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Is entrepreneurial role stress a necessary condition for burnout? A necessary condition analysis

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Abstract
The purpose of the present study was to investigate the stress—burnout link in entrepreneurship by employing the role stress theory's tri-component conceptualization (i.e., role conflict, role ambiguity, and role overload) using a novel statistical method entitled, Necessary Condition Analysis (NCA). The NCA is based on necessity logic, in contrast to variance-based methodologies (e.g., regression analysis and structural equation modeling) based on sufficiency logic, which seeks to assess whether an increase in the predictor variable is associated with an increase in the outcome variable. NCA aims to determine if there is a critical (necessary) determinant for an event to occur. In other words, NCA helps to answer questions, which allows identification of the necessity in type and the degree of concern for necessity linkages. Data were collected from self-identified American entrepreneurs ($N = 285$). The NCA's results were consistent with the conclusion of several variance-based research that identified the overall role of stress as a prerequisite for burnout. However, the three components of entrepreneurial role stress were not the necessary conditions for the development of entrepreneurial burnout. The present study is the first to use the NCA to investigate the role stress-burnout link in entrepreneurship, which has important theoretical and methodological implications. Theoretically, future studies should frame the necessary for developing entrepreneurial role stress in a broader manner, going beyond the tri-component conceptualization of role stress. And, methodologically, sufficiency logic analyses should be accompanied and supported by necessary logic analyses to deepen our understanding regarding various aspects of entrepreneurs' well-being.

Keywords Stress · Burnout · Entrepreneurship · Necessary condition

Introduction

Entrepreneurs are a vital part of society and are frequently referred to as cultural and economic heroes (Anderson & Warren, 2011; Cunningham & Fraser, 2022; Kalden et al., 2017). Entrepreneurship is one of the most challenging professions (Jennings & Brush, 2013; Montanari et al., 2021). Likewise, it has been expressed that "entrepreneurship is not a career where everything goes smoothly and without difficulties" (Sheehan & St-Jean, 2014, p. 2). For instance, it is widely acknowledged that entrepreneurship is one of the most stressful jobs (Stephan, 2018), which can entail a poor work-life balance (Adisa et al., 2019), long working hours (Forson, 2013), and health issues (Stephan, 2018). Several academics (e.g., Fernet et al., 2016; Nambisan & Baron, 2021; Palmer et al., 2021) have noted that entrepreneurship-related personal costs can also have consequences at firm and societal levels.

It is estimated that there are over 582 million entrepreneurs globally (Global Entrepreneurship Monitor, 2018). Additionally, many individuals identified as entrepreneurs have established ventures in recent years (Adisa et al., 2019). Given the importance of entrepreneurship, several academics have focused on researching entrepreneur well-being (e.g., Amorós et al., 2021; Wiklund et al., 2018, 2019). Consistently, some academics have examined entrepreneur

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well-being-related topics, such as entrepreneurial stress (e.g., Baron et al., 2016; Cardon & Patel, 2015; Lerman et al., 2021), entrepreneurial burnout (e.g., Li et al., 2021; Manzano-García et al., 2021; Ross et al., 2021; Wei et al., 2015), entrepreneurial psychological well-being (e.g., Guberina & Wang, 2021; Lanivich et al., 2021; Shir et al., 2019), and entrepreneurial eudaimonic well-being (Nikolaev et al., 2022) to list a few. However, it has been emphasized that further research into the well-being of entrepreneurs is warranted (e.g., Wiklund et al., 2019).

One such concept related to entrepreneurial well-being is the link between *stress* and its associated outcomes (e.g., burnout; Das, 2011; Quiun et al., 2022; Torrès et al., 2022). The general definition of stress is "when an individual perceives that the demands of an external situation are beyond his or her perceived ability to cope with them" (Jensen, 2012, p. 46). In addition, burnout is defined as "a state of exhaustion in which one is cynical about the value of one's occupation and doubtful of one's capacity to perform" (Maslach et al., 1996, p. 20). Burnout has been recognized as a modern occupational hazard due to its pervasiveness (Jamal, 2007; Jun et al., 2021; Kowalska et al., 2021; Maslach, 2003). Stress and burnout are detrimental to an individual's well-being; in particular, their effects are more pronounced in entrepreneurship because of various stressors (e.g., financial, job, personal) an entrepreneur's experience. One systematic literature review (Stephan, 2018) on entrepreneurship found that autonomy (i.e., freedom at work/flexibility) and stress were the two most studied entrepreneur-related work characteristics. Given the significance of stress and its accompanying outcomes, such as burnout, several scholars (e.g., Omrane et al., 2018; Palmer et al., 2021) have underscored the necessity for more research on stress and its associated results in an entrepreneurial context, which has been less understood than employment contexts (e.g., teachers, Conley & Woosley, 2000; Wei, Cang & Hisrich, 2015). For instance, entrepreneurial burnout has several negative consequences at various levels; individual (e.g., dissatisfaction with entrepreneurship) and economic/societal levels (e.g., firm closure) (Lerman et al., 2021; Wincent & Örtqvist, 2009a).

As noted, stress as a job characteristic of entrepreneurship has been researched to a certain extent (Stephan, 2018), considering multiple roles at each stage of the entrepreneurial process, a lack of resources and support from acquaintances could lead to experiencing stress and even burnout (Omrane et al., 2018). There is a consensus that prolonged stress experienced can lead to burnout (Omrane et al., 2018). The proposition is consistent with several stress-related theories (e.g., psychological stress theory, Biggs et al., 2017). However, it has been noted that stress experienced by entrepreneurs can have positive outcomes as well. For example, it has been maintained that several studies have found that some stressors experienced by entrepreneurs can be perceived as challenges (Patzelt & Shepherd, 2011; Stephan, 2018; Wei et al., 2015). Thus, the relationship between stress and burnout in entrepreneurship can be paradoxical (e.g., see Lerman et al., 2021; Stephan, 2018). Several researchers have expressed similar sentiments. For example, Lerman et al., 2021, pg. 373) noted, "Nearly four decades of research offered differing and ambiguous conclusions regarding the consequences of stress as it affects the entrepreneur and new ventures." It is maintained that these paradoxical findings may be due to regression methods, where the analysis is based on sufficiency logic—that is, linear rationale, which attempts to determine whether an increase in the predictor variable is associated with an increase in the outcome variable (i.e., variance-based approaches such as correlation and regression analyses).

Consequently, in the present study, the entrepreneurial stress—burnout link was explored using a novel analytical method—Necessary Condition Analysis (NCA, Dul, 2016, 2019). Unlike regression methods (e.g., structural equation modeling), where analysis is based on sufficiency logic, the NCA is equipped to analyze based on the necessity logic. To this end, the current study investigated (1) the necessity of entrepreneurial stress as a precondition for entrepreneurial burnout; and (2) the necessity of entrepreneurial role stress (i.e., the tri-component conceptualization of role stress; Buttner, 1992) for burnout in an entrepreneurial context. Also, management scholars (e.g., Aguinis et al., 2020) have noted that the NCA technique can help future management researchers gain a clearer understanding of causal effects when examining a particular outcome, as well as help advance theory. As such, we label the present study as an exploratory study, which not only employs the NCA technique but also, at the same time, tests if the tri-component conceptualization of role stress (e.g., Buttner, 1992) is relevant to the entrepreneurial context.

This study is structured as follows. Firstly, we describe the theoretical background and research model that informs the study's hypotheses. Secondly, we present the NCA logic and methodology and a concise explanation of the analyses. Thirdly, we present the method section, which describes the data gathering and the measures employed. Fourthly, NCA results are expounded. Finally, we conclude the manuscript with passages devoted to the study's discussion and implications.

Theoretical background and hypotheses

Role stress and the Tri-Component conceptualization A role theoretical approach (Biddle, 1986) emphasizes the character of individuals as social agents who acquire position-appropriate actions (Michaels et al., 1987). Consequently, every role (such as the personal role of being a parent or the professional role of being an entrepreneur) carries a certain

amount of role stress (Wincent & Örtqvist, 2009a). This theoretical approach has been used to understand stress-related outcomes in various professions (e.g., teachers, engineers, caregivers, etc.) across the world (e.g., Japan, the USA, etc.) (Dubinsky et al., 1992; Wei et al., 2015). The role stress theory's significance in entrepreneurship has been consistently maintained (Buttner, 1992; Wincent & Örtqvist, 2006, 2009a, b). Entrepreneurs, for instance, are social agents whose roles are determined by their role requirements or expectations (e.g., acting consistently with the expectations of customers, suppliers, and stakeholders; Wincent & Örtqvist, 2009a). Since an entrepreneurial journey entails invention, shifting from a concept to an established enterprise, and other boundary-spanning activities, role stress is a natural element of the entrepreneurial process (Wincent & Örtqvist, 2009a). Ideally, an entrepreneur will not experience role stress if they manage their role per the expectations of others (e.g., business partners or stakeholders). However, such a stress-free ideal entrepreneurial journey is sporadic, if not unattainable. According to studies, entrepreneurs face varying levels of role stress (e.g., Buttner, 1992; Jayasekara et al., 2020; St-Jean et al., 2022).

Based on the role stress conceptualization and related literature (e.g., Buttner, 1992), the tri-component conceptualization of role stress has been identified as optimal for *entrepreneurial role stress* (Buttner, 1992; Cardon & Patel, 2015; Wincent & Örtqvist, 2006, 2009a). This conceptualization refers to stress incurred by an entrepreneur due to three role dimensions, namely, *entrepreneurial role conflict* (i.e., incongruity or incompatibility in the role expectations or requirements; hereafter role conflict), *entrepreneurial role ambiguity* (i.e., clarity of role behavior to be performed; hereafter role ambiguity), and entrepreneurial *role overload* (i.e., due to lack of resources to perform the role; hereafter role overload) (Buttner, 1992; Wincent & Örtqvist, 2006; Wincent et al., 2008).[1]

In general, several consequences of role stress are documented and have been investigated in organizational psychology, including job dissatisfaction (Smith & Brannick, 1990; Chen et al., 2007; Thakre & Shroff, 2016), turnover intentions (O'Driscoll & Beehr, 1994; Naidoo, 2018; Wen et al., 2020; Al-Mansour, 2021), and role burnout (Cordes et al., 1997; Shepherd et al., 2010; Tang & Li, 2021). Likewise, the tri-component conceptualization of role stress has been used in investigating entrepreneurs (e.g., Buttner, 1992; Wincent et al., 2008). Wincent et al. (2008) explored how the tri-component conceptualization of role stress influences entrepreneurial venture withdrawal, for example.

Role stress and burnout In light of mentioned above, burnout can manifest in the form of exhaustion in various ways (e.g., emotional exhaustion, depersonalization, and a decrease in personal accomplishments, Palmer et al., 2021; emotional, physical, and mental exhaustion, Fernet et al., 2016), which have been studied in the context of many professions (e.g., teachers/educators, Kim & Lambie, 2018; human rights activists, Chen & Gorski, 2015; Judges, Pereira et al., 2022; and mental healthcare staff, Johnson et al., 2018).

Extant literature has documented the detrimental effects of job burnout on human well-being (e.g., Schaufeli et al., 2017; Zhou et al., 2022). In early burnout literature, Freudenberger noted, "Who is prone to burnout? The dedicated and the committed" (1974, p. 161). Lechat and Torres (2016) consistently stated that entrepreneurs are prime candidates for burnout. Given that entrepreneurs play many job roles (e.g., manager, seller, etc.) and meet corresponding role expectations (e.g., bankers, suppliers, etc.), this results in *entrepreneurial burnout* (Palmer et al., 2021). Consequently, entrepreneurial burnout refers to an "acute and prolonged professional stress" (Omrane et al., 2018, p. 30), Corroborated by several studies that have found a positive relationship between role stress and burnout in the context of entrepreneurship (Omrane et al., 2018; Palmer et al., 2021; Wincent & Örtqvist, 2009a), while Alarcon's (2011) meta-analytic study found a negative association between role stress and burnout. Overall, it has been maintained that stress is a necessary condition[2] for burnout. Per Lerman et al. (2021) meta-analytic study, role stress experienced by entrepreneurs per this conceptualization has been labeled as a hindrance stressor since it impacts their well-being negatively. In the present study, entrepreneurs were treated as a homogenous entity. And, based on the literature reviewed, the following hypothesis is being proposed:

> ***H_1:*** The presence of entrepreneurial role stress [overall] is a necessary condition for the presence of burnout among self-employed Americans (i.e., enabling logic).

The conceptual model of the proposed necessity condition for role stress overall is depicted in Fig. 1.

Furthermore, the tri-component conceptualization of role stress (e.g., Buttner, 1992), and the role stress-burnout link

[1] Per a meta-analytic study (Alarcon, 2011) that focused on role theory and burnout found that role ambiguity ($\rho = .32$, $k = 51$, $N = 22{,}145$), role conflict ($\rho = .53$, $k = 37$, $N = 13{,}568$), and workload ($\rho = .49$, $k = 86$, $N = 51{,}529$) were positively associated with burnout.

[2] A necessary condition is a condition that must be present to enable a specific outcome; without the condition, the outcome will be absent (Dul, 2019).

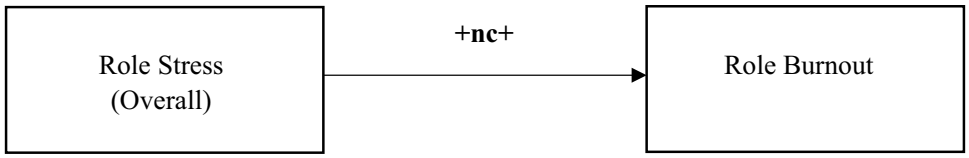

Fig. 1 Conceptual model of the proposed necessity condition for role stress overall. + **nc** +: "The presence or a high level of role stress [overall] is necessary for the presence of a high level of burnout"

literature (e.g., Omarane et al., 2018), the following hypotheses are being proposed:

H_{2a}: The presence of entrepreneurial role conflict is a necessary condition for the presence of burnout among self-employed Americans (i.e., enabling logic).
H_{2b}: The presence of entrepreneurial role ambiguity is a necessary condition for the presence of burnout among self-employed Americans. (i.e., enabling logic)
H_{2c}: The presence of entrepreneurial role overload is a necessary condition for the presence of burnout among self-employed Americans. (i.e., enabling logic)

The conceptual model of the proposed necessity conditions is depicted In Fig. 2.

Method

Participants and procedures

Data were collected from self-identified adult entrepreneurs (i.e.,18 years or older) based in the United States using an online crowdsourcing data collection platform named Prolific (prolific.ac), which has been deemed as an appropriate source for data collection in social sciences (Palan & Schitter, 2018). In total, using convenience sampling, 328 self-identified entrepreneurs took part in the study. However, based on the survey completion and clearance of manipulation check questions, 285 (Male = 149; *Mean* age = 39.01 years, *SD* = 12.71) entrepreneurs' responses were analyzed for statistical purposes, mainly consisting of solo entrepreneurs (n = 203, 71%) with the majority of them (60%) reporting income of US$ 50,000 or less per annum. All participants were compensated with a nominal financial incentive for their participation. All participants completed a consent form at the beginning of the questionnaire battery describing the purpose of the study. All procedures performed in studies involving human participants were by the 1989 Helsinki Declaration and its later amendments or comparable ethical standards. Table 1 presents demographic data from study participants.

Overview of the NCA procedure

NCA aims to determine if there is a necessary (critical) determinant for an event to occur (Arenius et al., 2017;

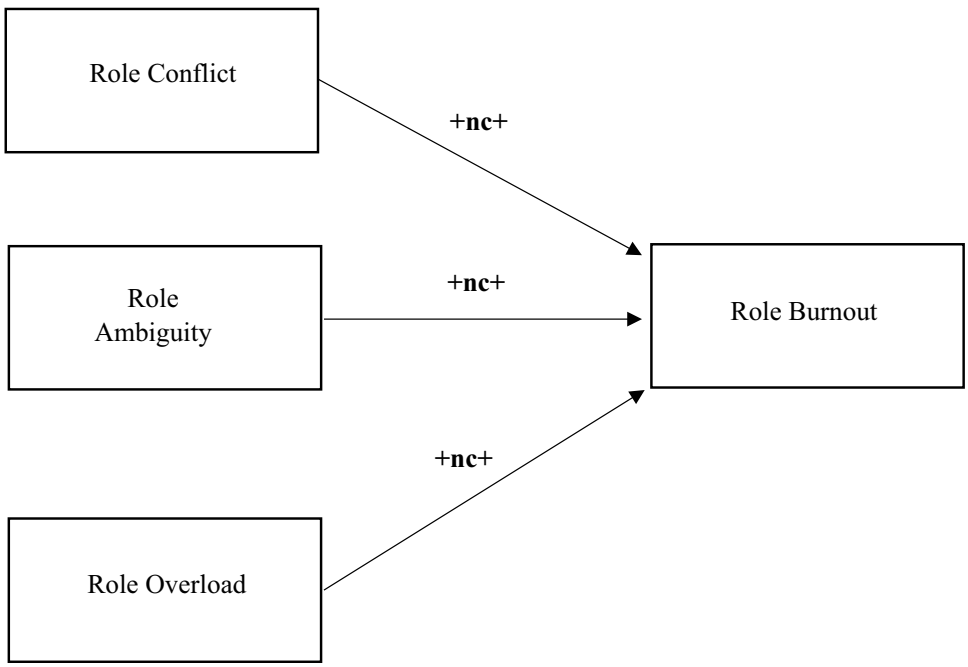

Fig. 2 Conceptual model of the proposed necessity conditions. + **nc** +: "The presence or a high level of role stress dimension is necessary for the presence of a high level of burnout"

Table 1 Demographic profile of the sample ($N = 285$)

Demographics	%
Gender	
Male	52
Female	47
Ethnicity	
White	80
Black or African American	7
American Indian or Alaskan Native	1
Asian	5
Native Hawaiian or Pacific Islander	7
Education	
Less than high school	1
High school graduate	9
Some college	21
2 year degree	15
4 year degree	38
Professional degree	14
Doctorate	2
Income (in US$)	
Less than 59,999	73
60,000 – 99,999	18
100,000 – 500,000	8
500,001 and above	1

Dul, 2016, 2019). For instance, achieving the legal voting age is a necessary condition for voting. However, age is not a sufficient criterion as attitudes and knowledge, among other factors, impact voting propensity (Arenius et al., 2017; Cohen & Chaffee, 2013). Thus, the logic of NCA differs from that of linear rational, which attempts to determine whether an increase in the predictor variable is associated with an increase in the outcome variable (i.e., variance-based approaches such as correlation and regression analyses). NCA enables the identification of necessity in *kind* (e.g., ''condition X is necessary or not for outcome Y") and the concern for necessary relationships in degree (e.g., "a specific level of condition X is necessary or not for a specific level of outcome Y") (Dul, 2016, 2019).

NCA application-related empirical studies can be found in various contexts (e.g., innovation in the buyer–supplier relationship, Van der Valk et al., 2016; lean manufacturing in small and medium enterprises, Knol et al., 2018; firm capabilities and performance, Tho, 2018; personality and impulsive buying behavior, Shahjehan & Qureshi, 2019; the emergence of motivation among schizophrenia spectrum disorder, Luther et al., 2017). For instance, the NCA method was used to determine whether intelligence is a necessary condition for creativity (Karwowski et al., 2016). Likewise, Arenius et al. (2017) employed the NCA method in the entrepreneurship context to understand the necessity of certain types of gestation activities for business formation.

The NCA method in a simple, dichotomous case (Dul, 2016, 2019) entails detecting a necessary condition (i.e., X is necessary for Y). It requires investigating in an XY scatterplot whether the intersection $X = 0$ and $Y = 1$ has no data points. If this intersection has data points, condition X is not necessary for Y. However, an in-depth analysis of the scatterplot(s) is recommended if X is necessary for Y. An in-depth analysis within the NCA technique involves two types of analyses—ceiling analysis and bottleneck analysis, which are explained in the following paragraphs briefly. The analyses mentioned above can also be extended to the context of ordinal and continuous variables (Dul, 2019). An exhaustive review of the NCA technique is beyond the scope of the present study; as such, the readers are referred elsewhere (see Dul, 2016, 2019).

There are two main recommended techniques to create ceiling lines within the NCA for the scatterplot (Dul, 2019), namely, *the Ceiling-Regression-Free Disposal Hull* (CR-FDH) and *the Ceiling Envelopment-Free Disposal Hull* (CE-FDH) (Dul, 2019). The CR-FDH technique creates a non-decreasing linear function that smooths the non-decreasing step function created by the second recommended technique (i.e., CE-FDH). Specifically, the CR-FDH method draws an ordinary least squares (OLS) regression trend line through the most upper-left data points in the scatterplot. However, since the CR-FDH is a smoothing technique and creates a straight ceiling line, it allows some data points to be above the ceiling line.

On the other hand, CE-FDH maximizes the area above the ceiling line that is the ceiling zone by assuming a non-decreasing (piecewise) linear ceiling, which results in no observation of empty space in the upper right corner of the scatterplot. As the ceiling zone with CE-FDH is left empty, the accuracy of this technique is 100 percent. Notably, these ceiling techniques differ from traditional regression-based approaches, where a best estimate average line is drawn through the middle of the data points (Dul, 2019). Furthermore, the NCA can also calculate a bottleneck table (Dul, 2019), which identifies the levels of X required for a given level of Y (i.e., when there is a bottleneck). More specifically, the bottleneck table identifies the specific minimum X level needed for different Y levels.

Finally, the NCA method calculates an effect size for a necessary condition. The effect size is the size of the ceiling zone divided by the scope (i.e., the entire area where data points are possible when considering the minimum and maximum levels of the independent variables—X) and dependent variables (i.e., Y) (Dul, 2019). According to Dul's

(2019) recommendations, an effect size of $0 < d < 0.1$ represents a small effect, $0.1 \leq d < 0.3$ represents a medium effect, $0.3 \leq d < 0.5$ represents a large effect, and $d \geq 0.5$ represents a very large effect.

Statistical packages

In the present study, two statistical software packages, namely SPSS 25.0 and NCA package, version 3.3. 1 (Dul, 2018; 2023) in R version 4.2.2, were used to conduct relevant statistical analyses; SPSS was used for descriptive statistics and reliability analyses. The NCA package conducted relevant NCA analyses such as scatterplot generation, process-related statistics, and bottleneck analyses.

Measurements

The survey consisted of Likert-type scales with items from existing scales used in previous studies (e.g., Wincent & Örtqvist, 2006).

The stress scale (Wincent & Örtqvist, 2006)

An 11-item entrepreneurial role stress scale was adopted from Wincent and Örtqvist (2006). It was rated on a 7-point Likert scale (1 = "Strongly Disagree" and 7 = "Strongly Agree"), which included 4-it4 items of role conflict, 4-it4 items of role ambiguity, and 3-it3 items of role overload. All the subscales, as well as the scale employed, demonstrated adequate reliability (i.e., $\alpha > 0.70$) as reported by Wincent and Örtqvist (2006).

The burnout scale (Malach-Pines, 2005)

The burnout scale developed by Malach-Pines (2005) was also used. It consists of 10 items measured on a 7-point Likert scale (1 = "Never" and 7 = "Always"). Both study's instruments were well-established and possessed adequate psychometric properties. For NCA purposes, composite scores were produced by averaging the number of items for a given construct, with more outstanding scores on a given construct representing higher levels. Malach-Pines (2005) reported that the burnout scale had adequate reliability when used in different samples ($\alpha > 0.80$).

Results

Descriptive statistics and reliability

For descriptive statistics concerning the study sample, see Table 1 for an overview. The construct-related measurement scales in the present study demonstrated adequate internal reliability (Role conflict = 0.75; Role ambiguity = 0.86; Role overload = 0.79; Stress overall[3] = 0.82; and Burnout = 0.93; Nunnally, 1978).

The NCA method for testing the entrepreneurial role stress-burnout link

Figure 3 depicts the scatterplot for Role Stress [overall] versus burnout. The scatterplot in question contains a space in the upper left corner above the space with observations, suggesting the possible presence of a necessary condition. Figure 4 depicts the scatterplot for role overload and burnout, which does not have a space in the upper left corner, suggesting an absence of a necessary condition. Figure 2 is used to illustrate how scatterplot analysis helps in identifying if a necessary condition exists or not. Consistent with the role overload vs. burnout scatterplot, the scatterplots for role conflict and role ambiguity yielded comparable results (see Figs. 5 and 6). Thus, establishing that the three dimensions of role stress—role conflict, role ambiguity, and role overload are not necessary for entrepreneurial role burnout. In Figs. 3, 4, 5, and 6, two ceiling lines are drawn (Dul, 2019), namely the ceiling envelopment technique (CE-FDH) and ceiling regression technique (CR-FDH), as noted earlier.

Additionally, Table 2 illustrates the bottleneck analysis, which shows all the necessary conditions for role stress [overall] and its related components (i.e., role conflict, role ambiguity, and role overload) via their bottlenecks at various levels (or degrees) of burnout[4]. For example, per Table. 2, to attain a 50 percent level of burnout, it is necessary for an entrepreneur to experience at least 11 percent or higher on role stress, but experiencing role stress-related components (e.g., role overload) is not a necessary condition. Conversely, to experience 100 percent burnout, it is a necessary condition that an entrepreneur experience at least 71 percent role stress. The effect sizes for role stress (overall), role conflict, role ambiguity, and role overload in the context of entrepreneurial burnout were $d = 0.21$ ($p = 0.002$), $d = 0.13$ ($p = 0.189$), $d = 0.07$ ($p = 0.05$), and $d = 0.09$ ($p = 0.112$) respectively. Based on the effect sizes and p-value significance proposed by Dul (2019), the overall role stress (i.e., composite) effect size is medium and statistically significant at $p < 0.05$. On the other hand, the effect sizes of role conflict, role ambiguity, and role overload are not necessary for entrepreneurial

[3] Stress overall consisted of all the eleven items related to role conflict, role ambiguity, and role overload constructs.

[4] For the sake of simplicity only CR-FDH results are discussed. Also, CR-FDH results are highly relevant for continuous variables (Dul, 2020).

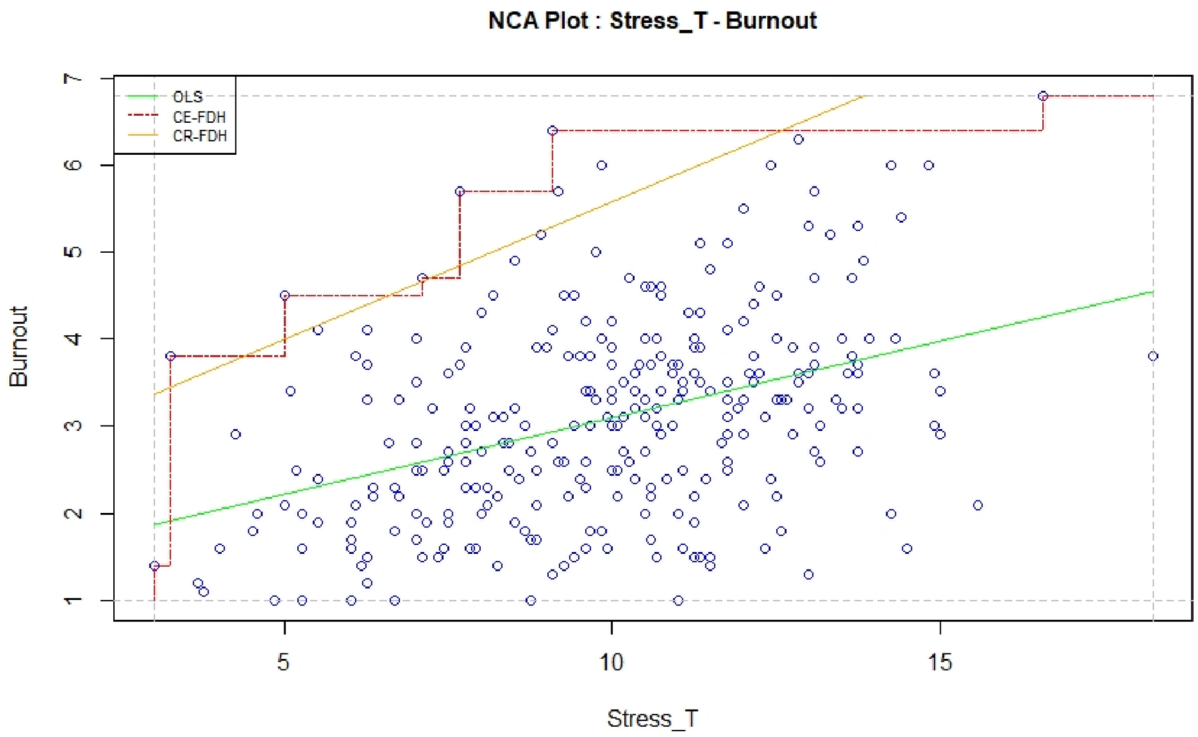

Fig. 3 Ceiling lines for condition (Role Stress—Overall). *Note*. OLS: Regression Line (Lower Solid Line); CR-FDH: Ceiling Regression Line (Upper Solid Line); CE-FDH: Ceiling Envelopment (Dashed Line)

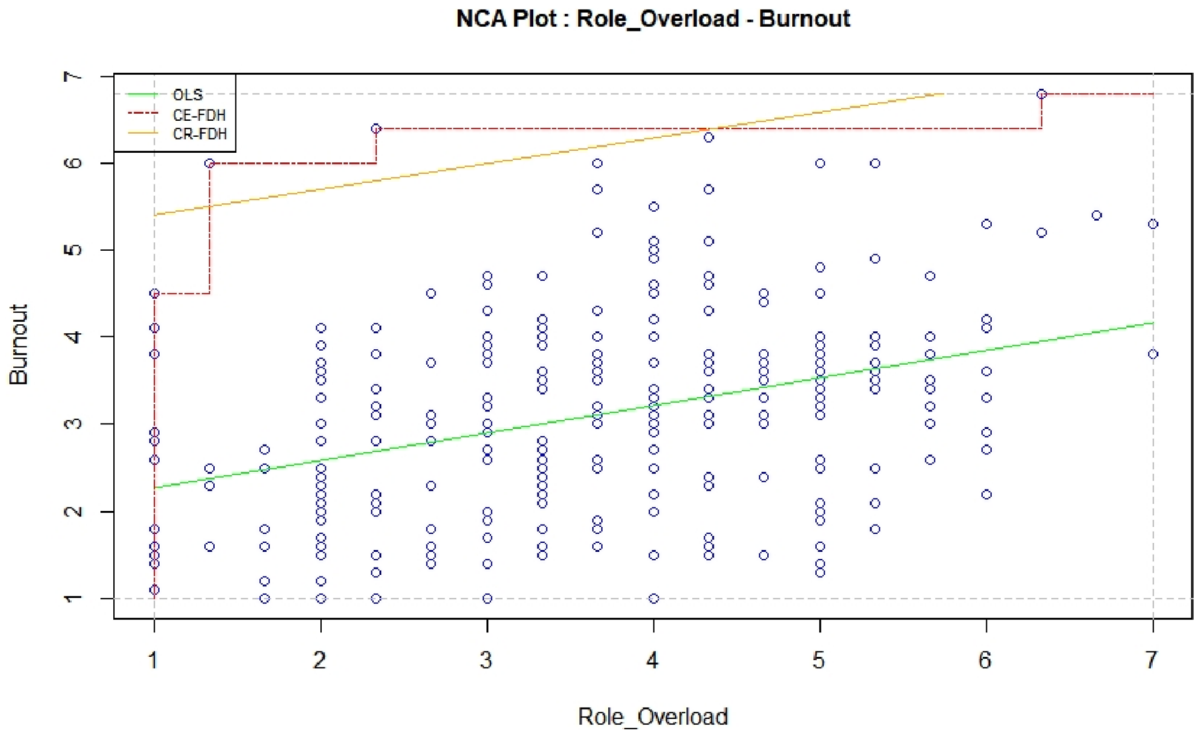

Fig. 4 Ceiling lines for condition (Role Overload). Note. OLS: Regression Line (Lower Solid Line); CR-FDH: Ceiling Regression Line (Upper Solid Line); CE-FDH: Ceiling Envelopment (Dashed Line)

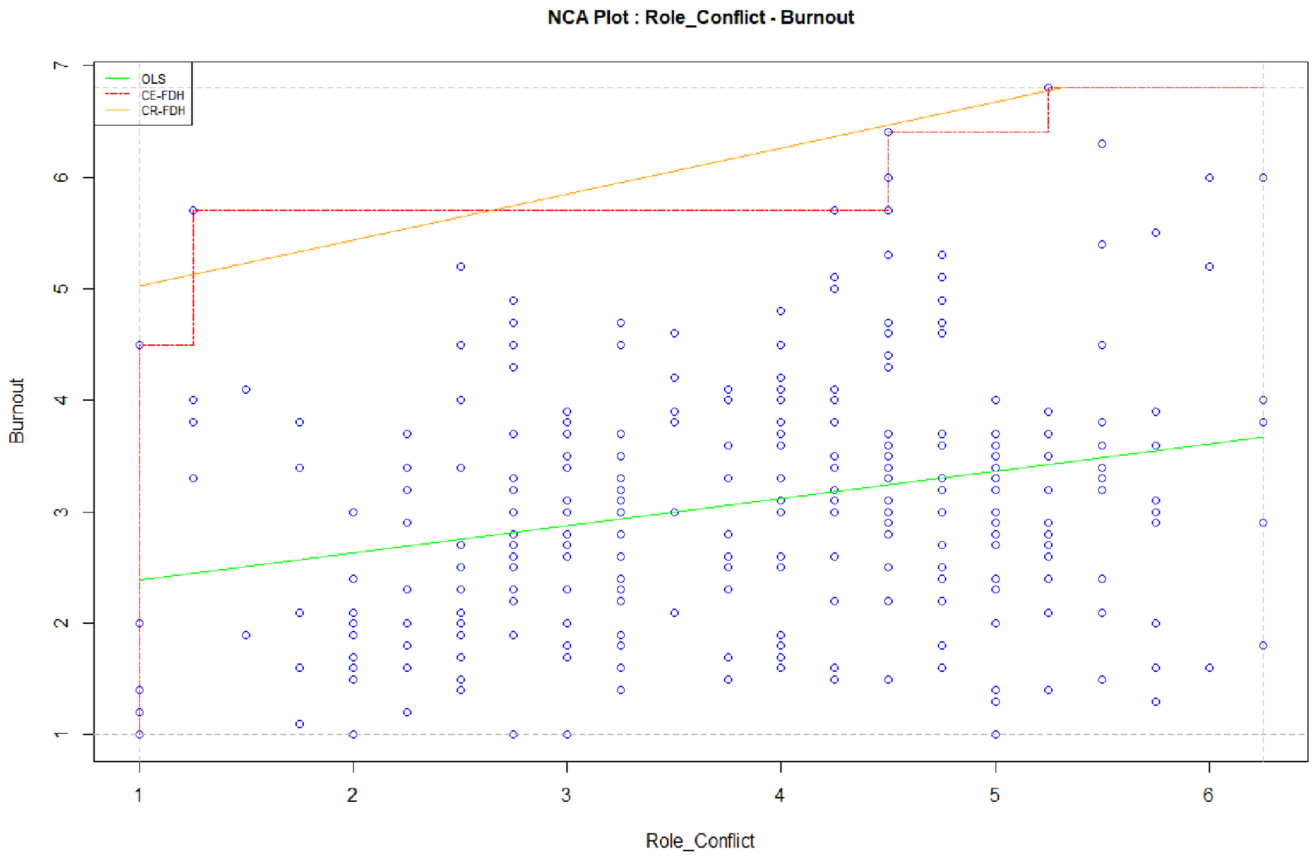

Fig. 5 Ceiling lines for condition (Role Conflict). *Note*. OLS: Regression Line (Lower Solid Line); CR-FDH: Ceiling Regression Line (Upper Solid Line); CE-FDH: Ceiling Envelopment (Dashed Line)

burnout since their effect sizes failed to reach statistical significance at $p < 0.05$.

These findings can be explained with an analogy (Dul, 2019). For example, a 'red apple' is not necessary for an apple pie, and green apple is not necessary for an apple pie. However, the higher-order construct (apple) is necessary. Thus, it is possible to formulate the necessary condition hypothesis with the higher-order concept. Similarly, role stress is a necessary condition to experience entrepreneurial burnout. But entrepreneurial role stress as conceptualized consistent with the tri-component model of role stress (e.g., role overload, etc.; Buttner, 1992) is not a necessary condition for entrepreneurial burnout.

Discussion

The present study investigated the relationship between stress and burnout, mainly the necessity of role stress to experience burnout in an entrepreneurship context. Based on the role stress theory, the study also investigates the necessary condition of the tri-component conceptualization of role stress (e.g., Buttner, 1992) using the NCA method (Dul, 2016, 2019).

To this end, consistent with the variance-based approach (e.g., regression analysis) studies, in the present study it was found that overall role stress is a necessary condition for entrepreneurial role burnout. An entrepreneur must experience role stress before one experience's role burnout. Several NCA-related statistics support the necessary condition. For example, the effect size ($d = 0.21$, $p = 0.002$) was moderate and statistically significant for the role stress-burnout relationship.

Since the necessity condition was moderate and statistically significant for overall role stress and burnout, the next step of the NCA method was to investigate the necessary conditions of the role stress dimensions' (e.g., role overload) necessary conditions for burnout among entrepreneurs. Per the NCA results, it was found that none of the three dimensions of role stress (i.e., role conflict, role ambiguity, and role overload) were necessary conditions for entrepreneurs to experience role burnout. In other words, the tri-component conceptualization of role stress in entrepreneurship does not necessarily lead to burnout based on necessity logic. The NCA-related statistics support the assertion mentioned above. The effect sizes of role conflict, role ambiguity, and

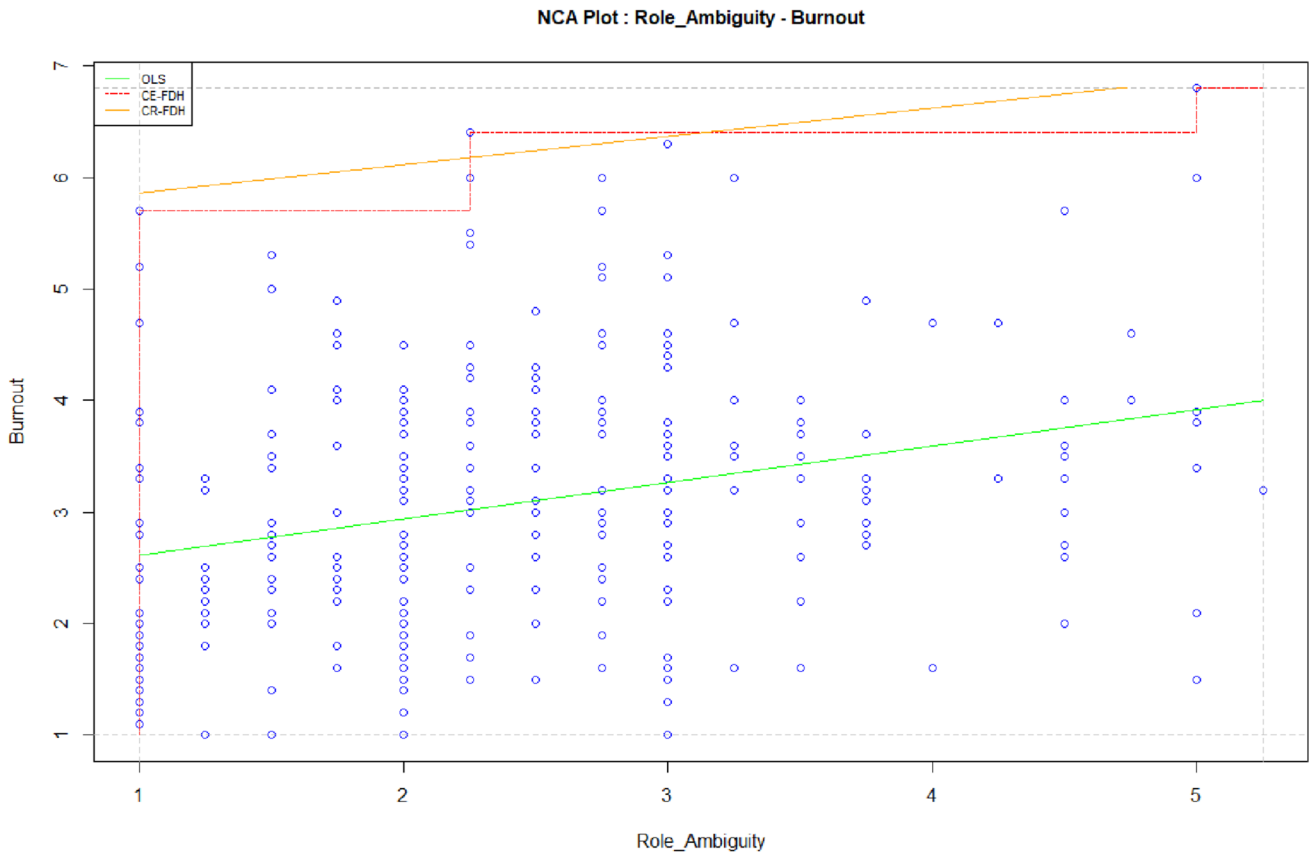

Fig. 6 Ceiling lines for condition (Role Ambiguity). *Note*. OLS: Regression Line (Lower Solid Line); CR-FDH: Ceiling Regression Line (Upper Solid Line); CE-FDH: Ceiling Envelopment (Dashed Line)

role overload were, for example, irrelevant since they failed to reach the statistical significance at $p < 0.05$.

Our finding is in stark contrast to previous studies that investigate the entrepreneurial role stress-burnout link based on sufficiency logic (e.g., regression analysis) using the role theory's stress conceptualization. Per the NCA, although entrepreneurial role stress is an essential prerequisite to experience burnout, conceptualizing role stress by the tri-component conceptualization is insufficient because role stress may result from factors other than the

Table 2 Bottleneck analysis results: required minimum levels of the necessary condition for different desired levels of the outcome expressed in CR-FDH percentage

Entrepreneurial burnout (%)	Stress overall (CR-FDH %)	Role conflict	Role ambiguity	Role overload
0	NN	NN	NN	NN
10	NN	NN	NN	NN
20	NN	NN	NN	NN
30	NN	NN	NN	NN
40	NN	NN	NN	NN
50	11.0	NN	NN	NN
60	23.0	NN	NN	NN
70	35.0	1.6	NN	NN
80	47.0	28.4	NN	13.0
90	59.0	55.2	33.8	45.9
100	70.9	82.0	87.5	78.7
D	.21	.13 (ns)	.07 (ns)	.09 (ns)

NN Not Necessary; *d* Effect Size; *ns* non-significant at $p < .05$

three dimensions proposed in the literature. For example, entrepreneurship literature (Lerman et al., 2021; Stephan, 2018) has noted that entrepreneurs encounter unique stressors compared to non-entrepreneurs, impacting them differently. For example, entrepreneurs spend long hours at work, which impacts their work-life balance (Jiang et al., 2018). Also, Lerman et al. (2021) noted that entrepreneurs experience stressors, which may contribute to their well-being (i.e., challenge stressors) as well as the ones that contribute to a decrement in their well-being (i.e., hindrance stressors). Thus, stress can have positive and negative consequences, particularly entrepreneurship.

Our NCA analysis revealed that role stress for entrepreneurs as conceptualized by role stress theory is not a necessary condition for entrepreneurs to experience burnout. In other words, role conflict, role overload, and role ambiguity are labeled as hindrance stressors (see Lerman et al., 2021) because typically these stressors in a non-entrepreneurship context have demonstrated that they cause role burnout. However, given the unique characteristics of entrepreneurship, these factors are not necessary conditions for entrepreneurs to experience burnout. We attribute this finding to the nature of entrepreneurship. It is extremely likely that entrepreneurs view these stressors as a part of their job and have superior coping mechanisms (Lerman et al., 2021). Also, in recent years, role stress might stem from other factors such as negative affect (Cardon & Patel, 2015) and anxiety/fear (Cacciotti & Hayton, 2015), warranting additional study.

Implications

The present study investigated the relationship using necessity logic (as opposed to sufficiency logic) using a novel statistical method (i.e., NCA, Dul, 2016, 2019). Results indicated that role stress [overall] is a necessary condition for burnout in entrepreneurial contexts. However, comparable results were not found for the tri-component conceptualization of role stress, which has been documented as a necessary and sufficient condition for role stress and its associated outcomes by other researchers (e.g., Buttner, 1992). To this end, some theoretical and methodological implications could be discussed.

Theoretically, future studies should frame the concept of entrepreneurial role stress in a broader, going beyond the tri-component conceptualization of role stress. In addition, a more general broader conceptualization of entrepreneurial role stress has implications for burnout research and can facilitate gaining a fine-grained understanding of entrepreneurial well-being.

To the best of our knowledge, the present study is the first to investigate the stress—burnout link in entrepreneurship using the NCA method (Dul, 2016, 2019). The NCA appears to be a more helpful and appropriate tool for determining necessity, an alternative to the widely employed correlation and regression analyses (Karwowski et al., 2016). For instance, in a typical sufficiency-based statistical method, role stress and its three dimensions (i.e., role conflict, role ambiguity, and role overload) are positively associated with burnout. Nevertheless, these average-based estimation approaches could mask the actual relationships between the constructs analyzed (e.g., role stress dimensions and burnout). Future studies are encouraged to complement the sufficiency logic analyses (e.g., regression analyses and structural equation modeling) with the necessary logic (i.e., NCA, Dul, 2016, 2019) better to understand the nuanced relationships between the study variables.

Limitations

Even though the current study's use of the NCA approach, as opposed to linear methodologies, is a strength, it also has some limitations. Consistent with the limitation of observational research, causality could not be determined. NCA may be more prone to sampling and measurement errors than conventional data analysis techniques. For drawing the ceiling line, the proposed ceiling techniques utilize only a tiny fraction of the sample's data (the observations near the ceiling line). The ceiling line (and thus other metrics derived from it, such as effect size and accuracy) may be susceptible to selection bias and measurement error in the situations around the ceiling line. This is especially true if the number of cases near the ceiling line is small. Therefore, the accuracy of the ceiling line is dependent on having representative cases with precise variable measurements surrounding the ceiling line. Given the size of the sample, the sample's representativeness, and the well-established measurements, however, it is possible that these constraints do not apply to our study. Finally, the inability to assure temporality in cross-sectional data also would temper the conclusions drawn.

Data availability The authors confirm that the data supporting the findings of this study are available.

Declarations

Ethical approval All procedures performed in studies involving human participants were by the 1989 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent All participants completed a consent form at the beginning of the questionnaire battery describing the purpose of the study.

Conflict of interests The authors have no known competing financial interests or personal relationships that could have influenced this work.

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