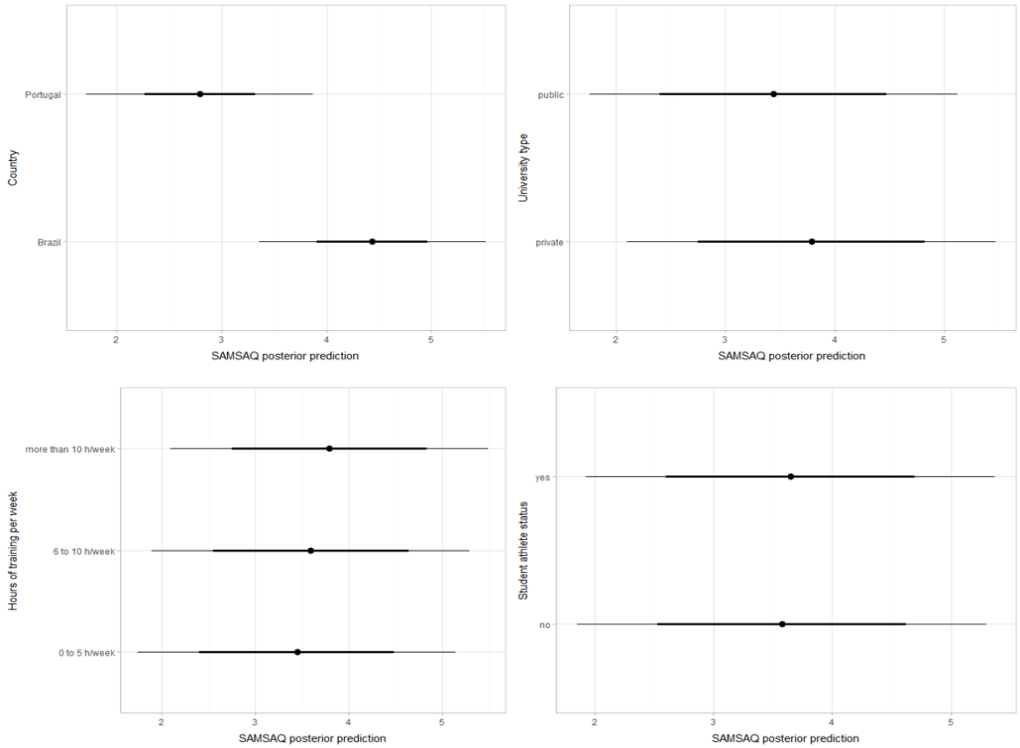


Figure 2 - Posterior predictions of the Student-Athletes' Motivation toward Sports and Academics Questionnaire in relation to the country, university type, training hours per week and student-athlete status.



Considering student-athletes' identity dimensions (Figures 3 and 4), data simulations suggest a substantial probability that student-athletes from Brazil present higher value for affectivity and student-athletes from private universities higher values of social identity. Student-athletes training more than 10 hours per week had higher values in both identity dimensions, but there was no variation when considering student-athletes´ status.

Figure 3 - Posterior predictions of affectivity dimension of Baller Identity Measurement Scale in relation to the country, university type, training hours per week and student-athlete status.

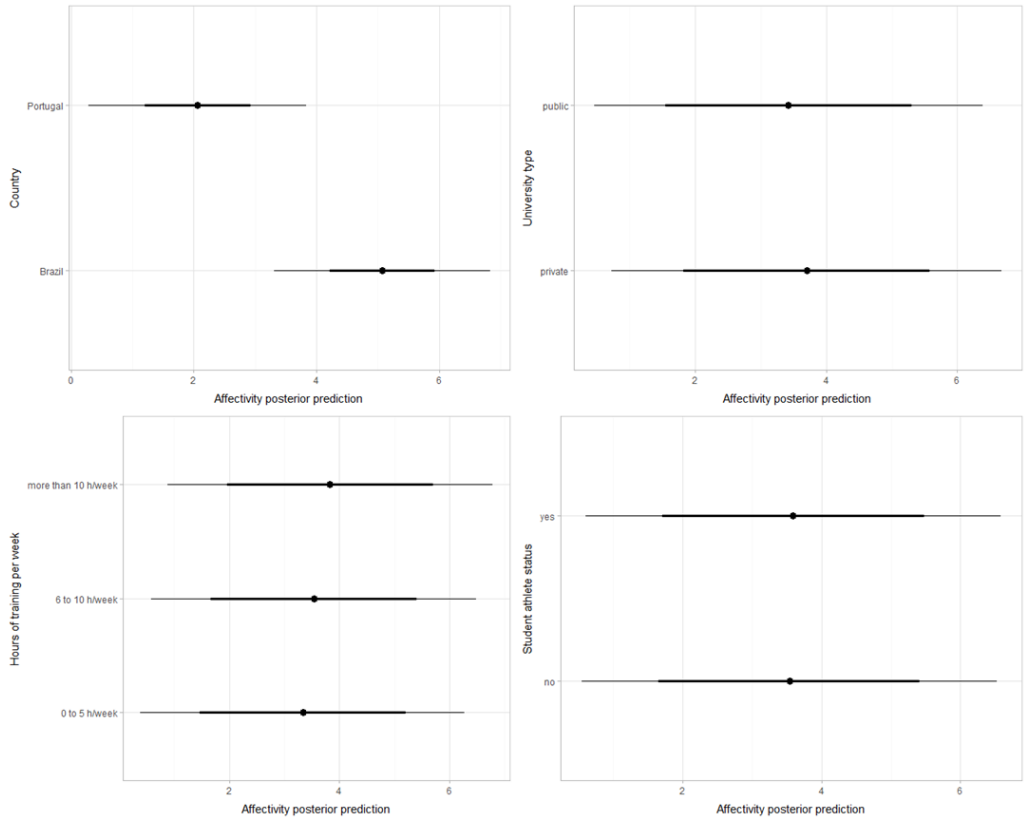
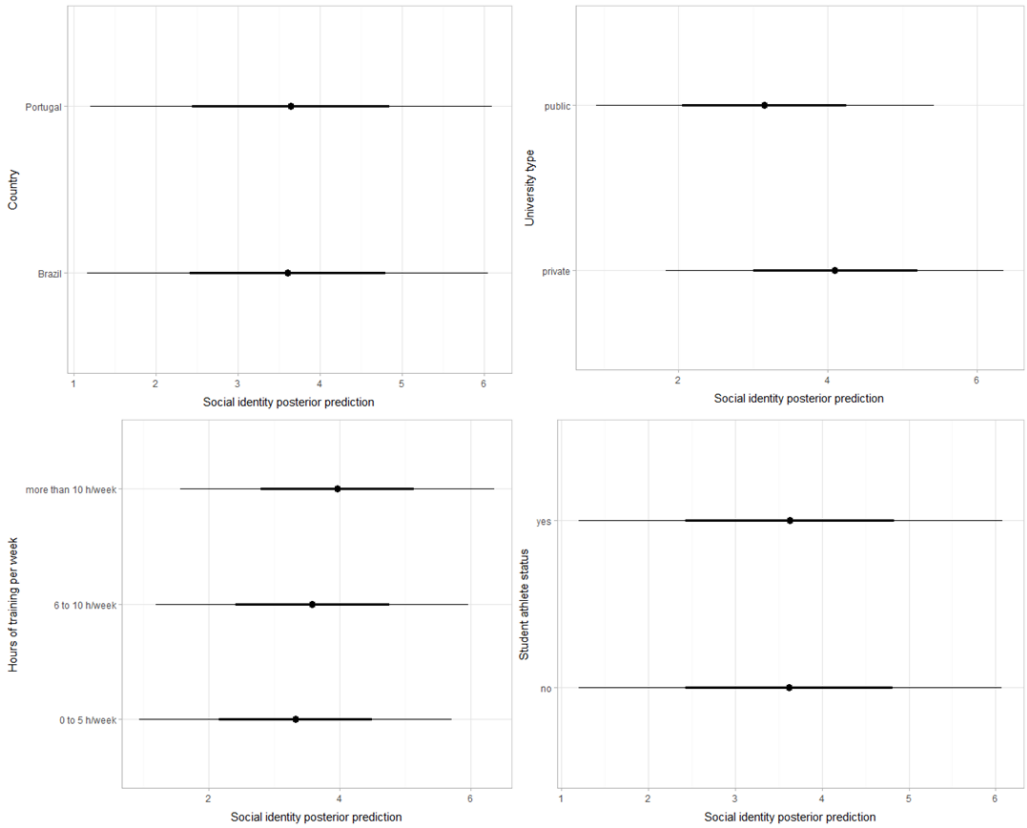


Figure 4 - Posterior predictions of social identity dimension of Baller Identity Measurement Scale in relation to the country, university type, training hours per week and student-athlete status.



Data predictions about student-athletes' motivation dimensions (Figures 5, 6 and 7) indicate that Brazilian student-athletes presented higher scores for academic motivation. On the other hand, predictions suggest that Portuguese student-athletes showed higher values for student and career motivation. In addition, student-athletes enrolled in private universities presented higher values of sports motivation, and student-athletes enrolled in public universities had higher values of career motivation. Student-athletes training more than 10 hours per week had a substantially higher score for sports motivation and career motivation than those training zero to five hours per week. There was no variation in the motivation indicators when considering student-athletes' status.

Figure 5 - Posterior predictions of academic motivation dimension of the Student-Athletes' Motivation toward Sports and Academics Questionnaire in relation to the country, university type, training hours per week and student-athlete status.

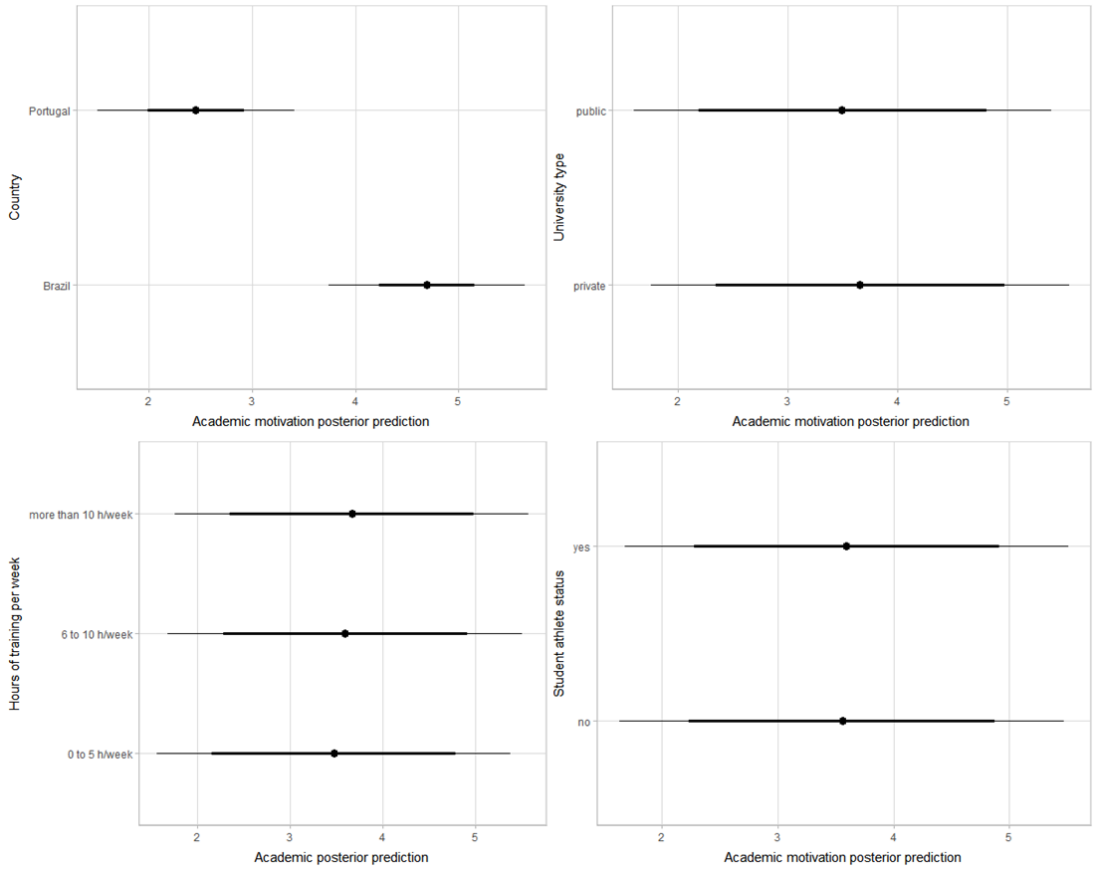


Figure 6 - Posterior predictions of sports motivation dimension of the Student-Athletes' Motivation toward Sports and Academics Questionnaire in relation to the country, university type, training hours per week and student-athlete status.

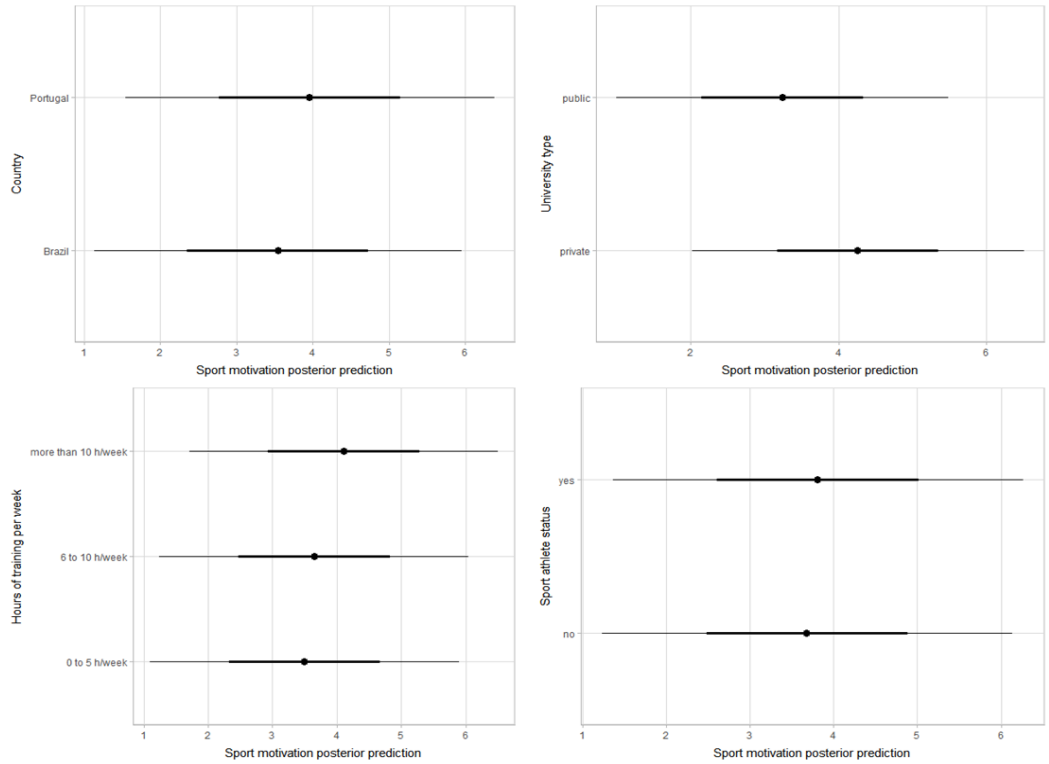
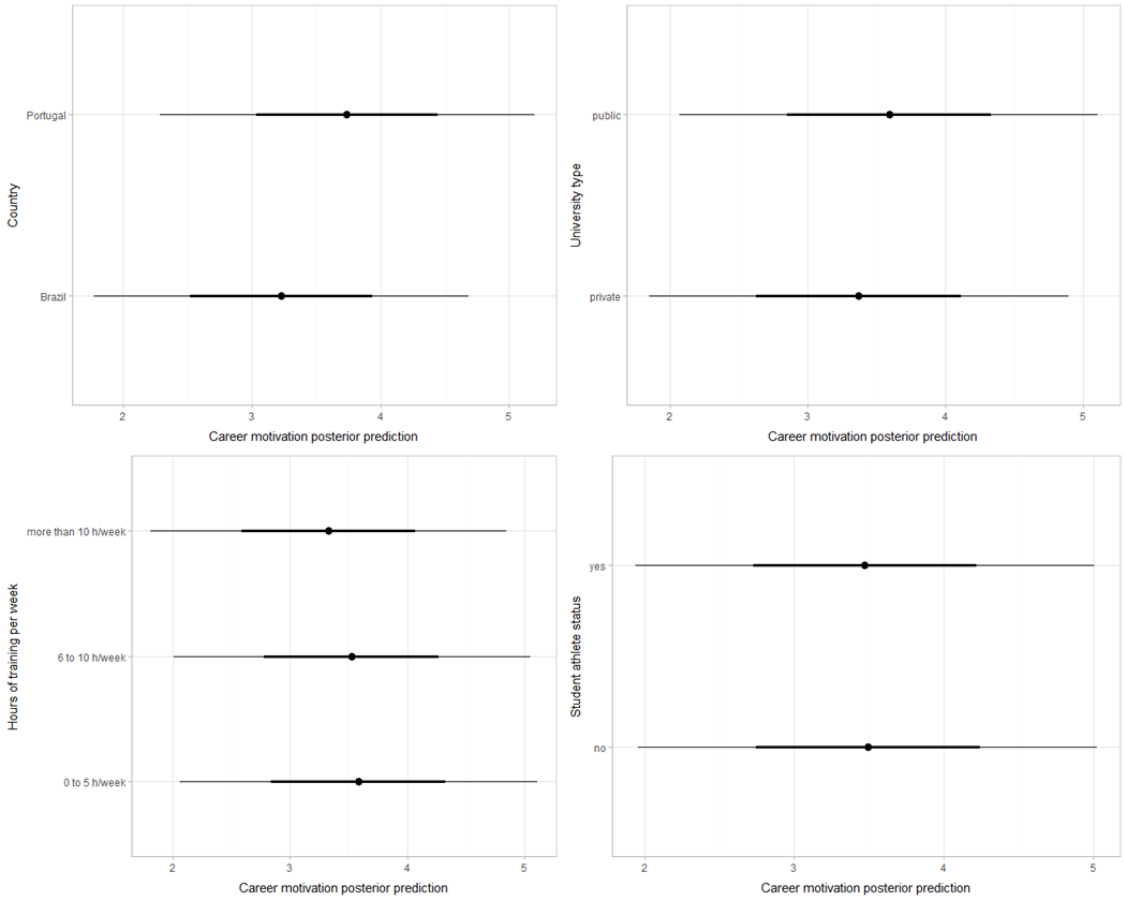


Figure 7 - Posterior predictions of career motivation dimension of the Student-Athletes' Motivation toward Sports and Academics Questionnaire in relation to the country, university type, training hours per week and student-athlete status.



7.4 DISCUSSION

The present study is the first to compare Brazil and Portugal concerning student-athletes' dual careers based on our knowledge. Additionally, multilevel regression and poststratification seem to be seldom used in sports science research. In this study, we estimated the variation of the student-athletes identity and motivation between Brazilian and Portuguese student-athletes, accounting for university type, training hours per week, and student-athletes status. It is important to highlight that the variables presented a small interaction effect. Therefore, looking at a practical implication, it points out the need to work with each of the variables in their context and combine them with no worries to have a misunderstanding about the data.

We argue that it is crucial to avoid a priori assumptions in cross-cultural studies, with adequate analysis of the results. To assure the validity of our observations, we initially determined a cross-cultural validation of the Portuguese versions of the Baller Identity Measurement Scale and Student-Athletes' Motivation toward Sports and Academics Questionnaire questionnaires. Overall, identity and motivation varied substantially between Brazilian and Portuguese student-athletes. Also, accounting for country-level variation, there was a substantial influence of student-athletes training hours per week and university type on student-athletes´ identity and motivation. There was no influence of student-athletes status on a between-individual variation on the scores of identity and motivation.

The cross-cultural of the Portuguese version of the Baller Identity Measurement Scale presented a two-factor "Affectivity" and "Social Identity" structure, which is consistent with the Italian version of the Baller Identity Measurement Scale (LUPO et al., 2017a), but inconsistent with the four-factor of the original version (HARRISON et al., 2010). Comparing the Portuguese Student-Athletes' Motivation toward Sports and Academics Questionnaire factorial structure with the previous Italian version (GUIDOTTI; CAPRANICA, 2013; LUPO et al., 2017), there was an almost full correspondence between items. However, differently from the four-factor model of the Italian version (GUIDOTTI; CAPRANICA, 2013), the Portuguese version of the Student-Athletes' Motivation toward Sports and Academics Questionnaire presented a three-factor structure (i.e., Sport Motivation, Academic Motivation, and Career Motivation), which was consistent the factorial structure observed by Lupo et. al. (2017b).

Our model predictions indicated a high probability of Brazilian student-athletes having higher values for affectivity and similar social identity than Portuguese student-athletes. Youth sports programs tend to be less structured in Brazil, and university sports in Brazilian

universities are still in development. In Portugal, young athletes´ development is deeply connected with the clubs and less school-based (STAMBULOVA; RYBA, 2013), explaining why the Portuguese population has lower levels of affectivity. Overall, Brazilian university contexts may provide more opportunities for sports participation, particularly allowing students with different sport experience levels to be engaged in sports. Although the university organization models are different across countries, the student-athletes from both Brazilian and Portuguese universities have similar moderate to high values of social identity. These results suggest that student-athletes have a high sense of grounded in their sport participation, even within different university organizational models.

Our model predictions showed a trend of higher academic motivation for Brazilian student-athletes but showed higher sport motivation and career motivation among Portuguese student-athletes. In the Portuguese population, the academic motivation factor was where student-athletes appear to be less motivated than Brazil, suggesting Portuguese student-athletes are interested in developing sports as a professional career. Generally, athletes tend to abandon sports training because of competition, economic resources, or lack of support through the dual-career (SUBIJANA; BARRIOPEDRO; CONDE, 2015), and the dropout rate is higher at the university level. Overall, when comparing both countries, the results from Brazil may reflect the trend for European athletes to abandon sport and prioritize education to prepare for future job opportunities (AMARA; AQUILINA; HENRY, 2004). Also, it is worth noting that the competition level at university championships is often lower than sports federations' competitions, including mostly amateur-level athletes. Therefore, although student-athletes from Portugal indicate higher values for sports motivation, Portuguese elite athletes enrolled in universities tend to have limited participation in those sports events to prevent injuries and not interfere with the elite sports performance. On the other hand, Brazilian state and national federation competitions have a different structure, which likely allows athletes with a higher level of performance to compete in university competitions, particularly those enrolled in private universities.

The university sport system is coordinated by the Academic Sports University Federation (FADU) in Portugal. Hence, it is responsible for organizing the annual university championships alongside the student associations at each university or higher education institutes. Being part of that organization is a social stand and having an organized sport system is also part of a political strategy. Therefore, the Portuguese student-athlete is likely motivated when is part of the organization, implying that the Portuguese student-athlete values the organization of the sport and the participation. This may partially explain the higher values of

sports motivation within the Portuguese student-athletes. As for Brazil, the National Federation of University Sports organizes the university championships; however, the organization does not promote sports policies, and its activity is detached from the higher education system. This disconnection between academic and sport systems and the ongoing development of the university system, both public and private, likely contributes to the student-athletes being significantly influenced by the sport context outside the university.

University contexts, private and public systems, are more diverse in Brazil than in Portugal. Nevertheless, public universities in Portugal have different policies and student-athlete status. It seems reasonable to assume that private universities are more likely to use sport as a self-promotion strategy to increase their attraction profile and media attention, aiming to bring profits to the university (HARRISON et al., 2010) through the number of student-athletes enrolled in the university to get more attention from potential sponsors (HARRISON et al., 2010).

Furthermore, private and public universities likely provide different facilities and support policies that reflect student-athletes identity and motivation (AQUILINA; HENRY, 2010). Our predictions confirmed that student-athletes' identity and motivation towards sports and academics are influenced by university type. In particular, student-athletes from private universities tend to have higher values for affectivity, social identity, and sport motivation. On the other hand, if public university student-athletes presented higher values for career motivation, there was no variation by university type for academic motivation.

Based on the data, when considering training hours` predictions, student-athletes more committed to the sport, i.e., with more than 10 hours of training per week, presented higher values for affectivity, social identity, and sport motivation. On the other hand, predictions suggested that student-athletes were less committed with sport participation (i.e., training zero to five hours per week) presented higher career motivation and similar values for academic motivation independent of the number of training hours. Student-athletes may present higher values for affectivity and social identity due to their intense dedication and time spent on an activity (COKER-CRANNEY et al., 2018) and their sense of belonging to a certain type of community (CULVER; TRUDEL, 2008). Although their sport motivation is higher, the career and academic motivation are not, which indicates that the time of dedication on training might not keep those student-athletes on a long dual career path, and they may choose one career over the other.

Lastly, our model predictions showed no variation in the identity and motivation of Brazilian and Portuguese student-athletes when grouped by their student-athletes status at each

university. These results may reflect the lack of adequate support policies (national/government policies), and/or student-athlete status does not represent the truly student-athletes needs. Although it has been highlighted the need and importance of student-athletes support policies (AQUILINA; HENRY, 2010; EUROPEAN COMMISSION, 2012; EUROPEAN PARLIAMENT, 2015; 2017), currently available forms of national policies and local rules, that vary by country and institution may not be sufficient to support a dual career.

The local legislation is a dimension with a major influence on the decisions and lifestyle of the student-athlete. The cultural context is intrinsically linked with the individuals´ identity and can explain the variation of the identity and motivation levels. When analyzing the Brazilian and Portuguese university context, it is possible to recognize how local legislation affects student-athletes. Regardless of the legislation, how the Higher Education Institutions apply the legislation and how the sport is organized has an impact on the daily life of the student-athlete and can affect their decisions and choices when they need to move or to access education.

Athletes need to develop academic careers in a high-level sports environment, but it is also one of the first factors that athletes have in mind when choosing a university (MACNAMARA; COLLINS, 2010). At a global level, athletes face similar challenges combining a dual career, but to understand how the student-athletes identify with their reality, how they face these challenges and conciliate the demands between sports and education has to be analyzed in the context where the athlete is (AQUILINA, 2013; STAMBULOVA; RYBA, 2013; STAMBULOVA et al., 2015). Hence, new approaches to the context where the athletes develop their training (i.e., academic and athletic) are needed. Moreover, it is recognized that transnational studies and projects can play an important role in identifying the best practices to reduce the dropout rate of academic and sports careers, promoting a successful reform of athletes, and guiding governments, sport structures, and educational institutions to make better decisions in the management of sports and education (GUIDOTTI; CORTIS; CAPRANICA, 2015). We emphasize that the empirical nature of our research does not underestimate the complicated way that affects sport perceptions across states.

The importance of cross-cultural studies is recognized, but the empirical effort to perform them is scarce. Our findings highlight the diverse ways in which student-athletes perceive their reality in the function of the cultural context, national policies, or university rules. The local ecologies seem to be more powerful than general legislation, and the institutions always mediate the generalization of specific good practices with their idiosyncrasies. It is crucial to compare the contexts and search for the decisive factors that shape student-athletes

perceptions, beliefs, and expectations. That is the only way to design customized policies, rules, and other support decisions. Scholars, managers, and coaches should be aware of that.

7.5 CONCLUSION

To our knowledge, this is the first attempt to perform a comparative study about student-athletes dual careers between Brazil and Portugal and the first study in sports science to use the multilevel regression and post-stratification. In addition, we established the reliability and validity of a cross-cultural Portuguese Baller Identity Measurement Scale questionnaire and the Student-Athletes' Motivation toward Sports and Academics Questionnaire version, which provides a valuable instrument to understand student-athletes living in Portuguese-speaking countries. Therefore, we estimated the variation among Brazilian and Portuguese university student-athletes´ identity and motivation, considering the influence of the type of university, training hours, and student-athletes status.

Overall, our model predictions show that cultural (country), academic (type of university), and sport (training hours) contexts play a considerable influence on student-athletes' identity and motivation. The present results highlight the need to consider the influence of individual-level and contextual-level influences on the identity and motivation of the student-athlete, regardless of the student-athlete status. Hence, we illustrated in this study the use of multilevel modeling and poststratification as a flexible and robust framework to deal with different sources and levels of variation on the outcomes related to student-athletes. Our results highlight the need for caution when designing and applying policies at the country and local levels, as they may have a major impact on the identity and motivation of the student-athlete. Cross-cultural studies of different contexts and in different populations (e.g., high school) will be relevant to provide a baseline for policy improvements and monitor their impact on both institution and student-athlete career. The differences between countries' sizes might impact how sport policies are developed and applied, which might be a limitation of the present study, although we applied the post-stratification to give adjusted estimates. Other limitations lie in the fact of this is a cross-country comparison, and it is never possible to include in the models some variables that might influence each culture.

8. FINAL CONSIDERATIONS

During the dual-career path, university student-athletes find themselves in a conflict of identity and motivation because of the challenges imposed by the combination of both careers (MATEU et al., 2020). Identity and motivation have been demonstrated to be crucial in understanding student-athlete's dual-career to help develop (EUROPEAN COMMISSION, 2012; GUIDOTTI; CORTIS; CAPRANICA, 2015a; STAMBULOVA.; WYLLEMAN, 2019; STEELE; VAN RENS; ASHLEY, 2020). However, no study investigated the student-athlete identity and motivation in university student-athletes in the Brazilian context. Additionally, there is the need to measure Brazilian student-athletes' identity and motivation to develop strategies to avoid dropping out during the dual-career. Thus, the present study aimed to investigate the identity and motivation of Brazilian university student-athletes toward the dual-career.

Two questionnaires were validated because no specific questionnaires could measure the student-athlete identity and the student-athlete motivation in the Brazilian culture. The BIMS (HARRISON et al., 2010) was translated and validated to the Brazilian culture to measure the student-athlete identity. Although the factorial structure was not similar to the American version (4 factors; HARRISON et al., 2010), the final structure (2 factors) matched with other countries' validations (LUPO et al., 2017a; FERNANDES; MOREIRA; GONÇALVES, 2019). It is common to find changes in the questionnaire's structure across countries due to differences between cultures (SU; PARHAM, 2002). After validating the questionnaire to the Brazilian culture, Bayesian multilevel regressions were run to examine the constructs of the questionnaire in a sample of student-athletes from the university games promoted by the Brazilian Confederation of University Sports. Overall, university type, competitive level, and student-athlete status were the characteristics that most influenced student-athlete identity. A small decrease in identity across the undergraduate period was observed based on the longitudinal models, although with large variability. Based on interviews with student-athletes, their identity seemed to change according to their priorities at a short and long goal. It was observed that student-athletes might have their priorities changed at the end of their graduation than their priorities across graduation. These finds corroborate with international finds that also found changes in student-athlete identity over time (LALLY, 2007). However, more longitudinal studies are needed. Additionally, when comparing Brazilian student-athletes with Portuguese student-athletes, there were higher affectivity estimates in Brazilian student-athletes. It might reflect that student-athletes are more connected with

universities than sports clubs in Brazil, as observed in countries where youth programs tend to be more structured (STAMBULOVA; RYBA, 2013).

The SAMSAQ (GASTON-GAYLES, 2005) was translated and validated to the Brazilian culture to measure student-athlete motivation. The factorial structure for the Brazilian culture macheted the 3-factor structure found in the original version (GASTON-GAYLES, 2005) as well as in other countries' validation (GUIDOTTI et al., 2013; LUPO et al., 2015; PARK; HONG; LEE, 2015; LUPO et al., 2017). Based on the evidence of construct, cross-sectional and longitudinal data were collected. In summary, sex seemed to influence career motivation and type of university and competitive level on sport and career motivation. However, student-athlete motivation might not change over a year, suggesting a need to motivate student-athletes since their beginning of university to keep the motivation across the undergraduate period. Still, there is also a need for measuring motivation in a large time frame. Lastly, Brazilian student-athletes presented a higher estimate of academic motivation than Portuguese student-athletes. It might indicate that Brazilian student-athletes are less interested in developing sport as a professional career given low support thought the dual-career (DE SUBIJANA; BARRIOPEDRO; SANZ, 2015) and prioritized education to prepare for future job opportunities (AMARA; AQUILINA; HENRY, 2004).

Scientific researches about the understanding of the dual career of university student-athletes have been developed and improved over the years. According to literature reviews, carried out based on European articles, there was a greater need to develop a greater number of psychometric scales and the need for greater dialogue with experts from different countries (GUIDOTTI; CORTIS; CAPRANICA, 2015b). Additionally, they have demonstrated advances in discussing identity and motivation (STAMBULOVA.; WYLLEMAN, 2019).

The longitudinal data findings of the present study open a new question to be made in the Brazilian culture that in European countries is already investigated. The study of transitions during the student-athlete career is under great discussion in the international literature (PARK; LAVALLEE; TOD, 2013), being a prominent theme in two special editions of the journal Psychology of Sport and Exercise (2004 and 2015), as well as focusing on educational transitions (MATEU et al., 2020). Among the transitions during higher education, it was verified, from longitudinal studies, that the athletic identity tends to decrease in the final stages of higher education (LALLY, 2007). The transition to higher education can generate discomfort and internal and external conflicts (MATEU et al., 2020). However, the dual career of student-athletes has been shown to assist in transitioning to the post-career, qualified to work in the labor market (DEBOIS; LEDON; WYLLEMAN, 2015). As highlighted in the work of Tshube

and Feltz (2015), the transition to the post-career can be smooth and automatic because the dual-career of student-athlete during university life, athletes develop countless skills arising from sport and studies. Despite being a growing theme over the years, it is still necessary to use more longitudinal models, correlations with other variables, and interventions studies (PARK; LAVALLEE; TOD, 2013).

The model of transitions faced by athletes in the athletic, psychological, psychosocial, and academic dimensions (WYLLEMAN; LAVALLEE, 2003) is the most widespread model among dual-career studies (BROWN et al., 2015). This same model has been improved over time by including two dimensions, the financial and legal (WYLLEMAN; ROSIER, 2016; WYLLEMAN, 2019), and renamed to Holistic Model of the Athletic Career. The model illustrates the interaction of different domains of an athletic life with the transitions of life outside of sport over the years, which include the identity and motivation of student-athletes (WYLLEMAN; ALFERMANN; LAVALLEE, 2004).

Another model for understanding the dual-career is the Holistic Ecological model for developing dual-career environments (HENRIKSEN et al., 2020). The model illustrates the complexity of interactions within and between different environments with the student-athlete as a central element. The microlevel is represented by communication and direct interaction with the domains (sports, education, and family) and with the people (relatives and friends) in which he or she spends most of his time. The macro-level refers to the social settings that affect student-athletes, but they (student-athletes) are not contained in this macro level, such as the sports and educational system (HENRIKSEN et al., 2020). Lastly, the model is encompassed by the past, present, and future dynamic natures.

These models demonstrate that student-athletes development is influenced by several domains and environments levels, of which identity and motivation are also influenced. Thus, based on the study findings and the models presented, sports and educational systems need to work integrated to increase and develop student-athlete identity and motivation. Sport and education need to plan joint actions and not develop separate and disconnected actions. The support and influence of each level on the university student-athletes are essential for maintaining a dual-career. Support policies were being developed abroad (EUROPEAN COMMISSION, 2012; RYAN; THORPE; POPE, 2017). The quality and involvement of different support spheres positively impact student-athletes (EUROPEAN COMMISSION, 2016; HENRIKSEN et al., 2020). Both contexts have responsibilities for developing the dual career of student-athlete, or at least they should. Responsibilities must be shared and in common agreement between the contexts. Only in this way will it be possible to develop the dual-career,

decreasing the conflicts of the student-athletes regarding the commitment in both contexts (EUROPEAN COMMISSION, 2012; RYAN; THORPE; POPE, 2017). Finally, we have a third sphere of support represented by the State and governmental organizations, in which many countries have concentrated the development of supports (WYLLEMAN; DE BRANDT; DEFRUYT, 2017; KUETTEL et al., 2020). The lack of dual-career support can generate countless stressful factors in student-athletes, exposing them to psychological disorders (HUANG; JACOBS; DEREVENSKY, 2010; BRATLAND-SANDA; SUNDGOT-BORGEN, 2013; BARRY et al., 2015; EGAN, 2019).

The present study highlights that identity and motivation of student-athletes toward dual-career are essential to be studied for the development of dual-career. Educational, sport, and cultural contexts have major influenced on identity and motivation. At the beginning of their undergraduate period, student-athletes need to be supported by higher education institutions, sports federations, and government organizations to make a favorable environment where they feel part of it, recognized, and motivated in a long-time frame.

Strengths. In addition to this study being the first to investigate university student-athletes identity and motivation toward dual-career in Brazil, robust analyses were conducted with large samples and mixed methods. The validations of the questionnaires to be Brazilian culture bring new instruments to measure psychological characteristics, and there were demonstrated that these questionnaires are sensible to measure what they were developed to measure. The methodological design is also a strength. We conducted a sequence of investigations from selecting, translating, and validating psychological measures to examining cross-sectional, mixed-longitudinal samples and conducting a retrospective longitudinal mixed-method study. The major methodological strength of the study is the use of Bayesian multilevel regression and post-stratification, which the papers from the present study were the first ones to use this technic in the entire literature of Sports Sciences. This analysis opens new discussions to have robust predictions and interpretations of psychological measures of target populations.

Limitations. Some limitations need to be addressed in the present study. First, we considered student-athletes competing in the sports events organized by the Brazilian Confederation of University Sports in the entire study. Other student-athletes compete in other sports events that were not considered in the present study. Second, we had an over-representation of student-athletes from the south region of Brazil, which might have influenced the results; (iii) there was not collected types of support and economical characteristics that might make models more informative; (iv) quantitative data was collected just over a year

because of the COVID-19 pandemic; (v) qualitative data was collected just in a cross-sectional design; and (vi) some university student-athletes reported training less than five hours per week, which caution needs to be taken in the interpretation of the athletic career.

Practical implications. Based on the present study's findings, stakeholders, institutions, support providers, sports federations, and governments have a better understanding of how student-athletes feel about their identity and motivation toward dual-career. From a minor point of view to a major point of view, higher education institutions are key players in the identity and motivation of student-athletes. Thus, higher education institutions need to strategically plan ways to incentivize the dual-career by giving the support needed to the student-athletes. Additionally, these institutions need to give special attention to student-athletes at the beginning of their university dual-career. It seemed to be in the beginning that identity and motivation are most developed. A way to incentive the student-athletes is the student-athlete status in which supports (e.g., financial, flexible hours, scholarship) is stated by the institution. University sports federations are other key players. By promoting the sports events, university sports federations can show the importance of following and keeping in a dual-career. Although the sports federations are focused on sports competition, these events are opportunities to make student-athletes identity and motivation develop independent of their competitive level. It needs to be shown that being in a dual-career is valuable for adding sports values and competencies and educational knowledge for their future. Other players that need to be addressed are the sport and educational secretary and ministry. The development of more structured policies that include student-athletes will contribute to a dual-career. It does not mean that by developing more structured policies that include student-athletes, the country will increase athletes' performance and the number of elite athletes. However, it does mean an incentive and support toward a dual-career that has much to contribute to peoples' lives.

Thus, it is encouraged the development of a well-stated document to support the dual-career. First, it is necessary to state the qualifications to be assisted, for example, by presenting the participation in sports events and sports achievement and good school performance in the last year (high grades). Additionally, it is important to establish a minimum of credits that student-athletes need to take each semester and register in the university sports federation. Second, it is necessary to state the supports. Student-athletes may have flexible school and sports schedules to combine both commitments. In addition, flexible dates for taking exams and homework when the student-athlete is in competitions are recommended. Multidisciplinary support is also recommended. Student-athletes could be assisted by multidisciplinary professionals in the university, such as psychologists, nutritionists, and physiotherapists. This

action would also contribute to the development of teaching, researches, and extension projects/programs. Professors could develop interventions programs with these student-athletes to increase teaching strategies, collect data about their interventions and produce new data.

Future directions. There are several ways to enter higher education in Brazil. Thus, future studies might investigate the influence of entering higher education on the identity and motivation of student-athletes. Another educational characteristic that might be investigated is the percentage of education conclusion. For example, students might take classes from different levels (e.g., the first year and the third year). Thus, asking for the percentage of education conclusion might give a better direction of how established this student is about her/his education. With the high development of distance learning, it can be a characteristic to be investigated to examine if the identity and motivation of student-athletes are influenced by being personally or virtually in the higher education environment. Ecological models might be used to understand how identity and motivation are influenced based on different dimensions and different spheres of support. Future studies need to consider collecting quantitative and qualitative longitudinal data all over the undergraduate period.

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APPENDIX A

Termo de Consentimento Livre e Esclarecido

UNIVERSIDADE FEDERAL DE SANTA CATARINA
CENTRO DE DESPORTOS
PROGRAMA DE PÓS-GRADUAÇÃO EM EDUCAÇÃO FÍSICA

Termo de Consentimento Livre e Esclarecido

Prezado (a) participante da pesquisa,

Conforme a proposta do pesquisador vinculado ao Curso de Educação Física do Centro de Desportos da Universidade Federal de Santa Catarina, temos o prazer de convidá-lo a participar da pesquisa de doutorado intitulada "CARREIRA DUPLA DO ESTUDANTE-ATLETA NO BRASIL". Considerando a Resolução nº. 466 de 12 de dezembro de 2012, do Conselho Nacional de Saúde e as determinações da Comissão de Ética em Pesquisas com Seres Humanos. O estudo servirá de base para a elaboração de uma tese de doutorado, vinculada ao Programa de Pós-Graduação em Educação Física (PPGEF) da Universidade Federal de Santa Catarina (UFSC), ressaltando que o pesquisador responsável atenderá as exigências deliberadas nesta resolução.

O estudo tem como objetivo principal, analisar a carreira dupla do estudante-atleta brasileiro. Especificamente pretende-se: validar para versão em português o questionário *BallerIdentityMeasurementScale*; validar o questionário *StudentAthletes' Motivationtoward Sports andAcademicsQuestionnaire – Europe*; verificar a identidade do estudante-atleta; verificar a motivação do estudante-atleta; investigar o desenvolvimento da carreira de estudante-atleta ao longo da formação na universidade brasileira. Espera-se que esta pesquisa contribua para futuros estudos e discussões acerca do estudante-atleta brasileiro.

Os benefícios e vantagens em participar deste estudo serão de contribuir com a produção do conhecimento sobre a identidade, motivação e desenvolvimento do estudante-atleta brasileiro, bem como contribuir para futuras discussões e implementação de maiores incentivos ao estudante-atleta brasileiro. Para isso, você não terá nenhum gasto, nem receberá compensação financeira, e todos os materiais necessários à coleta de dados serão providenciados pelos pesquisadores. Não haverá nenhuma forma de reembolso de dinheiro já que a sua participação na pesquisa não acarretará nenhum gasto.

Ressaltamos que a investigação apresenta riscos mínimos nos fatores psicológicos e sociais, como, por exemplo, cansaço, aborrecimento e desconforto ao responder as perguntas dos questionários. Sua participação implicará em responder dois questionários, contendo questões abertas e fechadas. Além dos referidos questionários, participantes poderão ser selecionados, para a realização de entrevista, com intuito de investigar o desenvolvimento da carreira de estudante-atleta. A participação implicará em responder a entrevista semiestruturada, com a utilização de um gravador para registro da fala de cada entrevistado. Após as transcrições das entrevistas, o conteúdo será reportado aos participantes individualmente, para possíveis alterações. Ressaltamos que os riscos apresentados durante a entrevista poderão ser de natureza comportamental como constrangimento ou alterações de comportamento.

Este Termo de Consentimento Livre e Esclarecido está sendo apresentado em duas vias, sendo que uma delas ficará em poder dos pesquisadores e a outra com o sujeito participante da pesquisa, ambas assinadas pelos pesquisadores. Ressaltamos que sua identidade, assim como suas respostas serão mantidas em sigilo e que você não precisará fornecer seu nome para participar da pesquisa. Garantimos o seu anonimato em todas as fases da pesquisa, e que as informações obtidas serão utilizadas exclusivamente para fins científicos, sendo que cada sujeito será identificado por número e somente os pesquisadores terão acesso a este dado. Você poderá retirar-se do estudo a qualquer momento. Não haverá nenhum gasto com a sua participação na pesquisa, sendo que você não terá nenhuma despesa adicional. Caso, para sua participação, você dispender de algum gasto, o mesmo será reembolsado.Diante de quaisquer danos causados pela pesquisa ao participante, o mesmo será indenizado pelos pesquisadores, conforme a responsabilidade indelegável e indeclinável. Por fim, após o encerramento e/ou interrupção da pesquisa você receberá assistência que for necessária, gratuita e pelo tempo que for necessário da forma que for mais adequada e escolhida pelo(a) senhor(a). Agradecemos, desde já, sua colaboração e participação, e colocamo-nos à disposição para eventuais esclarecimentos.

Nome do pesquisador responsável para contato: Humberto Jorge Gonçalves Moreira de Carvalho
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UNIVERSIDADE FEDERAL DE SANTA CATARINA
CENTRO DE DESPORTOS
PROGRAMA DE PÓS-GRADUAÇÃO EM EDUCAÇÃO FÍSICA

TERMO DE CONSENTIMENTO

Declaro que fui informado, de forma clara e objetiva, sobre todos os procedimentos da pesquisa intitulada: CARREIRA DUPLA DO ESTUDANTE-ATLETA NO BRASIL. Estou ciente que todos os dados à meu respeito serão sigilosos e que posso me retirar do estudo a qualquer momento. Assinando este termo, eu concordo em participar deste estudo. Agradecemos, desde já, sua colaboração e participação, e colocamo-nos à disposição para eventuais esclarecimentos.

Nome por extenso:_____

Assinatura:_____

Local, data: _____, _____/_____/_____

_____
Prof. Dr. Humberto Jorge Gonçalves Moreira de Carvalho
(Pesquisador Responsável/Orientador)

_____
Ricardo Teixeira Quinaud
(Pesquisador Principal/Doutorando)

APPENDIX B

Baller Identity Measurement Scale 2 (Brazilian version only)

Nas questões seguintes, indique o nível de **CONCORDÂNCIA,** considerando uma escala de 1 a 6, sendo 1 **DESCORDO TOTALMENTE** e 6 **CONCORDO TOTALMENTE**

1	Tenho muitos objetivos relacionados com a minha melhoria esportiva.	1	2	3	4	5	6
2	Melhorar a minha performance esportiva é uma parte muito importante da minha vida.	1	2	3	4	5	6
3	Passo mais tempo pensando no esporte que pratico do que em qualquer outra coisa.	1	2	3	4	5	6
4	As outras pessoas vêm-me maioritariamente como um atleta de alto rendimento.	1	2	3	4	5	6
5	Sinto-me mal comigo mesmo quando não atinjo os meus objetivos esportivos.	1	2	3	4	5	6
6	Competir é a coisa mais importante da minha vida.	1	2	3	4	5	6

Construct evidences

The total cross-sectional sample comprised 862 participants. For methodological purpose, we split the total sample into two independent samples generated through random numbers. We conducted a Bayesian exploratory factor analysis (BEFA), based on sample 1, testing the Maximum number of latent factor (Kmax) with four latent factors (HARRISON et al., 2010) and with two latent factors (QUINAUD et al., 2020). We set our minimum posterior means in 3 and our Metropolis-Hasting acceptance rate was used to retain items posterior probabilities of being different from zero. To conduct this analysis, the package "BayesFM" was used (CONTI et al., 2014), in R (R CORE TEAM, 2018). We ran 80,000 iterations with a burn-in period of 5,000 iterations. We also applied Bayesian confirmatory factor analysis (BCFA), based on sample 2, to confirm or not the evidence found in BEFA. We ran BCFA using the package "blavaan" (MERKLE; ROSSEEL, 2018), in the R (R CORE TEAM, 2018) with two chains for 8,000 iterations with 2,000 burn-in iterations and regularized using normal prior (0,10) for the manifest variable (intercept) and normal prior (0,1) for latent variable. Posterior latent variables closer or higher to 0.5 were considerate with good evidence of validity (MERKLE; ROSSEEL, 2018). Moreover, Bayesian Gamma Hat (BGammaHat), Adjusted Bayesian Gamma Hat (adjBgammahat), and Bayesian McDonald's centrality index (BMc) were also applied to confirm the model fit, which values closer to one suggest a better fit (MONTENEGRO-MONTENEGRO, 2020).

BEFA showed evidence of two-factor structure and rejected the four-factor structure. Items 1, 3, 5, 7, and 9 grouped in factor Social Identity and items 2, 4, 6, 8, and 10 grouped in factor Affectivity. Just items 1 and 3 presented posterior means lower than 3 (Supplementary table 2). Additionally, Metropolis-Hasting indicated all items posterior probabilities of being different from zero. Based on the questionnaire structure evidence of BEFA, we tested the model in the BCFA. Items 1, 3, 6 and 10 presented low posterior values of 0.48, 0.33, 0.37 and 0.47, respectively. Additionally, the fit indexes BGammaHat = 0.94, adjBGammaHat = 0.86, and BMc = 0.86 were not well adequate. Although items 1 and 10 were below 0.5, their values were closer to it. Thus, at first, we decided to exclude just items 3 and 6 and test a new model. In the second model, items 1 and 10 decreased their values both to 0.46 and the model still not well fit (BGammaHat = 0.94, adjBGammaHat = 0.81, and BMc = 0.87). We than decided to exclude items 1 and 10. In the third model, items presented posterior values closer and higher to 0.5 (item 2 = 0.80, item 4 =0.89, item 5 = 0.78, item 7 = 0.60, item 8 = 0.49 and item 9 = 0.76) and fit indexes presented evidences of good model fit (BGammaHat = 0.98, adjBGammaHat = 0.90, and BMc = 0.97). Thus, based on the evidence presented in BEFA and BCFA, we considered this final model satisfactory.

The evidence of validity of the present study confirmed the two-factor structure of the BIMS-PT (QUINAUD et al., 2020). In this new version, four items were excluded based on the evidence of low posterior values. Although items were excluded, we kept the same factors' because almost all items grouped in the same factors as the first version. Just item 9 (being a student-athlete is the only important thing in my life) changed the factor, from Affectivity to Social Identity. This shift seems reasonable considering in the first version this item presented high cross-loading (QUINAUD et al., 2020) and its meaning is aligned with other items, such as item 5 (I spend more time thinking about being a student-athlete). It is interesting observation is the items that did not present cross-loadings in the first version (with exception of item 8) did not show satisfactory values in this new one, probably due to the different approach used. Although it is not our intention to speculate on statistical issues, it seems that Bayesian approach gives a different perspective when suggesting the most suitable items to retain. The evidence of a new construct showed how important was to conduct these (BEFA and BCFA) analyses before any empirical analysis. Additionally, it brought a new perspective of how we interpret our study subject.

Results cross-sectional modelling

Estimates and variance partition coefficients (90% confidence intervals) of BIMS-PT2 factors responses among Brazilian student-athletes by age group, sex, competitive level, sport type, student-athlete status, educational area, and university type.

	Social identity	Affectivity
	Estimations (90% CI)	Estimations (90% CI)
Age group		
18 to 19 years	4.31 (2.29 to 6.43)	4.89 (3.30 to 6.38)
20 to 21 years	4.23 (2.21 to 6.33)	4.89 (3.29 to 6.38)
22 to 23 years	4.28 (2.27 to 6.40)	4.92 (3.33 to 6.42)
24 years or older	4.33 (2.33 to 6.45)	4.92 (3.32 to 6.41)
Sex		
Female	4.42 (2.52 to 6.37)	4.95 (3.49 to 6.33)
Male	4.15 (2.24 to 6.09)	4.88 (3.42 to 6.26)
Competitive level		
University	2.78 (1.02 to 4.61)	4.38 (2.91 to 5.77)
States	3.92 (2.17 to 5.71)	4.70 (3.20 to 6.08)
National	4.82 (3.09 to 6.64)	5.14 (3.66 to 6.53)
International	5.70 (3.85 to 7.59)	5.36 (3.84 to 6.75
Sport type		
Individual	4.18 (2.29 to 6.12)	4.85 (3.44 to 6.17)
Team	4.40 (2.53 to 6.34)	4.98 (3.56 to 6.30
Student-athletes status		
No	3.88 (2.21 to 5.56)	4.76 (3.47 to 5.97)
Yes	4.71 (3.02 to 6.40)	5.09 (3.80 to 6.29)
Major type		
Agrarian sciences	4.31 (2.26 to 6.47)	4.92 (3.34 to 6.44)
Applied social science	4.36 (2.34 to 6.48)	4.92 (3.33 to 6.42)
Arts and linguistics	4.16 (2.09 to 6.29)	4.88 (3.27 to 6.39)
Biological sciences	4.25 (2.19 to 6.36)	4.90 (3.30 to 6.41)
Engineering	4.35 (2.32 to 6.47)	4.93 (3.35 to 6.42)
Exact Sciences	4.27 (2.22 to 6.41)	4.86 (3.27 to 6.37)
Health sciences	4.30 (2.31 to 6.44)	4.92 (3.32 to 6.41)
Human sciences	4.29 (2.24 to 6.40)	4.89 (3.28 to 6.40)
University type		
Private	4.30 (2.36 to 6.29)	4.90 (3.44 to 6.30)
Public	4.27 (2.33 to 6.29)	4.92 (3.46 to 6.33)

CI = Confidence interval. The analysis was conducted based on total sample.

Participants' short reports

Sophy

Sophy is a freshman. When she was 6, she started to train triathlon most influenced by her mother and started to identify sport as part of her life. Sport became one of her main focuses and at age of 12, Sophy went to her first 100 meters hurdles competition to represent her school and won. She identified with this sport modality and put all her efforts on training and competing 100 meters hurdles. When she was 16, she won the World School Championship, in

Turkey, and other several international championships until nowadays. Due to her performance, United States universities invited her; however, she declined because in Brazil was being recognized as future Olympic athlete by her social, sport and family context and in the United States she felt uncertainty about her future. When she started university, she knew that it would be not easy to combine both careers. Although she was confused and knew the importance to have a professional/academic career, her athletic identity was over her student identity. Because the Olympics Games were too close at that time, she was already decided to stop study to dedicate exclusivity to sport. Her difficult to identify herself as an athlete and as a student at the same time is mainly due to the lack of a link between sport and university system and the need to prioritize one per time. When asked to define herself in the present moment, she did not even mention about her educational situation or career, although before she seemed to worry about it.

Samuel

Samuel is a sophomore. He started training and identifying with his sport when he was 12 because of his sister. Because this sport was not so famous before, just a year after Samuel started training, he played the Brazilian Championship. He knew that he was not very good on it, but this opportunity gave him the motivation to improve. After that, he was invited to train with the Brazilian hockey field team. During his high school, he found very challenged to combine both careers, but his school supported him. Because there was not a university in his home city, he moved to another state where other team members lived. He chose this city because of the other team members; however, he just stayed a semester in the university and dropped out because he was not handling both careers. In the year that he dropped out from university, he got his most achievement that was playing in the Olympics Games. After that, he felt free to make other choices and went to Europe to play in countries such as Belgium, Netherlands and Portugal. About two years and a half out of university he went back. He is still stating that hockey field is his priority, but a little bit different than before, he now considers losing training. He describes himself in the present moment as an athlete, but knows that this identity is not strong as before and that could be a better athlete or student without combining a dual-career.

Marcus

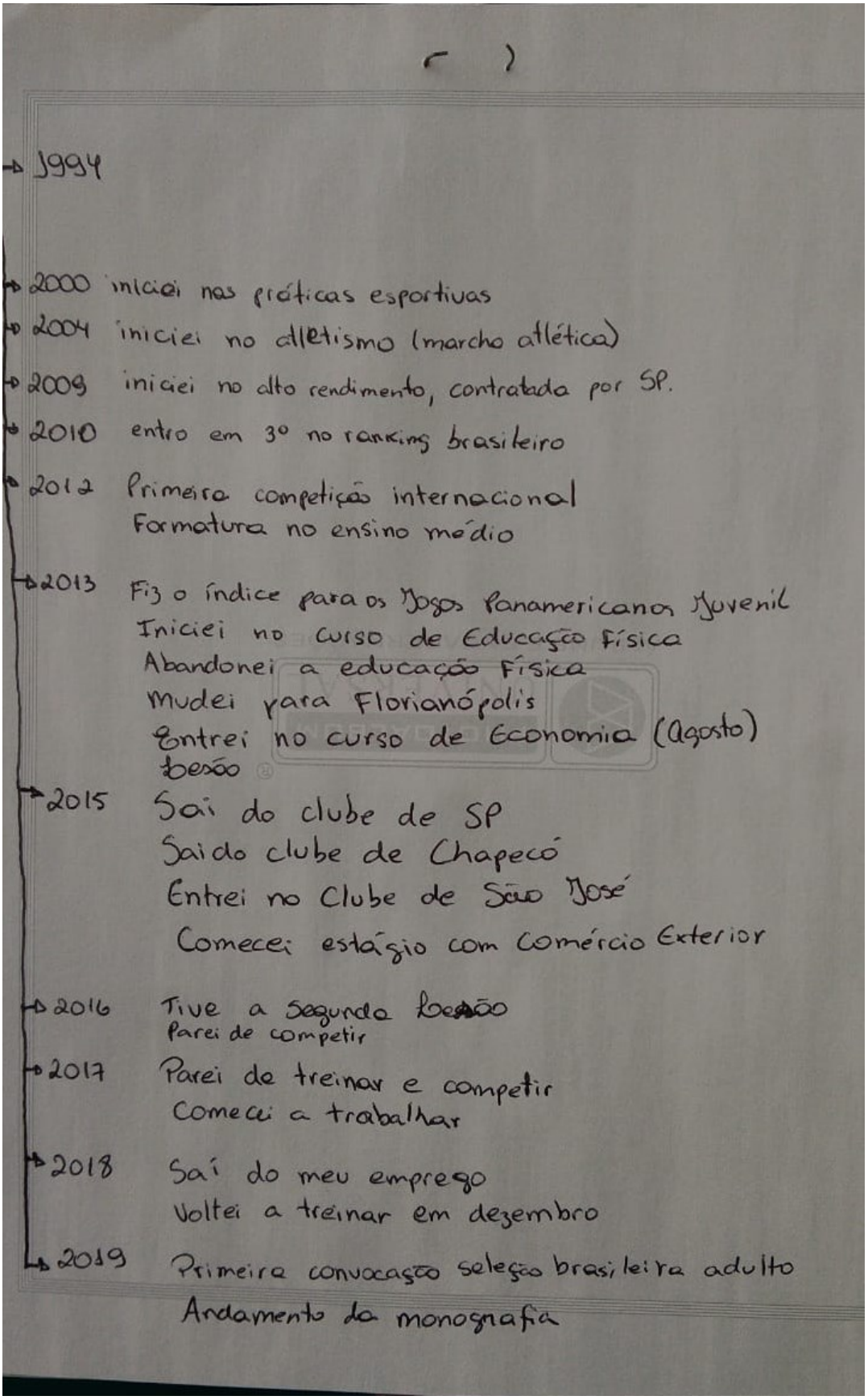
Marcus is a junior. He stared playing rugby in the club when he was 12, but just at age of 16 he went to his first competition. His sports trajectory was not the same as the other participants of the present study. He took a long time to start playing in high performance. Just at age of 17, he was invited to the Brazilian Rugby team. A year after he started in the Brazilian rugby team

he went to the university. Beginning a dual-career almost at the same time, he found himself travelling every weekend to train with the Brazilian rugby team in another state, but at this moment he was comfortable with that. Thus, the combined activities (sport and study) were always managed as priorities. He played in international championships and for him, his best one was the Test Mach in Rugby League. Although he was playing at high performance, he thought that his best performance was getting over and he needed to focus on study. He went to Portugal to study a year there, but also played rugby in the university. When he came back to Brazil, he played again for his rugby team in the national championship and still playing. Although he is still playing, he does not identify himself as an athlete.

Penny

Penny is a senior. During her childhood, she played several sports, but at age of 13 she went to a race-walking competition and "for in love". She felt proud of herself and after that, she trained every day. Two years later (15 years old), she was in the 9º race-walking Brazilian ranking and three years later (16 years old) in 2º. According to her, it was that moment that she started to feel like an athlete. She also stated that her inspiration was and is her coach, which was an Olympic medalist. Her last competition before entering in the university was the Pan Americano, but she did not score. During her first year of university, she found several challenges to keep in her sport due to leave alone in a different city, needed to work and study. Different from other participants of the study that also presented a sports career before entering in the university, she dropped out from sport and decided to focus on her study. Although she was not prioritizing her sport or competing in high performance, she kept training every day and competing in local and state events. Her athletic identity was not lost during this time. In her last year of university, she went back to high performance and because she did not stop training, she is already in the 11º race-walking Brazilian ranking. Sports career became her focus again. Her athletic identity seems to be the same as when she started university and, because she is almost done with the university, it is not something that she thinks anymore.

Figure 1. Rappaport timeline



1994

2000 iniciei nas práticas esportivas

2004 iniciei no atletismo (marcho atlética)

2009 iniciei no alto rendimento, contratada por SP.

2010 entro em 3º no ranking brasileiro

2012 Primeira competição internacional
Formatura no ensino médio

2013 Fiz o índice para os Jogos Panamericanos Juvenil
Iniciei no curso de Educação Física
Abandonei a educação Física
Mudei para Florianópolis
Entrei no curso de Economia (Agosto)
1 sessão

2015 Saí do clube de SP
Saí do clube de Chapecó
Entrei no Clube de São José
Comecei estágio com Comércio Exterior

2016 Tive a segunda sessão
Parei de competir

2017 Parei de treinar e competir
Comecei a trabalhar

2018 Saí do meu emprego
Voltei a treinar em dezembro

2019 Primeira convocação seleção brasileira adulto
Andamento da monografia

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APPENDIX C

Interview's Script

Interview 1

Introduction

1. How old are you?
2. How long have you been playing your sport?
3. Is "NAME OF SPORT" your main sport?
4. When were you introduced to organized competitive sports?
5. When were you recognized as being talented bringing with it an intensive level of training and competitions?
6. When was your mastery stage reflecting participation at the highest competitive level (if is in or passed of this stage)?
7. When was your discontinuation stage entailing transition out of competitive sports (if is in or passed of this stage)?
8. What is your greatest achievement in your sport and school?
9. What is your main goal in your sport and school?
10. When and why did you join this club and university?
11. What are the best things about being in this team and in this university?
12. Is there anything you don't like about being in this team and in this university?

Stages of athletic development

13. What were your driven motivations and challenges at your initiation stage of athletic development, especially to cosily the dual career (academic and sport)?
14. What were your internally driven motivators and challenges at your development stage of athletic development, especially to cosily the dual career (academic and sport)?
15. What were/are your driven motivations and challenges at your mastery stage of athletic development, especially to cosily the dual career (academic and sport)?
16. What were/are/will be your driven motivations and challenges at your discontinuation stage of athletic development, especially to cosily the dual career (academic and sport)?

Social

17. How do you get on with your teammates? Have you made any strong friendships in the team? Do you do things with teammates outside your sport? How about your classmates?

18. How do you get on with your coach? Do you enjoy having him/her as your coach? How does your coach make you feel in the team and about yourself?

19. How would you describe the social aspects of being in this team and in this university?

Coaching pedagogy

20. What things do you like most about the practice that you normally do?

21. What do you dislike the most about practice?

22. Could you please describe what a normal practice session is like?

23. Do you normally look forward to practice?

Significant people

24. Have any people in particular motivated you to play your sport and commit to it over the time you have been playing it?

25. How have your parents influenced your sport career?

26. Have any coaches or teachers influenced you strongly over your career?

Sense of competency/improvement

27. Are you happy with how you are playing and are there any areas of your game that you feel you need to work on? How about your study, are you happy how things are going?

28. Do you feel you are improving over each season?

Competition

29. Which do you prefer: practice or competition games?

30. What do you like most about competition games?

31. What do you dislike about competition games?

Challenges

32. What are the main challenges that you have to deal with to maintain your commitment to your sport and school and how do you deal with them?

33. Overall, are you enjoying your sport and your major? What are your plans or goals for the future?

Interview 2 schedule

1. How is your schoolwork going at the moment-are you busy?

2. How does your commitment to study at school affect your commitment to your sport in the club or your commitment to basketball affect your study?

3. Do you play your sport at school? How does that affect your club?

4. Do you play other sports? (if yes) Do this have an impact upon your main sport?

5. To what extent is your social life in general and your sport interrelated?

6. In your circle of close friends how many were made through your sport?

7. Outside practice and competition, how often to you find yourself talking about your sport and who with?
8. If someone asked you who you were, how would you describe yourself?
9. How important is your sport in your life? Does it figure in your future?
10. What do you think you have learned from playing your sport and how has it contributed to making you the sort of person you are now?
11. What does mean being student-athlete?
12. Do you have any support from you institution? If yes, what kind of support?
13. If you could suggest to major stakeholders from sport about what needs to be done to develop a well dual-career, what would be it?

APPENDIX D

Student-Athletes' Motivation Toward Sports and Academics Questionnaire (Brazilian context only)

Nas questões seguintes, indique o nível de **CONCORDÂNCIA**, considerando uma escala de 1 a 6, sendo 1 **DESCORDO TOTALMENTE** e 6 **CONCORDO TOTALMENTE**

1	Atingir elevado nível de performance esportiva é um objetivo para mim este ano.	1	2	3	4	5	6
2	Para mim é importante aprender aquilo que é ensinado no curso.	1	2	3	4	5	6
3	Estou disposto a investir tempo para obter excelentes notas em meus cursos	1	2	3	4	5	6
4	Para mim os estudos são importantes para atingir conhecimento e competências.	1	2	3	4	5	6
5	Eu vou estar apto a utilizar o que me foi ensinado no curso em diferentes aspetos da minha vida fora do ambiente escolar.	1	2	3	4	5	6
6	Eu escolho praticar esporte porque é algo em que quero investir como carreia.	1	2	3	4	5	6
7	Para mim é importante treinar arduamente de forma a melhorar a minha performance.	1	2	3	4	5	6
8	É importante para mim ser melhor do que os outros atletas da minha modalidade.	1	2	3	4	5	6
9	O esforço que faço para ser um atleta excepcional na minha modalidade vale a pena.	1	2	3	4	5	6
10	A obtenção de um diploma do Ensino Superior é importante para enriquecer o meu conhecimento.	1	2	3	4	5	6
11	Estou confiante que posso ser um atleta de ponta na minha equipe/modalidade esta temporada.	1	2	3	4	5	6
12	O meu objetivo esportivo é atingir um nível profissional ou atingir mínimos para os Jogos Olímpicos na minha modalidade.	1	2	3	4	5	6
13	Estou confiante que posso atingir um nível de elite/profissional na minha modalidade.	1	2	3	4	5	6
14	Estou confiante que posso obter um diploma de conclusão de curso.	1	2	3	4	5	6
15	Para mim é importante atingir performances elevadas e não cometer erros.	1	2	3	4	5	6
16	Estou disposto a utilizar o tempo para ser excepcional na minha modalidade.	1	2	3	4	5	6
17	Maior parte dos conteúdos curriculares do meu curso são interessantes para mim.	1	2	3	4	5	6