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Sense of personal agency in adolescence and young adulthood: A preliminary assessment model☆

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ABSTRACT

Although there is a growing interest in the concept of sense of personal agency in adolescence and young adulthood, its operationalization and assessment have been inconsistent. We propose and test a preliminary assessment model of sense of agency combining four of the most relevant indicators suggested by the literature for its assessment (setting goals, optimism, decision-making, and self-efficacy). We conducted three independent studies with young adults [study 1 = 692; study 2 = 410] and adolescents [study 3 = 481] to analyze its psychometric properties. The CFA results revealed a good fit to the data in all three studies. The results of studies 1 and 2 indicate that even though the four dimensions share a significant proportion of variance, they do not assess the overlapping aspects of sense of agency. The findings of study 1 clarified that the proposed measurement model is invariant across sex and different levels of psychosocial risk. The results of study 2 suggest that, as expected, the latent construct of sense of agency is linked to different dimensions of psycho-emotional adjustment of young adults. Lastly, the findings of study 3 revealed that our preliminary model is invariant across three assessment points establishing the measurement longitudinal invariance.

1. Introduction

Although empirical studies drawing on sense of agency have increased in the last twenty years (Schoon & Lyons-Amos, 2017), its definition and assessment have been inconsistent. Many researchers who analyze the sense of agency tend to do so through fragmented approaches, examining only one of its indicators (Cavazzoni et al., 2021; Hitlin & Elder, 2007). When an effort is made to apply a multidimensional approach, concepts suggested for assessing it tend to not cover the full range of conceptually relevant dimensions (Kristiansen, 2014). The analysis and understanding of sense of personal agency require greater investment among researchers, not only due to the lack of coherence in its operationalization but also due to the lack of knowledge about the factors that contribute to or hinder its construction during adolescence and young adulthood (Schoon, 2018). According to Shanahan and Hood (1998), a fully specified agency model necessarily includes three elements: (1) measurement of several dimensions; (2) measurement of relationships and proximal configurations that facilitate and shape the

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pursuit of goals; and (3) measuring macrostructural contexts as they shape structured pathways of work, education and family. In a broad research project, we intend to identify a model capable of covering dimensions conceptually relevant to the assessment of human agency; so that in future studies it is possible to analyze the contribution of factors from different life contexts of individuals (individual, family, peers, and school) in individual agency beliefs. Therefore, in this study, we empirically address the first of these elements with our proposal of measurement model.

The current study proposes and analyzes a preliminary assessment model based on previous theoretical treatments, namely the approaches of Bandura (2006a), focused on self-efficacy, and Shanahan et al. (2002), oriented towards planned competence, as well as in the multidimensional empirical model proposed by Hitlin and Elder (2007). According to Bandura (2006b), sense of agency is based on four proprieties (intentionality, premeditation, self-reactivity and self-reflection), and it is self-efficacy beliefs that catalyze intentional action towards desired results, i.e., if people do not believe they have the power to produce results, they are likely to decrease their efforts to achieve self-determined goals. For Shanahan et al. (2002), sense of personal agency consists of a self-controlled process that underlies decision-making. Hitlin and Elder (2007), in turn, consider that a fully specified model of agency must include different dimensions. These authors following several previous works proposed a measurement model composed of three indicators: self-efficacy, planning, and optimism. Although we recognize the importance of these works for the advancement of assessment of sense of agency, Hitlin and Elder (2007) themselves recognize throughout their work the importance of including a self-regulated goals indicator for the assessment of agency. The relevance of including an indicator of self-regulated goals in the assessment of sense of personal agency, has also been suggested by different authors (e.g., Donald et al., 2017; Gallagher, 2000; Kristiansen, 2014).

Guided by these works, our preliminary model understands that for individuals to shape their own life course, they need to: (i) first of all, to set goals according to their personal interests and values; (ii) believe that they will achieve positive results in the future, which facilitates involvement in decision-making processes; (iii) be able to draw and follow long-term advantageous plans; and (iv) believe in own competence to achieve their goals. A more in-depth discussion of the importance of analyzing each of these four indicators particularly of including a goal-setting dimension in the agency's assessment is provided below.

1.1. Self-regulated goals

Without knowing whether individuals have internally regulated goals when engaged in certain actions, it is difficult to understand to what extent these goals are involved in the agency process, even if their actions are intentional and voluntary (Kristiansen, 2014). According to self-determination theory (Deci & Ryan, 2004), sense of agency means "to be the actor of one's own voluntary behavior". This definition can have two distinct meanings depending on who generated the voluntary behavior. Voluntary behavior can be performed based on an internal volition of the individual (the goal is valued or interesting), or an external motivation (when the goal is associated with material rewards or high status imposed on the subject) (Deci & Ryan, 2004). The distinction between these two types of motivation is essential in the understanding of agency, in that an agentic action has, at its base, an intentional and voluntary action, internally regulated by the individual. For people to believe that they are effective actors in their life course, it is necessary that they understand themselves capable of setting their volitional goals (Gallagher, 2000). The empirical evidence also suggests that motivation due to interest (internal) is more effective than motivation driven by external reward (Lee & Reeve, 2013).

1.2. Optimism

According to Hitlin and Johnson (2015), the expectation that actions will succeed establishes the next step for individuals to engage in actions towards to achievement of their self-determined goals. Temporally, optimism is related to a future orientation (Ginevra et al., 2016) and establishes one of the most important components of sense of agency, because it implies that measures can be taken which will influence the future (Hitlin & Elder, 2007; Schafer et al., 2011). People with a strong sense that their efforts will be valued in the future, will tend to have more ease to engage in internally regulated actions and greater perseverance when facing difficulties (Hitlin & Johnson, 2015). The empirical evidence suggests the more optimistic people are, the more they will understand themselves as actors of their life course (Hitlin & Johnson, 2015; Johnson & Hitlin, 2017).

1.3. Action planning

The sense of personal agency understood as planned competence consists of a person's facility to draw and follow advantageous long-term plans (Shanahan et al., 2002). People who report greater planful competence are more likely to be able to recognize and cultivate their strengths and plan a sequence of relevant steps and actions to reach goals. They demonstrate rational decision-making and the ability to re-evaluate life decisions (Schoon & Heckhausen, 2019). The inclusion of this indicator in the assessment of sense of agency is crucial because some young people may consider that their goals are internally regulated and show high optimism, but they have inadequate planning skills. Therefore, this indicates that the assessment of the sense of agency based on indicators of regulated goals and optimism is insufficient. It is also necessary to understand if individuals consider themselves capable of participating in relevant decision-making processes to achieve their goals (Donald et al., 2017).

1.4. Self-efficacy

The dimension of self-efficacy was mainly explored in the socio-cognitive theory of Bandura (2006a), highlighting its importance for human agency. Self-efficacy, as defined by Bandura (2006a), refers to subjective judgments about the competence to perform actions in order to achieve the initially established goals. Once an action has been initiated, individuals with more self-efficacy invest more effort and persist longer than do those with low self-efficacy. When obstacles arise, individuals recover more quickly and remain committed to their goals, which establishes a central aspect for an agentic performance (Bandura, 2006a). Furthermore, it is important to highlight that self-efficacy is not the same as positive illusions, as it is based on experience and does not promote the taking of great risks. Instead, it promotes behaviors of self-change that are within the reach of a person's abilities (Bandura, 2006a). Thus, in order for individuals to believe that be effective actors in their lives, they must, to some extent, believe that they have sufficient competence to achieve those (Donald et al., 2017).

1.5. Sex and psychosocial context

Sex and psychosocial context have been suggested as important correlates to perceptions of personal agency (Hurault et al., 2020; Schoon & Heckhausen, 2019). According to Sczesny et al. (2019), the gender stereotypes characteristic of Western societies tend to contribute to men understanding themselves as more agentic than women. In these societies, people expect men to be more active in directing their lives and women to be more compassionate. Moreover, in Western societies, there are still important gender inequalities. The perception of the existence of these inequalities, experienced or not by the individual, can enhance in women the perception of a lower capacity to shape their course of life. The empirical evidence found that men, more than

women, understand themselves as effective actors in their lives (Hurault et al., 2020).

Regarding psychosocial risk, some theorists understand that the unequal access to life opportunities and resources can limit individuals' options and choices (Schoon & Heckhausen, 2019). The empirical evidence has suggested that low education and unskilled occupations of parents, as well as the experiences of an accident or serious illness and high residential mobility, are adversities that tend to undermine individuals development (Hitlin & Johnson, 2015; Spisma et al., 2015). According to Dannefer and Huang (2017), the multiple experiences of these circumstances can contribute to individuals' perception that a more limited set of possibilities/choices are available to them. As such a complete understanding of personal agency should not be dissociated from the individual's psychosocial context.

Although the literature highlights sex and psychosocial context as important correlates to sense of personal agency, there are few studies that addressed these issues directly. As far as we know, only one study analyzed the personal agency measure's invariance in relation to sex (Hurault et al., 2020), and no study did so in relation to cumulative psychosocial risk; although this is a crucial prerequisite for comparisons between groups (Cheung & Lau, 2012). In the current study, we sought to address these gaps directly.

1.6. Psychoemotional adjustment

According to Zimmerman and Cleary (2006), the development of sense of agency establishes a great challenge, but also, an important resource for young during adolescence. Côté (2002) adds also that this individual belief is of crucial importance for an effective adaptation of individuals in young adulthood. Currently, young adults face an increased social and psychological instability that does not result from the task of normative exploration of identity; but, instead, is a reflection of macroeconomic trends marked by uncertainty and unpredictability (Arnett, 2011). Such characteristics of contemporary western societies seem to imply a greater agency perception so that young people can be effective actors in their life course. Empirical evidence seems to corroborate this perspective indicating that a lower sense of personal agency is associated with anxiety disorders, depression and schizophrenia (Gallagher & Trigg, 2016). Conversely, a strong sense of agency has been associated with greater self-esteem, resilience and adaptive strategies of emotion regulation (Smith et al., 2000). Recognizing the importance of this evidence, we consider it important to analyze whether our preliminary model corroborates these associations, inspecting their concurrent validity.

1.7. Sense of agency over time

According to Schoon (2018), sense of personal agency changes over time, depending on individuals' maturity, transformations in social relationships, and the changing social context. In a world with rapid transformations and social transitions, it is crucial for people to adjust, face up to and take chances of the opportunities and constraints of change. This means that sense of agency is not a personality trait that is acquired during adolescence and remains reasonably stable throughout the life cycle. Instead, sense of agency is a dynamic process shaped by the interactions between the developing individual and the changing context (Schoon & Heckhausen, 2019). Recognizing the dynamic character of sense of agency, we consider that a fully specified measure for its assessment needs to be able to assess the same construct at different times over time. This is the basic idea of longitudinal invariance analyses. Despite the relevance of longitudinal invariance, no study, to the best of our knowledge, has directly addressed this issue. In the current study, we sought to gather evidence about the longitudinal invariance of our preliminary model.

1.8. Current study

The current article was organized into three studies. In the first study, we analyzed whether the structural, convergent and discriminant validity of our model. Moreover, we inspect the measurement invariance across young adults' sex and psychosocial risk. We also analyzed whether sense of agency differed according to these variables. In the second study, we sought to confirm the evidence found in study 1 in an independent sample of young adults. Further, to gather evidence regarding the concurrent validity of our model, we analyzed whether sense of agency was linked to anxiety, depression, resilience, and emotional regulation strategies of young adults. Lastly, in the third study, we analyzed the structural validity of the proposed model in a sample of adolescents, and we inspected its longitudinal invariance over three assessments (18 months from T1 to T3).

2. Study 1

2.1. Method

2.1.1. Participants

The sample comprised 692 young adults from the general community (75.1% are female), with ages ranging from 18 to 30 ($M = 23.05$, $SD = 3.36$). Most of participants (98.4%) had Portuguese nationality. Only, 1.4% had other nationalities (0.2% values were missing). Approximately, 1.2% had 9th grade, 45.8% had 12th grade, 52.5% had a college degree, and 0.6% had a postgraduate degree. Half of the participants (52.6%) were students, 33.8% were employed, 7.5% were student-workers, and 5.6% were unemployed (0.5% values were missing). Most of participants (90.7%) were single, 9.1% were married/civil union and 0.1% was divorced. Most of the participants (57.1%) lived with both parents and some were living with their romantic partner (15.2%), or mother (13.6%). <2% of the participants were living with their father and 0.1% lived with another figure. There were 3.3% of missing values.

2.2. Measures

2.2.1. Goal setting and decision-making

Items from the Short Self-Regulation Questionnaire (SSRQ) (Carey et al., 2004; Portuguese version by García Del Castillo & Dias, 2009) were used to assess two dimensions of personal agency. In the current study, we used an adapted structure of SSRQ that presents a similar structure to the one found with the Spanish population (Pichardo et al., 2018). This structure is composed of 16 items distributed in three dimensions, however in the current study only used the goal-setting (seven items, "*I set my goals and track my progress*", $\alpha = 0.85$) and decision-making (five items, "*I have trouble making up my mind about things*" $\alpha = 0.80$) dimensions. The score of decision-making items must be reverted to calculate the mean of this dimension. The responses are given on a five-point scale from "strongly disagree," to "strongly agree".

2.2.2. Optimism

Items from the Visions About Future (VAF) test (Ginevra et al., 2016, Portuguese version by Nunes et al., 2018) were used to assess the future orientation dimension of personal agency. We used only optimism dimension (six items, "*Usually, I am full of enthusiasm and optimism about my future*", $\alpha = 0.91$). The responses are given on a five-point scale from "it does not describe me at all" to "it describes me very well".

2.2.3. Self-efficacy

Items from the General Self-Efficacy Scale (GSE) (Schwarzer & Jerusalem, 1995, Portuguese version by Nunes et al., 1999) were used to assess the self-efficacy. This scale is unidimensional (10 items, "*I can solve most problems if I invest the necessary effort*", $\alpha = 0.84$) and the responses are given on a four-point scale from "not at all true" to "exactly

true".

2.2.4. Multi-risk Index Questionnaire

In order to collect information on risk indicators, the Multi-risk Index Questionnaire was developed for study 1. This questionnaire includes information involving parental figures and young adults, identified in literature as relevant to risk assessment (Hitlin & Johnson, 2015; Schoon & Lyons-Amos, 2017). The risk factors were analyzed based on the Cumulative Risk Model proposed by Sameroff et al. (1993). This approach takes into account the co-occurrence of risk factors, by analyzing the combination of different factors, instead of each individual factor. We calculated a Composite Risk Index (CRI) through the sum of five risks factors. The CRI varies on a scale from zero to seven, where zero means no risk factors and seven indicates the maximum presence of risk factors. Next we present each risk factor, the scoring, and its frequency in study 1.

2.2.4.1. Low parental education. A level of education of mother and father equal to or bellow than the 6th grade (illiterate and 4th grade) was identified as a risk factor. Scores: 0 – No risk (48.8%), 1 - Risk associated with one parent (26.2%), and 2 - Risk associated with both parents (25.4%).

2.2.4.2. Unskilled parental occupations. Occupations such as unemployed, retired and unskilled work (professions requiring level 1 and 2 skills, according to Portuguese Classification of Occupations) were considered a risk factor. Scores: 0 – No risk (14.9%), 1 - Risk associated with one parent (28.0%), 2 - Risk associated with both parents (52.7%).

2.2.4.3. Physical mobility. Change of residence and/or university and/or employment, in the last five years, but only in those cases where participants felt it had a negative impact on their lives. Scores: 0 – No risk (63.7%), 1 – Risk (36.3%).

2.2.4.4. Accident or serious illness. The experience of an accident or serious illness, in the last five years, understood by the participants as having had a negative impact on their lives. Scores: 0 – No risk (84.4%), 1 – Risk (15.6%).

2.2.4.5. Experience of two or more negative events. The experience of two or more negative events, in the last five years, that participants understood as having had a negative impact on their lives. Scores: 0 – No risk (29.3%), 1 – Risk (70.7%).

The last three factors were only considered a risk when the situation had a negative impact on youth quality of life. We used a Likert scale ranging from 0 to 4 (0 - "Did not affect me negatively"; 4 - "It affected me a lot") to assess the perceived negative impact.

2.2.5. Procedures

The authors' institutional Ethics Committee approved the study. Data were collected online (LimeSurvey 3.15®) between August and November 2018. An invitation was posted on different social networks. Moreover, we sent an email to different universities and companies, asking for help in disseminating the study. Universities and companies that accepted our request forwarded our email to the list of their students and employees. More specifically, from their general email, universities and companies sent the invitation made by the research team to the institutional emails of their students and employees. These institutions had no any further involvement in the data collection process in our study beyond the dissemination of our invitation. Regarding companies, we selected companies from different areas to ensure variability, and with a rate of younger employees, given the target population of the current study. Informed consent was obtained from all participants before data collection. The confidentiality and anonymity of the responses were assured in both studies, as well as the voluntary nature of the participation. The participants, as well as the universities and companies, did not receive any reward for participation or dissemination of study. Young adults responded to the questionnaires in Portuguese language.

2.2.6. Data analysis

Data analysis was performed using the software Statistical Package for Social Sciences (SPSS, 25.0), IBM SPSS AMOS 25 and R. The answers to the self-report measures were mandatory in order for participants to proceed with filling out the protocol; thus, there were no missing values. However, in the sociodemographic questionnaire, the answers were not mandatory. The univariate outliers were identified through Z score < -3 or > 3, while the multivariate outliers were identified by calculating the distance of Mahalanobis. All analyses presented did not include the participants identified as outliers. The normality distribution was analyzed according to Kline (2015) reference values: skewness <3 and kurtosis <8–10. We conducted a first-order CFA to analyze the covariance between the four indicators of sense of personal agency. Then, we test a second-order CFA model to examine whether the shared variance among the first-order factors supports a second-order latent construct representing "sense of personal agency" We performed CFA's analyses employing maximum likelihood (ML) estimation, in Amos 25.0. Each CFA was tested using several fit indices: Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Standardized Root Mean Square Residual (SRMR) and Root Mean Square Error of Approximation (RMSEA). The following criteria were used: CFI and TLI ≥ 0.90, RMSEA and SRMR <0.10, and $\chi^2/df < 5$ to indicate an acceptable fit (Kline, 2015). Convergent validity was assessed by estimating two indices, namely, the average variance extracted (AVE > 0.50) and the composite reliability (CR > 0.70). We calculated the Cronbach's alphas for the four dimensions and the total model, as well as correlations between each dimension. Discriminant validity was also assessed by maximum shared variance (MSV), comparing the intercorrelation of the GS, SE, DM and OPT scales to the square root of the AVE of each dimension (Fornell & Larker, 1981). Furthermore, we analyzed measurement invariance, across sex and across two levels of psychosocial risk. Then, we ran differential analyzes using the univariate analysis of variance.

2.3. Results

2.3.1. Preliminary analyses

Skewness and kurtosis values indicated no severe departures from the normality of items included in personal agency's model (Kline, 2015). Skewness ranged from -0.77 to 0.08 and kurtosis ranged from -0.93 to 1.78.

2.3.2. Structural validity

First of all, we converted all questionnaires scores into Z scores. The parameters associated with the standardized variables are directly comparable since their estimation is not contaminated by the measure greatness and by any differences in the magnitude of the original variables (Marôco, 2014). After standardizing the manifest variables, we performed a 1st-order CFA in order to analyze a four-factor model, comprising Goal-setting (GS), Optimism (OP), Decision-making (DM), and Self-efficacy (SE). All items of each dimension were introduced in model: GS (7 items), OP (6 items), DM (5 items), and SE (10 items). The adjustment indices were within the theoretically expected values (CFI $=$ 0.91, TLI $=$ 0.90, SRMR $=$ 0.05, RMSEA $=$ 0.06, $\chi^2_{(342)} = 1133.15$, $\chi^2/df = 3.31$), but SE and GS dimensions had AVE values below to 0.50. AVE values below 0.50 indicate that there are items of GS and SE dimensions that do not transmit enough variance to converge in a single construct, i.e., these two dimensions contain items that are a less effective measure of the latent construct. These misfit values can result from high multicollinearity between items, and a more parsimonious model can be achieved through the progressive elimination of items that reveal a lesser contribution to the latent construct (Hair et al., 2010).

Through semantic analysis of each item which belongs these two dimensions, as well as of their factor loadings we chose for eliminated seven items: five items in SE dimension (1, 2, 3, 5 and 6) and two items in GS dimension (15 and 25). A new CFA analysis was performed in this new model which revealed acceptable adjustment indices CFI = 0.94, TLI = 0.93, SRMR = 0.05, RMSEA = 0.06, $\chi^2_{(181)} = 636.94$, $\chi^2/df = 3.52$ (Fig. S1), as well as AVE values higher than 0.05 in all dimensions. The modified model also presented a significantly higher quality of fit than the initial model ($\chi^2_{(143)} = 429.21$, $p < .05$), as well as a considerably lower MECVI (decreases from 1.92 to 1.13). We suggest therefore that the modified model fits better with the correlational structure observed between the items.

Following, we performed a second order CFA to test whether the four first-order factors converged to a second-order latent variable. The results of the second-order CFA were within the theoretically expected values, suggesting that self-efficacy, goal-setting, decision-making, and optimism converged to a latent variable of personal agency (CFI = 0.93, TLI = 0.92, SRMR = 0.06, RMSEA = 0.06, $\chi^2_{(183)} = 653.85$, $\chi^2/df = 3.60$). The theorized second-order construct loaded on the four proposed factors. Goal-setting ($\beta = 0.76$, $p = .001$), optimism ($\beta = 0.65$, $p = .001$), decision-making ($\beta = 0.67$, $p = .001$) and self-efficacy ($\beta = 0.80$, $p = .001$) were predicted positively by the latent construct of the sense of personal agency (Fig. S2). The R^2 values seem to reflect that the four first-order factors establish sub-constructs of sense of agency.

2.3.3. Internal consistency, and convergent and discriminant validity

We found acceptable Cronbach's alphas coefficients for each dimension, as well as for latent construct (>0.70) (Table 1). Further, the average variance extracted, composite reliability and maximum shared variance provided evidence for the convergent and discriminant validity of the model. Evidence for convergent validity also was found by examining associations between the four indicators of sense of personal agency. The intra-scale correlations maintained the same direction and magnitude, suggesting the representativeness of the proposed model.

2.3.4. Measurement invariance

We examine the measurement invariance of our model among participants' sex and two psychosocial risk levels in R, using the lavaan package (Rosseel, 2012). We followed the standard steps of measurement invariance: configural invariance, first-order metric invariance, second-order metric invariance, first-order scalar invariance, second-order scalar invariance, first-order residual invariance, and second-order residual invariance. We interpret the results according to the following guideline: ΔCFI ≤0.01 and ΔRMSEA <0.015 between a more restricted model and the preceding one in the invariance sequence indicate the invariance hypothesis should be accepted (Cheung & Lau, 2012).

According to Yoon and Lai (2018), great imbalances between groups can promote skewed results of invariance; therefore, the results that guarantee invariance across unbalanced groups are not completely reliable. In order to overcome the imbalance between the male and female groups present in our two studies, we analyzed the measurement invariance across sex through the subsampling method proposed by Yoon and Lai (2018). We also opt to analyze the measurement invariance across sex, aggregating the responses of participants of study 1 and study 2 due to the lack of statistical power of study 2 to test the invariance using the subsampling method (reduced number of male participants). To test the measurement invariance in this total sample ($N_{total} = 1102$, $N_{male} = 257$; $N_{female} = 845$, we randomly selected 100 subsamples from the female group with an equal number of cases to the male group. Next, we tested the invariance between each one of 100 subsamples of the female group ($N = 257$) with the male sample (N = 257). The average of fit indexes obtained in each of 100 analysis suggest that our assessment model reveal second-order residual invariance across sex (ΔCFI = −0.001; ΔRMSEA = 0.000) (Table 2). In order to analyze the invariance of our model regard psychosocial risk, we divided the sample into two groups, based on the score obtained in the Composite Risk Index, through 1 cut-off point (50%): $N_{lower\ risk} = 357$; $N_{higher\ risk} = 335$. We also found second-order residual invariance across sociocultural risk levels (ΔCFI = 0.000; ΔRMSEA = 0.000) (Table 2).

2.3.5. Differential analyses

We found that males, more than women, are more likely to understand themselves as effective actor in their life course ($F_{(1,1101)} = 6.03$, $p = .014$, $\eta^2_p = 0.01$) ($N_{study1+study2} = 1102$). We also found that young

Table 2
Model fit of the invariance steps across sex of participants and psychosocial risk.

	Variables	Models	CFI	RMSEA	ΔCFI	ΔRMSEA
Merging the samples of studies 1 and 2 (N = 1102)	**Sex** Female = 257 Male = 257	1	0.990	0.018	–	–
		2	0.990	0.018	0.000	0.000
		3	0.989	0.019	−001	0.001
		4	0.982	0.023	−0.007	0.004
		5	0.977	0.026	−0.005	0.003
		6	0.980	0.024	0.003	−0.002
		7	0.979	0.024	−0.001	0.000
Study 1	**Risk** Lower risk: 357 Higher risk: 335	1	0.927	0.065	–	–
		2	0.927	0.063	0.000	−0.002
		3	0.926	0.063	−0.001	0.000
		4	0.926	0.062	0.000	−0.001
		5	0.924	0.063	−0.002	0.001
		6	0.921	0.062	−0.003	−0.001
		7	0.921	0.062	0.000	0.000

Note. Model 1 - configural invariance; Model 2-1st order metric invariance; Model 3 – 2nd order metric invariance; Model 4 – 1st order scalar invariance; Model 5 – 2nd order scalar invariance; Model 6 – 1st-order residual invariance; Model 7 – 2nd-order residual invariance. Δ = change from previous model. The results of measurement invariance across sex are the average of the invariance analysis between the male group and the 100 random subsamples of the female group.

Table 1
Correlations between variables, Convergent validity, Discriminant validity and Internal consistency of sense of personal agency.

	GS	SE	MD	OPT	PA	AVE	Composite reliability	Internal consistency
GS	–	0.63*** (0.3)	0.66*** (0.4)	0.52*** (0.2)	0.84***	0.5 [0.5]	0.83 [0.83]	0.85 [0.84]
SE	0.72*** (0.3)	–	0.71*** (0.4)	0.62*** (0.3)	0.93***	0.5 [0.5]	0.83 [0.83]	0.84 [0.80]
MD	0.61*** (0.3)	0.64*** (0.3)	–	0.50*** (0.2)	0.85***	0.5 [0.5]	0.83 [0.83]	0.80 [0.81]
OPT	0.57*** (0.3)	0.64*** (0.3)	0.45*** (0.1)	–	0.74***	0.6 [0.7]	0.86 [0.83]	0.91 [0.91]
SPA	0.87***	0.94***	0.76***	0.76***	–	0.5 [0.5]	0.80 [0.80]	0.92 [0.91]

Note. *** .001. GS – Goal-setting; SE – Self-efficacy; MD – Making decision; OPT – Optimism; SPA – Sense of personal agency; AVE – average variance extracted; Internal consistency - Cronbach's alpha; Correlations of study 1 are presented on the lower diagonal while correlations of study 2 are presented on the upper diagonal; Square intercorrelation is presented in parentheses; The AVE, Composite reliability and Internal consistency values of study 2 are presented in brackets.

people living in situations of greater cumulative risk showed less sense of personal agency compared to young people with a lower multiple and cumulative risks ($F_{(1, 690)} = 20.90$, $p = .001$, $\eta^2_p = 0.03$) ($N_{study1} = 692$).

3. Study 2

3.1. Method

3.1.1. Participants

The sample comprised 410 young adults from general community (79.3% are female), with ages ranging from 18 to 30 ($M = 23.94$, $SD = 3.74$). Most of participants 98.8% had Portuguese nationality. Only, 1.2% had other nationalities. Approximately, 1.0% had 9th grade, 32.9% had the 12th grade, 65.1% had a college degree, and 1.0% had a postgraduate degree. Half of the participants (48.5%) were students, 42.2% were employees, 7.3% were student-workers, and 2.0% were unemployed. Most of participants (87.3%) were single, 12.2% were married/civil union, and 0.5% was divorced. Most participants (61%) lived in an urban context while 39% lived in a rural context.

3.1.2. Measures

3.1.2.1. Personal agency. We used the same measures of study 1 to assess sense of agency's indicators.

3.1.2.2. Rosenberg Self-Esteem Scale (RSES). We used the RSES (Rosenberg, 1965; Portuguese version Pechorro et al., 2011) to assess self-esteem. This scale is unidimensional (10 items, "*I feel that I have a number of good qualities*", $\alpha = 0.90$) and the responses are given on a six-point scale from "strongly disagree" to "strongly agree".

3.1.2.3. Brief Symptom Inventory (BSI). We used the BSI (Derogatis, 1975, Portuguese version by Canavarro, 1999) to assess psychopathological symptomatology. In the present study we used Depression (six items, "*Feeling lonely*", $\alpha = 0.87$) and Anxiety (six items, "*Nervousness or shakiness inside*", $\alpha = 0.87$) dimensions. The responses are given on a four-point scale from "never" to "too often".

3.1.2.4. Emotion Regulation Questionnaire (ERQ). We used the ERQ (Gross & John, 2003; Portuguese version Vaz, 2009) to assess how participants control and manage their emotions. This scale contains two dimensions: Cognitive reevaluation (five items, "*When I want to feel more positive emotion, I change the way I'm thinking about the situation*", $\alpha = 0.82$) and Emotional suppression (five items, "*I control my emotions by not expressing them*", $\alpha = 0.76$). The responses are given on a seven-point scale from "strongly disagree" to "strongly agree".

3.1.2.5. Connor-Davidson Resilience Scale (CD-RISC). We used the CD-RISC (Connor & Davidson, 2003; Portuguese version Faria-Anjos et al., 2019) to assess the resilience. In the current study, we used the total score of resilience (16 items, "*I am able to adapt to change*", $\alpha = 0.89$). The responses are given on a five-point scale from "not true at all" to "true nearly all the time".

3.1.3. Procedures

We followed the same procedures from Study 1 and we collected data between October and November 2019. It should be noted that we disseminated this second study on different social networks, universities and companies from Study 1. The authors' institutional Ethics Committee also approved study 2.

3.1.4. Data analysis

We performed the same analyses carried out in study 1 (cross-validity), with exception of measurement invariance. Further, we also analyzed the concurrent validity of the proposed model through the analysis of bivariate correlations and structural equation models.

3.1.5. Preliminary analyses

Skewness ranged from −0.60 to 0.01 and kurtosis ranged from −1.03 to 1.25.

3.1.6. Structural validity

Evidence for structural validity was also found in study 2. The 1st order CFA revealed good fit indices (CFI = 0.93, TLI = 0.94, SRMR = 0.05, RMSEA = 0.06, $\chi^2_{(181)} = 424.00$, $\chi^2/df = 2.34$); as well as the 2nd order CFA (CFI = 0.94, TLI = 0.93, SRMR = 0.05, RMSEA = 0.06, $\chi^2_{(183)} = 432.09$, $\chi^2/df = 2.36$). These results suggest that our 1st- and 2nd-order models fit well with data outside the population where initially they were developed.

3.1.7. Internal consistency, and convergent and discriminant validity

Cronbach's alpha coefficients were acceptable and the values of AVE, CR and MSV ensured the convergent and discriminant validity (Table 1).

3.1.8. Concurrent validity

Concurrent validity was analyzed by examining associations between sense of personal agency and scales of self-esteem, resilience, anxiety and depression. As expected, our latent variable revealed positive strong correlations with resilience and self-esteem and negative moderate correlations with anxiety and depression (Table 3).

Moreover, we also used structural equation modeling to analyze the competence of our assessment model to explain variables expected based on previous empirical evidence, such as anxiety, depression, cognitive reevaluation and emotional suppression. The independent variable (sense personal agency) was introduced into the model as a latent variable, with four manifest variables (goal-setting, optimism, decision-making and self-efficacy), while the dependent variables (anxiety, depression, cognitive reevaluation and suppression emotional) were introduced as observed variables. The model presented a good fit to the data, CFI = 0.98, TLI = 0.95, SRMR = 0.03, RMSEA = 0.08, $\chi^2/df = 3.72$ (Fig. 1). The results indicate that sense of agency has a significant direct contribution regarding to all variables: depression ($\beta = -0.72$, $p = .001$), anxiety ($\beta = -0.61$, $p = .001$), cognitive reevaluation ($\beta = 0.39$, $p = .001$), and emotional suppression ($\beta = -0.34$, $p = .001$).

4. Study 3

4.1. Method

4.1.1. Participants

The sample includes 481 adolescents (58.4% were males; $M_{age} = 15.59$ years, $SD = 0.80$) of high schools from northern Portugal. Most of the participants (76.7%) lived with both parents and some were living with their mother (18.4%). <3% of the participants were living with

Table 3
Correlations between personal agency, self-esteem, resilience, anxiety and depression (Study 2).

Study 2	1	2	3	4	5
1. SPA	–				
2. SE	0.70***	–			
3. RES	0.77***	0.70***	–		
4. ANX	−0.50***	−0.50***	−0.45***	–	
5.DEP	−0.55***	−0.70***	−0.56***	0.71***	–
M	0.00	4.53	3.66	2.14	2.10
SD	0.88	0.93	0.52	0.79	0.79

Note. SPA – Sense of personal agency; SE – Self-esteem; RES – Resilience; ANX – Anxiety; DEP – Depression: *M* – Mean; *SD* – Standard deviation. The average of personal agency's sense is zero because all items were converted in Z score to express the variables on the same scale.
*** $p > .001$.

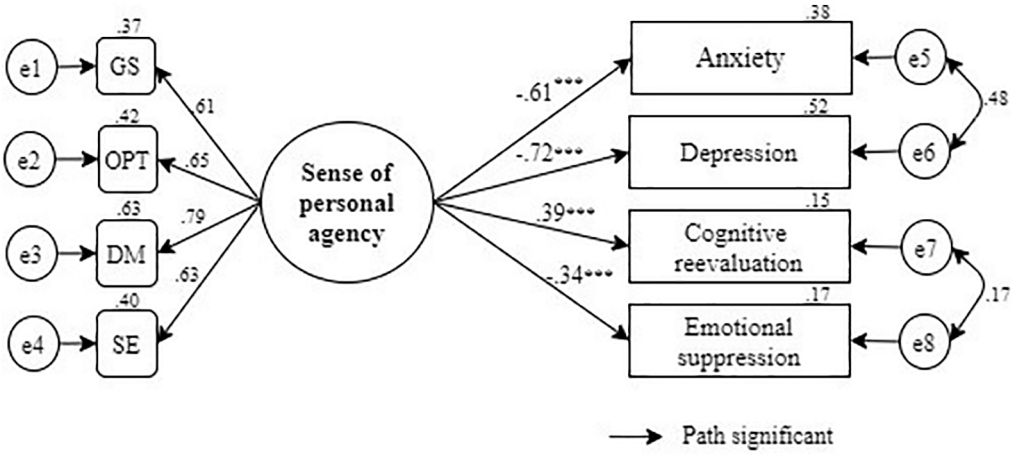

Fig. 1. Multiple linear regression model among personal agency and anxiety, depression, cognitive reevaluation and emotional suppression in Study 2. Note. GS – Goal-setting; SE – Self-efficacy; DM – Decision-making; OPT – Optimism.

their father and 1.5% lived with another figure. There were 0.6% of missing values. Approximately, 53% of adolescents were in the 10th grade and 47% were in the 11th grade. Data were obtained at three assessment points. We conducted the baseline assessment (T1) during the 10th and 11th years of high school. After 12 months of initial assessment, we evaluated again the adolescents (T2). The last assessment (T3) was conducted six months after the second assessment. Adolescent's mean age was 16.53 at T2 (SD = 0.77), and 16.94 at T3 (SD = 0.87).

Ninety-one adolescents had missing data at T2 (18.9%) and 127 adolescents had missing data at T3 (26.4%). The attrition rate was 12.2% (n = 61) at T2, and 12.6% (n = 59) at T3. The most attrition in T2 was mostly due to the inclusion of a class in T1 that would not attend the same school in the following school year (after 12 months). This class was wrongly selected by the school board to participate in our longitudinal study at T1. Attrition at T3 was mainly due to the miss-identification of two classes by the research team which made it impossible pairing these students' observations at T2 with their observations in the last evaluation moment. Results from Little's MCAR tests (Little, 1988) indicate that the observed patterns of missing data were consistent with the assumption of missing completely at random (MCAR), ($\chi^2_{(30)}$ = 20.39, p = .906).

4.1.2. Measures

4.1.2.1. Personal agency. We used the same measures described in studies 1 and 2 to assess the indicators of sense of personal agency at T1, T2, and T3.

4.1.3. Procedures

We analyzed data from adolescents collected between September 2019 and June 2021 within a broader research project. We obtained authorizations from the authors' institutional Ethics Committee, the data protection officer, and the Ministry of Education to administer the questionnaires in the school context. Each student (under age) was given an informed consent to be filled by their parents to authorize their participation. Adolescents also filled the informed assent. The measures were filled under the supervision of the main researcher and teacher. The adolescents and schools did not receive any reward for participation.

4.1.4. Data analysis

The same outlier identification procedures described in study 1 were performed in the current study. Data normality was also inspected. Further, we analyze the internal consistency, CFA, and longitudinal invariance of the proposed measurement model. We used the method of full information maximum likelihood (FIML) to deal with missing data.

4.1.5. Preliminary analyses

Skewness ranged from −0.64 to 0.11, at T1, from −0.51 to 0.15 at T2, and from −0.72 to 0.10 at T3. Kurtosis ranged from −0.91 to 0.61 at T1, from −0.87 to 1.19 at T2, and from −0.98 to 1.15 at T3.

4.1.6. Structural validity

Evidence for structural validity was also found in study 3. The proposed model of the sense of personal agency informed by four manifest variables (goal-setting, decision-making, optimism, and self-efficacy) revealed a good adjustment to the data in T1 (CFI = 0.99, TLI = 0.99, RMSEA = 0.05, $\chi^2_{(2)}$ = 3.96, χ^2/df = 1.98), T2 (CFI = 0.99, TLI = 0.98, RMSEA = 0.04, $\chi^2_{(2)}$ = 3.47, χ^2/df = 2.34), and T3 (CFI = 0.93, TLI = 0.94, SRMR = 0.05, RMSEA = 0.06, $\chi^2_{(181)}$ = 424.00, χ^2/df = 2.34).

4.1.7. Internal consistency

We found good internal consistency for goal-setting (α = 0.79 / 0.81 / 0.85), decision-making (α = 0.69 / 0.75 / 0.82), optimism (α = 0.89 / 0.89 / 0.91), and self-efficacy (α = 0.75 / 0.79 / 0.85), as well as for total model (α = 0.88 / 0.90 / 0.92) at T1, T2 and T3, respectively.

4.1.8. Longitudinal invariance

We examine the measurement invariance of our preliminary model over three assessment points. This analysis was carried out in a model composed of three latent variables (sense of personal agency of T1, T2, and T3) each informed by four manifest indicators (setting goals, decision making, optimism, and self-efficacy) assessed at T1, T2, and T3. We specified correlations among the three latent variables, as well as error correlations between the same manifest indicators assessed in each of three assessment points. We found residual invariance (ΔCFI = −0.006; ΔRMSEA = 0.002) (Table 4).

5. Discussion

The current study sought to propose and analyze a preliminary assessment model of sense of personal agency in young adulthood and adolescence, comprising four factors: goal-setting, optimism, decision-making and self-efficacy. Taken together, the results of the three studies seem to gather encouraging evidence about the robustness of our

Table 4
Model fit of longitudinal measurement invariance (study 3).

Models	CFI	RMSEA	ΔCFI	ΔRMSEA
1	0.990	0.035	–	–
2	0.986	0.037	−0.004	0.002
3	0.979	0.043	0.007	0.005
4	0.973	0.045	−0.006	0.002

Note. Model 1 - configural invariance; Model 2 - metric invariance; Model 3 - scalar invariance; Model 4 - residual invariance. Δ = change from previous model.

preliminary model.

The validity of our model was supported by a number of findings. The results of 1st- and 2nd-order confirmatory factor analyses revealed good adjustment in two independent samples of young adults, as well as in all three assessment points in a longitudinal adolescent's sample, supporting our theoretical approach. Further, the four factors exhibited significant inter-correlations, in the theoretically expected direction. Evidence for convergent and discriminant validity also were found in studies 1 and 2. Convergent validity indicates that the four dimensions included in our assessment model are correlated with each other, and share a significant proportion of common variance, suggesting that they may converge to assess a common factor. In turn, discriminant validity suggests that, despite being strongly correlated with each other, the four dimensions assess distinct aspects of the latent variable. Therefore, our results indicate that the four dimensions are not redundant and that they do not assess the same aspects of sense of personal agency (Fornell & Larker, 1981).

Moreover, the observed results highlight the presence of satisfactory values of reliability in all factors, as well as for the global model. These results support the adequacy of the theoretically-driven model to assess the sense of agency in young adulthood and adolescence (Nunnally & Bernstein, 1994). The cross-validation of the proposed model across three independent samples also gives robustness to our multidimensional approach. The evidence found in studies 2 and 3 provides an important indication of how well our model will fit with other populations. These findings indicate that our model maintains its factor structure in other samples of young adults and adolescents. Despite this result, it would also be valuable in future studies to analyze the adequacy of our preliminary model in other young adults' samples with more heterogeneous characteristics than the ones of the participants in Study 1 and Study 2.

The findings seem to corroborate our approach to assess sense of agency based on an individual's ability to define self-regulated goals, on optimism for the future, on action planning and on self-efficacy (Donald et al., 2017; Hitlin & Elder, 2007). One of the strengths of our preliminary model consists of the inclusion of capacity to set self-regulated goals as a crucial component of sense of agency. In our understanding, for people to reveal a strong sense of agency, they need to consider themselves as authors of their goals and actions. This indicator assumes particular relevance in the assessment of sense of agency since people can act voluntarily and intentionally, but their action are shaped by opportunities and constraints in the external environment.

Another strength of our preliminary model is its invariant structure across sex and two levels of psychosocial risk. The lack of measurement variance ensures that men and women, as well as youth with lower and higher levels of cumulative psychosocial risk, attribute the same meaning to the four first-order indicators and the latent construct of the sense of personal agency. Therefore, this indicates that the comparisons between groups are possible and that results will effectively reflect the differences between them (Cheung & Lau, 2012). As expected, we found that men reported a higher sense of agency than women. Men seem understand that they have a broader "horizon of possibilities and choices" and understanding themselves as more capable enough to shape their life course than women. Such self-perception can be potentiated by society's expectation that men are more active, dynamic and persistent in the pursuit of their volitional goals. Further, our findings also can be due to gender inequalities experienced in the daily-live of women (Sczesny et al., 2019; Torres, 2018). Our findings corroborate previous empirical evidence (Hurault et al., 2020).

Moreover, we found that young people who experienced higher cumulative risk showed a less sense of agency comparatively to their peers who experienced lower levels of multiple risks. Our results seem to suggest that cumulative risks undermines sense of personal agency of young adults. These findings were expected. The literature suggests that young people who experience multiple risks are more likely to experience feelings of personal inability to overcome the constraints and challenges to achieve their volitional goals. Moreover, our findings corroborate the previous empirical evidence (Dannefer & Huang, 2017). In future studies, the cumulative psychosocial risk should include an indicator of the socioeconomic status (SES) of young people.

The current study also gathered evidence regarding the concurrent validity of our proposed model, revealing capable of corroborating the differences in psycho-emotional adjustment of individuals found in previous researches based on different levels of sense of personal agency (Polito et al., 2015; Smith et al., 2000). As expected, we found a strong sense of personal agency was positively associated with self-esteem and resilience, as well as negatively associated with anxiety and depression. Moreover, we found a strong sense of agency was positively linked with activation of adaptive strategies of emotion regulation (cognitive reevaluation) and negatively linked to activation of maladaptive strategies (emotional suppression). These results are consistent with previous studies that suggest that individuals' belief that they are capable of shaping their life course is a crucial factor to individuals' emotional regulation and psycho-affective adjustment (Polito et al., 2015).

Lastly, we verified that our preliminary model is invariant over time. These findings ensure the equality of our construct across different assessment points. Longitudinal measurement invariance (LMI) is a great quality of measure because it ensures that comparisons in longitudinal studies can be performed. Any inference about changes in development over time can be misleading and inaccurate unless the LMI premise is met. As such, these results indicate that our preliminary assessment model can be used to draw conclusions about growth and change of sense of personal agency over time.

The current study establishes a preliminary, but a useful step for the empirical modeling of human agency's sense. Its strengths consist of the inclusion of setting self-regulated goals as a crucial component of agency's perceptions, the cross-validation of our model in independent samples, as well as its invariance over time. Nonetheless, the current study also has some limitations that must be acknowledged. Although it is consensual that the structural equations model establishes a statistical procedure that allows ensuring the quality of the psychometric coefficients of an evaluation model of a psychological construct (Kline, 2015), it is also known that the generalization of a factorial structure that fit in a sample, to the remaining population, should be careful. Furthermore, our studies did not include any previously validated specific measure of sense of personal agency. It would be valuable in future studies to analyze the correlations between our preliminary assessment model with other validated measures to assess the sense of personal agency, such as the Sense of Agency Scale (F-SoAS; Tapal et al., 2017). This additional analysis would add robustness to the findings of the current study and give researchers greater confidence to use our preliminary model in future studies. It also would be important that in future studies we analyze the explanatory variables of sense of personal agency based on a bioecological approach of development. In other words, to achieve a more comprehensive understanding of sense of agency, researchers should devote the next steps to analyze the contribution of different live contexts of individuals (e.g., individual, family, peers, and school/company) in the individuals' agency beliefs and actions (Schoon, 2018). Nonetheless, we clarify that our preliminary model was developed based on theoretical assumptions, seeking to

expand previously assessment models. Despite the aforementioned limitations, the current study brings together encouraging preliminary evidence on the robustness of the proposed model for assessing young people's sense of personal agency. Taken together, the results of the three studies indicate that our model could be a promising research tool for researchers to assess the sense of personal agency.

Data availability statement

The raw data and materials used in this manuscript are not openly available due to privacy and ethical restrictions, but can be obtained from the corresponding author. No aspects of the study were pre-registered.

CRediT authorship contribution statement

Filipa Nunes: Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Visualization, Funding acquisition. **Catarina Pinheiro Mota:** Conceptualization, Methodology, Writing – review & editing, Supervision, Project administration. **Ingrid Schoon:** Writing – review & editing, Supervision. **Tiago Ferreira:** Formal analysis, Writing – review & editing. **Paula Mena Matos:** Conceptualization, Methodology, Writing – review & editing, Supervision, Project administration.

Declaration of competing interest

On behalf of all authors, the corresponding author states that there is no conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.paid.2022.111754.

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