

# Factors Driving Virtual Running Event Participation: A CHAID Segmentation Approach

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## Abstract

Virtual running events (VREs) have emerged as participatory events and are projected to be a legitimate future segment in the sport event industry. This paper considers the most suitable market segment(s) with future intentions to partake in VREs. A Chi-Squared Automatic Interaction Detector (CHAID) algorithm, scarcely used to segment sport consumer markets, was applied based on various motivational factors that may drive VRE participation. Data were collected from 1,017 individuals who had participated in a VRE. Ten distinct market segments with varying intentions to partake in VREs were identified, uncovering at least six viable future VRE segments. Hedonia, perceived psycho-social risk, perceived price and VRE benefits were the strongest predictors of VRE participation intentions. The CHAID analysis allowed a detailed description of the relative importance of the characteristics within each segment, confirming the benefit of using this sophisticated technique to develop targeted marketing strategies.

**Keywords:** virtual running events; market segmentation; CHAID analysis

## Introduction

In 2021, the global virtual events market size was valued at USD \$114.12 billion and is projected to increase significantly to USD \$29,657.64 billion by 2030 (Grand View Research, 2021). The inability to host live events during various stages of COVID-19 lockdown propelled the transformation of events into virtual counterparts, spurring significant shifts in the sporting landscape (Waśkowski & Jasiulewicz, 2022). Virtual running events (VREs) in particular are projected to be a legitimate future segment in the sport event industry (Helsen et al., 2022; Kim & Jung, 2022; Thibaut et al., 2022). While literature emerged on changes in sport and leisure participation in general (Mutz, 2021), only a few studies have explored the factors and/or the groups of people who participated in VREs (Helsen et al., 2022; Thibaut et al., 2022; Waśkowski & Jasiulewicz,

2022). This study fills this gap by exploring distinct market segments of VRE participants based on a range of motivational factors argued to be especially relevant to the VRE context.

Sport consumers consist of various cohorts that display diverse attitudes and behaviors toward the sport objects they support (Doyle et al., 2013). Several sport studies profile distinct markets based on different segmentation techniques (Chang et al., 2023; Helsen et al., 2022; Thibaut et al., 2022; Valek et al., 2015; Waśkowski & Jasiulewicz, 2022). Many of these popular segmentation techniques present limitations to the depth of information that can be obtained and are often limited to predefined (already known or proposed) groupings (Díaz-Pérez & Bethencourt-Cejas, 2016; Doyle et al., 2013; Orme, 2000). Data analysis techniques driven by machine learning offer greater insights as they

discover patterns in the data and allow one to identify yet unknown viable segments (Chang et al., 2023). One such technique, Chi-Squared Automatic Interaction Detector (CHAID) analysis, is a more robust market segmentation technique that allows marketers to understand which combinations of independent variables have the strongest influence on a dependent variable via a decision-tree model (Kass, 1980). Unfortunately, the CHAID technique has rarely been used in sport consumer research (Chang et al., 2023; Rosa et al., 2023; Valek et al., 2015). To date, no study has provided detailed profiles of VRE participants as potentially lucrative segments for sport event organizations. Therefore, this study makes a unique methodological contribution by employing a CHAID analysis to better understand the potential market segments for VREs.

VREs exhibit a variety of formats. Some VREs are facilitated by platforms such as Zwift, which enables runners to connect globally to engage in virtual experiences (Reed et al., 2023). Other VREs take place via scheduled events occurring simultaneously at multiple physical locations worldwide, fostering virtual connections across different time zones through dedicated apps, such as the Wings for Life World Run (Wings for Life, 2022). Conversely, VREs may occur on predetermined dates but offer participants the flexibility to choose any physical location and start time (Helsen et al., 2022; Westmattmann et al., 2020). The current study focuses on the latter as research on these VREs is scant (Helsen et al., 2022). With minimal exploration into the profiles of these VRE participants to date, a pressing question emerges: Would these virtual alternatives endure as viable marketing opportunities?

## Literature Review

### *Market Segmentation in the Sport Context*

Market segmentation involves dividing a heterogeneous market into smaller, more homogeneous segments based on certain characteristics or needs shared by the members of each segment (Doyle et al., 2013; Kaiser et al., 2019). Previous studies have highlighted the benefits of combining a variety of strategies to capture different market segments (Díaz-Pérez & Bethencourt-Cejas, 2016; Díaz-Pérez et al., 2020; Doyle et al., 2013). Bases for segmentation in sport management studies include socio-demographics, psychographics, product usage, and product benefit segmentation, of which demographic and psychographic variables are most popular (Kaiser et al., 2019). Running events may also cater to different market segments. For example, a running event could offer various distances such as longer distances for more serious leisure runners (e.g., a marathon or a half marathon event), and shorter

distances (e.g., 5 or 10 km races) for casual leisure participants who could partake as runners or walkers. The COVID-19 pandemic spurred significant shifts in the sporting landscape as VREs became increasingly popular (Waśkowski & Jasiulewicz, 2022). As a result, marketers need to realize as many VRE segments as possible, statistically speaking, to cater to the unique needs of each segment (Díaz-Pérez & Bethencourt-Cejas, 2016). To achieve this, marketers need to delve deeper into segmentation and apply the most sophisticated techniques (Chang et al., 2023).

### *Applying CHAID for Market Segmentation*

There are many segmentation techniques available, such as discriminant analysis, conjoint and discrete choice analyses, cluster analysis, latent class regression models, CART (Classification and Regression Trees), and CHAID (Galguera et al., 2006). Most segmentation techniques are descriptive, use a limited number of predefined segments, and only allow certain data types (such as cluster and latent class analysis). Regression analyses use intra-group variability without explaining the dynamic relationships between variables that lead to individual differences, while conjoint and discrete choice analyses are limited to comparisons between one or two options (Díaz-Pérez & Bethencourt-Cejas, 2016; Orme, 2000).

CHAID is a post hoc predictive method with many benefits over some more commonly used statistical techniques (Chang et al., 2023). First, CHAID considers the relationship between the dependent and independent variables via a decision-tree modeling technique (Kass, 1980); and does not need predefined groupings (Chang et al., 2023; Díaz-Pérez et al., 2020). Second, CHAID is nonparametric and nonlinear and can overcome the drawbacks of regression analysis that mainly uses intra-group variability (Díaz-Pérez & Bethencourt-Cejas, 2016; Orme, 2000). Third, CHAID provides more detailed groupings to identify market segments based on a dependent variable and hierarchical rankings, showing additional insights into the differences among the groups (Díaz-Pérez & Bethencourt-Cejas, 2016; Doyle et al., 2013). Finally, CHAID is an unsupervised model that can grow into multiple, more sophisticated branches as opposed to CART, which is a supervised model that only delivers binary splits (Lin & Fan, 2019).

The use of the CHAID technique has seen limited application in a sport context. From a sport event perspective, one study considered the sport performance of race walkers at different distances (Brodáni & Czaková, 2022), while another evaluated the different levels of physical activity, physical fitness, and sedentary time in older adults (Rosa et al., 2023). A third study segmented marathon runners based on their

motivation to participate in a sport event (Valek et al., 2015). CHAID has also been used to segment the market for different seasonal ticket options (Chang et al., 2023). Even though these aforementioned studies used CHAID analysis, none of them focused on a VRE context, confirming the contribution of the current study.

In addition, the available segmentation studies in a VRE context did not use the CHAID technique. Waśkowski and Jasiulewicz (2022) employed cluster analysis, which did not allow for the distinction between the dependent and independent variables. Helsen et al. (2022) used Chi-square and hierarchical logistic regression to compare differences in sport participation behavior pre- and during COVID-19, limiting segmentation to these two clusters only with no insight into heterogeneity within the groups (Orme, 2000). Finally, Thibaut et al. (2022) utilized canonical correlation analysis that similarly compared sport participation behavior during COVID-19 between three predefined segments based on club membership, type of sports event, and online sports participation. The limitations of these aforementioned segmentation techniques reaffirm the value of using CHAID as a segmentation technique based on its ability to uncover complex relationships that may not be evident when considering limited variables or relationships, making this a unique methodological contribution of the current study.

#### ***Future VRE Participation Intentions (Dependent Variable for Segmentation Purposes)***

Existing segmentation studies on VRE participation during COVID-19 focus on how sport participants' behavior changed at the beginning of COVID-19 and whether VREs formed part of this change (Helsen et al., 2022; Thibaut et al., 2022). The main aim of previous studies was to determine existing sport participation factors (pre-COVID-19) that relate to VRE participation rather than how to design favorable VRE experiences. Only Waśkowski and Jasiulewicz (2022) explored factors related to value co-creation in VRE design for different market segments. Even though self-reported participation intentions do not always guarantee actual behavior (Finnegan et al., 2020), previous studies have found a positive relationship between past and repeated participation in VREs (Helsen et al., 2020; Thibaut et al., 2022). A strength of this study is that it explores intentions based on past VRE participation as opposed to anticipated experiences; and serves as the dependent variable in the segmentation study.

#### ***Motivations Driving Event Participation (Independent Variables for Segmentation Purposes)***

Sport marketers' understanding of motivations that drive event participation is key to differentiation and

to meet consumers' evolving needs and expectations (Lough et al., 2016). Several studies have considered runners' motivations to partake in marathon events (Aicher et al., 2015; Davies et al., 2019; Du et al., 2015). In this regard, Aicher and Brenner (2015) wrote a conceptual paper on motivations to participate in marathon events based on the self-determination theory. Buning and Gibson (2016) applied a social worlds perspective as a method for identifying individuals' travel patterns to participate in sport events. Studies have also made comparisons between the motives of sport tourists and locals to partake in running events (Aicher et al., 2015), as well as motives to partake in urban or rural marathons (Davies et al., 2019). Considering changes in the format of running events brought about by COVID-19, it is relevant to determine motivating factors that may drive future VRE participation (Madininos et al., 2021; Thibaut et al., 2022; Woyo & Nyamandi, 2021).

The segmentation variables included in this study draw from the human motivational theory of personal investment. It is concerned with how people invest their time, energy and talent in a particular activity (Maehr & Braskamp, 1986) and considers the social-contextual environment in which an individual exists, making certain options more accessible and salient in contrast to other less appealing alternatives (King et al., 2019). Accordingly, the decision to invest oneself in an activity, such as VRE participation, is dependent on three key components of meaning including facilitating conditions, sense of self, and perceived goals (Maehr & Braskamp, 1986). The current study applies these three conditions to measure the motivations and event format preferences that may lead to future VRE participation. Facilitating conditions relate to the *perceived price*, the *benefits* that VREs offer, as well as *perceived risks* of partaking in an event (experienced during the COVID-19 period). *Event attributes* present in VREs may support participation motivations related to one's sense of self (King et al., 2019). The final component is perceived goals, in particular the goal to attain an overall sense of well-being (*or different types of happiness*) that are possible through sport event participation (Doyle et al., 2013; Malchrowicz-Moško & Poczta, 2018). These five factors, as the independent variables of the study, are subsequently discussed.

#### ***Perceived Price***

Price is critical in sport consumers' decision-making and strongly predicts event participation (Aicher & Newland, 2018; Du et al., 2015). In this study, perceived price refers to the participant's judgments about the prices and pricing efforts of the event organization (Schiffman & Kanuk, 2010). VREs can offer lower

event prices due to reduced administrative costs (e.g., need for fewer additional support staff, metro-police and/or ambulances; Westmattmann et al., 2020).

#### *Virtual Event Benefits*

Sport events allow for several benefits, such as escaping from daily worries, allowing for travel, spending time with family and friends, and providing opportunities to meet new people (Kaplanidou & Vogt, 2010). Although no virtual event can fully replace a live event experience, VREs do offer certain benefits that may impact event decision-making due to the facilitating conditions (Kim & Jung, 2022; Woyo & Nyamandi, 2021). Some of these VRE benefits include convenience (e.g., choosing your own starting time and route), travel costs (e.g., reducing traveling/accommodation costs), and individual benefits (e.g., to run alone or with selected others; Helsen et al., 2022; Waśkowski & Jasiulewicz, 2022).

#### *Perceived Risk*

The COVID-19 pandemic brought the perceived risk of event participation to the fore and may influence how running events, especially VREs are perceived. Perceived risk is related to a consumer's perception formed by the potential negative consequences that may arise from a consumption experience (Matiza & Kruger, 2021). Different types of sport events have different participation requirements that can affect the level of perceived risk, with the notion that the lower the perceived risk, the higher the likelihood of participation (Deng & Ritchie, 2018; Li et al., 2021; Matiza & Kruger, 2021). Various types of risks relate to consumption behavior (Matiza & Kruger, 2021; Roehl & Fesenmaier, 1992), and in this study three risks as identified by Matiza and Kruger (2021) relate to the facilitating conditions during the COVID-19 pandemic. First, *physical risk* factors may harm or endanger an individual's health and well-being (Deng & Ritchie, 2018; Matiza & Kruger, 2021) and, in a VRE context, may exist to a lesser degree compared to live running events. Second, *psychological risk* may not be present at VREs compared to the negative emotional experiences, such as discomfort, worry, and unnecessary tension relating to the self-image and self-perception from participation in live events (Matiza & Kruger, 2021). Finally, *social risk* and the feelings of social pressure or judgment from peers may be lower for VREs due to virtual participation (Deng & Ritchie, 2018; Fuchs & Reichel, 2006; Matiza & Kruger, 2021; Temerak & Winklhofer, 2023).

#### *Event Attributes (Novelty, Prestige, Cause-Related, Tangible Items)*

A person's sense of self considers identity-relevant processes that relate to, amongst others, one's sense

of purpose or meaningfulness (King & McInerney, 2014). Sport experiences often go beyond mere transactional exchanges between consumers and service providers, potentially resulting in meaningful experiences (Zomerdijk & Voss, 2010). Studies have shown that event attributes such as *novelty* may enhance the meaningfulness or feeling of accomplishment of the sport experience (Newland & Aicher, 2018; Skavronskaya et al., 2019). Novelty refers to the experience of something different from routine (González-Cutre et al., 2019) and is considered in this study because many of the VREs offered during COVID-19 were offered as novel event experiences. This may play a role (or not) in future VRE participation.

Event *brand prestige* can also impact the meaningfulness of the event experience (Stokburger-Sauer et al., 2012). Brand prestige is the perception held by consumers that the organization or brand is well-regarded, respected, admired, or well-known (Bergami & Bagozzi, 2000). Various international events, such as the Comrades Marathon in South Africa that holds considerable brand prestige, offered VRE alternatives during the COVID-19 period. The opportunity to be associated with participation in events with prestigious (or meaningful) event brands may impact future VRE participation.

Participating in events that raise funds for a *good cause* (such as charity events) also enhances event participation experiences' meaningfulness (Armbrecht & Andersson, 2020; Theodorakis et al., 2015). Being part of a charity sport event contributes to a feeling of being part of something bigger compared to the individual factors contributed (Bunds et al., 2023) and may be a driving factor for future VRE participation.

There are also tangible attributes that can enhance the meaningfulness of an event experience, such as medals, event T-shirts, and goodie bags (Du et al., 2015; Kim & Jung, 2022; Newland & Aicher, 2018). With VREs, tangible event items are either delivered to participants or can be collected from specified store outlets or pick-up points (MyProCoach Ltd, 2021). Tangible items (e.g., a medal) are often used as symbols for self-expression and may enhance the meaningfulness of the event experience (Karjaluo et al., 2016).

#### *Happiness (Hedonia and Eudaimonia)*

Consumer happiness is individuals' pleasure from exchanging money for goods and services (Desmeules, 2002). Running has been growing internationally as a participatory sport, where individuals participate not because of the competitive aspect but for health or leisure (Doyle et al., 2013; Malchrowicz-Moško & Poczta, 2018), as well as a sense of belongingness (King & Watkins, 2012). Participation in sport activities evokes feelings of happiness (enhances subjective well-being),

having significant societal benefits, and as such, sport marketers should take note of the happiness effect from event participation (Bailey & Fernando, 2012; Yu et al., 2022). Literature distinguishes between two types of happiness; hedonia (short-term, pleasure-based) and eudaimonia (long-term, meaning-based; Gaston-Breton et al., 2020). Past studies have considered these types of happiness among participants of running events (Armbrecht & Andersson, 2020). One study has considered fun (hedonia) in VRE experiences (Waśkowski & Jasiulewicz, 2022). This study explored the extent to which both types of happiness segmented VRE participation intentions.

## Methods

### *Research Design and Sampling*

The academic institution's faculty ethics committee granted ethical clearance for the study (protocol nr EMS163/21). A convenience sampling technique was used to reach a large sample for quantitative data. Individuals 18 years or older who had participated in a VRE between September 15 and October 31, 2021 were included (selected using screening questions). Data were collected via an online survey hosted on Qualtrics. After permission was obtained from the companies and group administrators, links to the online survey were posted on the social media pages of South African running groups (local to national), two running events that hosted the biggest virtual races during COVID-19 (including the world's biggest ultra-marathon and the most prominent national series event), as well as a specialist running store that distributes running gear across the country. Targeting South African runners was suitable since the country's event calendar hosts races of all sizes across different locations almost every weekend (Runnersguide, 2020). Online platforms were also relevant given the virtual event context and considering that these online community members already have a vested interest in running.

The population size of all VRE participants across different VREs was unknown. However, a total of 3,024 responses were submitted via the survey link. After removing surveys with missing responses, a final sample of 1,017 fully completed questionnaires was obtained. This sample size was suitable for the classification analysis employed, given that CHAID works best in large samples ( $N=1000$  and above) where the power of the test is essential (Mehmet & Elkonca, 2020). Nonresponse bias was assessed by comparing the responses of the early responders with the later 50% of responders, as per Dooley and Lindner's (2003) suggestion. Randomly selected items from each construct were subjected to homogeneity of variance testing. The

results indicated no significant differences between the respondents, suggesting that nonresponse bias was not a noteworthy concern.

### *Measurement Instrument*

The self-administered, structured questionnaire obtained participants' consent, followed by two screening questions, namely; whether respondents were 18 years or older and if the individual has participated in a VRE. To profile respondents, socio-demographics (age, gender, casual or serious leisure participant) were included, followed by questions related to running behaviors (i.e., runner or walker, member of a formal running club, running frequency, and preferred event distance in kilometers). Sport participation behavior pre-COVID-19 has been shown to influence runners' participation in VREs during COVID-19 (Helsen et al., 2022; Thibaut et al., 2022).

All scale items were adapted for the VRE context and utilized a sliding scale from 1 to 100 (1 = *strongly disagree* to 100 = *strongly agree*). Hedonia was measured with nine items from Babin et al. (1994). Eudaimonia included eight items from Sirgy et al. (2016). Perceived risk items from Matiza and Kruger (2021) were adapted from their travel behavior context to a running event context, and included physical risk (4 items), social risk (4 items), and psychological risk (3 items). Perceived price comprised three items (Zhong & Moon, 2020). Event attributes included event novelty (single item from Skavronskaya et al., 2019); event brand prestige (two items from Stokburger-Sauer et al., 2012); cause-related event participation (single item from Filo & Coghlan, 2016); and tangibles (three items that include tangibles offered for participation in running events). Event attributes were measured with a sliding scale (1 = *not at all important* to 100 = *extremely important*). Benefits of VRE participation were derived from a review of the literature (Helsen et al., 2022; Waśkowski & Jasiulewicz, 2022) and measured on a sliding scale (1 = *definitely not a reason* to 100 = *definitely a reason*). A statement on intention to participate in VREs in the future was measured on a sliding scale (1 = *extremely unlikely* to 100 = *extremely likely*).

### *Data Analysis*

First, Exploratory Factor Analyses (EFAs) were conducted to determine the dimensionality of the factors included in the study. The EFAs used the Principal Axis Factoring technique with oblique rotation (Kline, 2011). Internal consistency reliability was determined by Cronbach's Alpha, as well as the Guttman Split-Half coefficient value for the two-item price scale (values for both to be above 0.7 to be acceptable; Hair et al., 2019; Benton, 2015). Finally, the convergent validity was

assessed with the composite reliability (CR; above 0.7 being excellent; Kline, 2011), and the Average Variance Explained (AVE) with levels above 0.5 considered acceptable (Hair et al., 2019).

The CHAID technique, introduced by Kass (1980), serves as an exploratory statistical method for market segmentation. In this study, the CHAID analysis shows the motivational factors (as independent variables) and their relationships with the dependent variable, namely future VRE participation intention, via a decision-tree modeling technique using chi-square or F statistics, the Bonferroni method, and a category merger algorithm (Kass, 1980).

The analysis begins by first identifying the independent variable (perceived price, VRE benefits, perceived risks, event attributes, hedonia or eudaimonia in this study) that best explains the dependent variable (future intentions to partake in VREs) and creates the first branch. After that, this independent variable is split into (two or more) subgroups, referred to as the parent nodes (or second layer of branches). These subgroups illustrate values of the independent variable where homogeneous but significantly different subgroups exist regarding the dependent variable (future VRE participation intentions).

After the initial split, CHAID considers the additional independent variables causing the parent nodes to further split into child nodes to form more layers or branches, where applicable. Segment configuration (splitting) continues until no further meaningful relationships (or branches) emerge between the dependent and independent variables. The final subgroups (known as terminal nodes) each contain a homogenous subset of the data for the dependent variable (Thomas & Galambos, 2004). Ultimately, the result is a hierarchical, tree-like structure, where the “tree trunk” at the top represents the full dataset or all respondents. This trunk branches out progressively into smaller, more homogeneous subgroups, with each branch reflecting a unique combination of factors influencing the dependent variable. For a visual representation of this structure, see Figure 1.

## Sample Profile, EFA, Reliability and Validity Results

### *Respondent Profile and Running Behaviors*

The results of the respondent profile are provided in Table 1. The sample ( $n=1017$ ) comprised more female (68.04%) than male (31.56%) respondents. This study was able to handle the skewed female sample due to CHAID not being influenced by the distribution of data as well as its capability of using gender to describe segments (Kass, 1980). The average age of the participants was 43 (min=19; max=77). More were casual (57.42%) than serious leisure event participants

(42.58%), and most partook in running as a leisure activity prior to COVID-19 (92.13%). More participated as runners in VREs (76.89%) rather than walkers (23.11%), and more were members of formal running clubs prior to COVID-19 (65.49%). Most respondents run three to five times per week (66.31%), and fewer run once or twice per week (21.24%). Only a few respondents run six to seven times per week (13.42%). The most preferred event distances were 21.1 kilometers (i.e., half-marathon; 29.5%), followed by 42.2 kilometers (i.e., marathon event; 20.16%), and shorter distances such as 10 kilometer (22.82%) and five-kilometer events (17.6%).

### *EFA Analysis*

The factorability of the data was assessed with two tests, namely; Bartlett’s test of sphericity, showing significance ( $p < 0.05$ ) across all scales, and Kaiser-Meyer-Olkin’s measure of sampling adequacy with values above the 0.6 threshold (Pallant, 2016; refer to Table 2). Thus, the factorability of the different factor matrices was confirmed.

The EFA analysis revealed eight motivational factors with loadings above 0.4. The items of the following each loaded onto a single factor: eudaimonia (8 items); hedonia (9 items); VRE benefits (8 items); and perceived price (2 items remaining after removal of one low-loading item). Perceived risk loaded onto two factors (one low-loading item removed). The first risk factor was perceived physical risk (4 items loaded as one factor). For the second risk factor, social and psychological risks formed one factor and were relabeled as psycho-social risk (6 items). The “new” perceived psycho-social risk factor contributes to the sport event context since VRE participants view these two risk types as similar—negative emotional experiences with regard to co-participation, whereas other contexts view them to be different. Event attributes were split into two factors (one low-loading item removed) and were relabeled as intangible event attributes (3 items: novelty, brand prestige, and well-established brand) and tangible event attributes (3 items: T-shirts, medal, and goodie bags).

### *Reliability and Validity*

As evident from Table 2, both the Cronbach’s Alpha values and the Guttman Split-Half coefficient value of the two-item scale were satisfactory (above 0.7; Hair et al., 2019; Benton, 2015). The composite reliability (CR) and the average variance extracted (AVE) values were calculated for convergent validity. The composite reliability (CR) values (calculated for 3-item scales or above) were all above 0.7 (Fornell & Larcker, 1981). All factors showed AVE values above the acceptable 0.5

**Table 1. Demographics and Running Behaviors**

Demographic profile (N=1017)		Running behavior	%
<b>Age (mean)</b>	43 (min=19; max=77)	<b>Running as a leisure activity</b>	
<b>Gender (%)</b>		Yes	92.13
Male	31.56	No	7.87
Female	68.04	<b>Participate as runners/walkers</b>	
Prefer not to say	0.40	Runner	76.89
<b>Casual/serious leisure participant (%)</b>		Walker	23.11
Casual	57.42	<b>Formal running club member</b>	
Serious	42.58	Yes	65.49
		No	34.51
		<b>Running frequency (per week)</b>	
		Once	11.41
		Twice	9.83
		Three times	20.16
		Four times	21.53
		Five times	22.62
		Six times	7.23
		Every day of the week	6.19
		<b>Preferred event distance (km)</b>	
		5km	17.60
		10km	22.82
		15km	5.90
		21.1km	29.50
		32km	0.20
		42.2km	20.16
		More than 42.2km	2.36
		Did not partake in running events prior to COVID-19	5.41

level (Hair et al., 2019) except for perceived physical risk (AVE=0.39). Nevertheless, this factor was retained for further analysis as the CR was above 0.6 and is acceptable in exploratory research (Hair et al., 2019).

### CHAID Analysis Results and Discussion

The model's performance is indicated by utilizing the risk estimate (within node variance) to calculate the proportion of variance explained by the model. To meaningfully interpret risk estimates with a scale-dependent variable, the total variance equals the within-node (error) variance plus the between-node (explained) variance. The proportion of variance explained by the model was 43%. Although this indicates only a moderate amount of variance explained, the analysis focused on understanding the relationships between the independent and dependent variables within the context of forming homogenous subgroups.

The research objective for this study is to segment the market for VRE participation intentions using a CHAID technique as a more sophisticated but

underutilized segmentation technique in sport event studies. Figure 1 presents the results from the CHAID analysis where the decision-tree model formed 14 nodes, of which the ten terminal nodes represent distinct market segments (nodes are only considered a distinct segment at the final/terminal tree level).

#### Nodes Based on the Independent Variables

In Figure 1, Node 0 (i.e., the "trunk" of the tree) indicates the mean value (mean = 53.36) for the overall sample in terms of VRE participation. Four motivational factors, based on the values of the *F* statistic and corresponding *p*-values, were identified as significant predictors of VRE participation intentions, namely; hedonia, perceived psycho-social risk, perceived price, and VRE benefits. Hedonia was identified as the independent variable that best explained VRE participation intentions as indicated in the first layer of branches in the CHAID tree (*F*=117.796, *df*<sub>1</sub>=5, *df*<sub>2</sub>=1011, *p*=0.000). For hedonia, six parent nodes were identified that were homogenous within each node but

**Table 2. Results from EFA, Reliability and Validity**

Construct	Statements	Mean	Std Dev	Factor loading	Cronbach's Alpha ( $\alpha$ )	CR	AVE	KMO	Variance Explained (%)
<b>Hedonia</b>	<b>When I partake in VREs</b>	70.72	32.62	0.914	0.95	0.95	0.72	0.92	71.74
	...I enjoy the experience.								
	...I feel a sense of adventure.	65.54	34.23	0.917					
	...compared to other things I could have done, the time I spend partaking in these events, is truly enjoyable.	65.47	32.25	0.885					
	...I feel excited to be part of the experience.	65.38	33.39	0.936					
	...I am able to forget my problems.	65.24	33.76	0.826					
	...I enjoy being immersed in the experience.	62.44	33.02	0.925					
	<b>Participating in VRES</b>								
	... is a fun way of running.	61.48	35.42	0.833					
	...is a true joy.	56.39	37.05	0.867					
...feels like an escape.	56.22	36.61	0.835						
<b>Eudaimonia</b>	<b>When I partake in VREs</b>	58.22	33.90	0.821	0.97	0.97	0.78	0.94	77.97
	... I feel a special fit (or connectedness) with the activity of running.								
	...I feel more complete or fulfilled than when I partake in most other activities.	54.01	34.07	0.823					
	...I feel that running is what I was meant to do.	53.67	34.52	0.781					
	...I feel more intensely involved than when I engage in most other activities.	52.56	33.59	0.788					
	<b>Participating in VREs</b>								
	... gives me the greatest feeling of really being alive.	51.57	36.45	0.888					
	... is part of who I am.	48.28	36.33	0.904					
	...gives me my strongest sense that this is who I really am.	48.22	36.16	0.909					
	... is central to my identity.	42.53	34.05	0.852					
<b>Perceived physical risks</b>	Proper sanitation and hygiene in live sporting events are now more important than ever.	83.57	23.96	0.726	0.76	0.70	0.39	0.91	61.35
	The risk of infectious diseases could influence my decision to partake in VREs.	57.96	35.33	0.832					
	VREs are a safer option for me if I prefer to not be vaccinated.	49.49	38.10	0.409					
	I do not think that live running events can currently uphold the COVID-19 safety requirements.	46.23	34.25	0.435					
<b>Perceived psycho-social risk</b>	People who are important to me (friends, family, colleagues) would prefer me to partake in VREs (rather than live events) in the near future.	44.15	37.14	0.467	0.92	0.91	0.61	0.91	63.35
	People who are close to me would prefer me to participate in VREs (rather than live events) in the near future.	36.47	35.87	0.630					
	The thought of partaking in a live running event at present makes me feel uncomfortable.	34.27	34.37	0.825					
	The thought of partaking in live running events at present makes me worry.	33.95	34.28	0.827					
	The thought of partaking in live running events at present causes me to experience unnecessary tension.	31.28	33.54	0.904					
	I might be disappointed if I were to participate in a live running event, since the world has changed.	26.16	29.14	0.885					
	If I participate in live running events in the near future, it will negatively affect my image in society.	21.77	27.85	0.855					

**Table 2. Results from EFA, Reliability and Validity (Continued)**

Construct	Statements	Mean	Std Dev	Factor loading	Cronbach's Alpha ( $\alpha$ )	CR	AVE	KMO	Variance Explained (%)
<b>*Event Attributes (Intangible)</b>	The purpose of the VRE is to raise funds for a 'good cause'.	74.34	29.17	0.408	0.95	0.95	0.72	0.82	53.04
	The event brand has a favourable reputation.	63.90	32.49	0.932					
	The VRE offers a novel event experience.	60.06	31.69	0.629					
	The event brand should be well-established.	60.39	33.28	0.947					
<b>Tangible Attributes</b>	A free T-shirt is included in the entry fee.	70.76	33.65	0.988	0.97	0.97	0.78	0.82	53.04
	A goodie bag is included in the entry fee.	66.65	34.86	0.830					
	I receive a real (physical) medal.	66.09	36.37	0.533					
<b>**Perceived price</b>	I feel that VREs are too expensive.	58.32	33.35	0.919	^ 0.76	0.78	0.65	0.56	46.34
	I do not feel it is worth my while to pay for VREs where I need to create my own event experience.	52.16	35.14	0.673					
<b>VRE event benefits</b>	Convenience of choosing my own starting time of the race.	57.53	37.63	0.975	0.92	0.94	0.66	0.91	61.35
	A VRE saves me travelling and/or accommodation costs.	57.38	36.71	0.921					
	VREs are more affordable than live events.	56.03	36.34	0.728					
	I am able to choose my own route.	53.84	38.41	0.933					
	I have a friend(s) who will participate in the VRE with me.	51.45	37.90	0.612					
	I am concerned about contracting COVID-19 at live events.	42.93	37.21	0.781					
	I am afraid of spreading COVID-19 at live events.	41.44	36.73	0.922					
I prefer to run alone and I can do so during VREs.	37.77	35.71	0.528						

Note. VREs was written out in full as virtual running events.

^ Guttman Split-Half Coefficient

The following items did not load: \*"The purpose of the VRE is to raise funds to fight COVID-19"; \*\* "I cannot currently partake in any running events due to lack of finances because of COVID-19".

statistically significantly differ from the other nodes (refer to Figure 1). Nodes 1 to 3 were terminal nodes as no further subgroups emerged from these segments, while Nodes 4 to 6 split into further subgroups. The nodes below printed in *Italics* format represent all the terminal nodes (or final segments).

*Node 1* represented the lowest levels of hedonia (range  $\leq 13.111$ ). *Node 2* showed slightly higher levels of hedonia (range is between 13.111 and 31.111) and *Node 3* indicated yet higher levels of hedonia (range is between 31.111 and 50.000). *Node 6* showed the highest levels of hedonia overall (range  $> 85.556$ ) and split into two terminal nodes (Nodes 11 and 12) based on perceived psycho-social risk ( $F=32.362$ ,  $df_1=1$ ,  $df_2=302$ ,  $p=0.000$ ). In *Node 11*, lower levels of perceived risk from event participation were present (range  $\leq 72.667$ ), whereas in *Node 12* higher levels of perceived risk (range  $\geq 72.667$ ) were evident. *Node 5* showed the second highest level of hedonia (range is between 70.000 and 85.556) and split into two terminal nodes (Nodes 9 and 10) based on price perceptions ( $F=21.512$ ,  $df_1=1$ ,  $df_2=203$ ,  $p=0.000$ ). *Node 9* indicated a lower perceived price (range

$\leq 36.000$ ), whereas *Node 10* showed a higher perceived price (range  $> 36.000$ ). *Node 4* represented the third highest levels of hedonia (range between 50.000 and 70.000) and split into two subgroups, Nodes 7 and 8 ( $F=40.692$ ,  $df_1=1$ ,  $df_2=200$ ,  $p=0.000$ ). *Node 7* formed a terminal node showing lower perceived VRE benefits (range  $\leq 30.750$ ) and *Node 8* with higher perceived VRE benefits (range  $\geq 30.750$ ). However, *Node 8* further split into two subgroups which formed two terminal nodes; Nodes 13 and 14. In *Nodes 13 and 14*, perceived price ( $F=15.264$ ,  $df_1=1$ ,  $df_2=149$ ,  $p=0.001$ ) was the strongest predictor of VRE intention. *Node 13* showed a lower perceived price (range  $\leq 55.000$ ), while a greater perceived price (range  $\geq 55.000$ ) was evident in *Node 14*.

Table 3 provides an overview of the discussed spread of the CHAID decision-tree in the form of a gains table, sorted from the ten segments (terminal nodes in Figure 1) with the highest to lowest VRE participation intentions (based on the mean values of the segments). The first column in Table 3 indicates the order in which the segments are ranked based on the highest mean scores and intentions to partake in VREs.

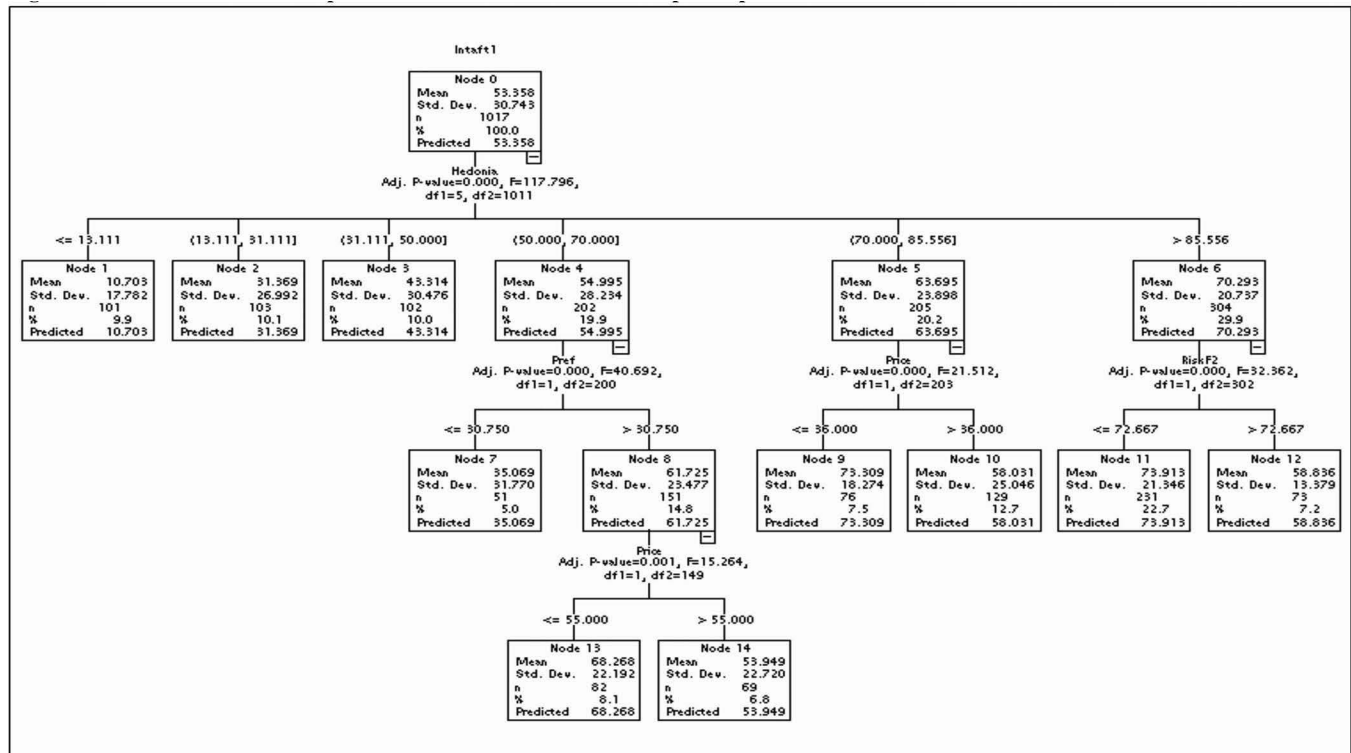


Figure 1. CHAID Tree with Independent Variables for Future VRE Participation Intentions

Table 3. Ranking of Segments Based on VRE Intentions and Predictor Variables

Rank (highest to lowest VRE intentions)	Mean Scores	Node (in CHAID)	Respondent Nr & %	Predictors of VRE intentions
Segment 1 (Node 11)	73.9134	11	231 (22.7%)	High hedonia (range above 85.556) Lower perceived risk of event participation (range $\leq 72.667$ )
Segment 2 (Node 9)	73.3092	9	76 (7.5%)	Moderately high hedonia (range 70.000–85.000) Low perceived VRE price (range $\leq 36.000$ )
Segment 3 (Node 13)	68.2683	13	82 (8.1%)	Moderate hedonia (range 50.000–70.000) Benefits of VREs are valued (range $> 30.750$ ) Low perceived VRE price (range $\leq 55.000$ )
Segment 4 (Node 12)	58.8356	12	73 (7.2%)	High hedonia (range $> 85.556$ ) Higher perceived risk of event participation (range $> 72.667$ )
Segment 5 (Node 10)	58.0310	10	129 (12.7%)	Moderately high hedonia (range 70.000–85.556) High perceived price (range $\leq 36.000$ )
Segment 6 (Node 14)	53.9493	14	69 (6.8%)	Moderate hedonia (range 50.000–70.000) Benefits of VREs are valued (range $> 30.750$ ) High perceived VRE price (range $> 55.000$ )
Segment 7 (Node 3)	43.3137	3	102 (10%)	Low hedonia (range 31.111–50.000)
Segment 8 (Node 7)	35.0686	7	51 (5%)	Moderately low hedonia (between 50.000–70.000) Benefits of VREs less valued (range $\leq 30.750$ )
Segment 9 (Node 2)	31.3689	2	103 (10.01%)	Low hedonia (range between 13.111–31.111)
Segment 10 (Node 1)	10.7030	1	101 (9.9%)	Lowest hedonia (range $\leq 13.111$ )

Note. Refer to Figure 1 for the Nodes in the decision-tree.

**Table 4. Segment Description Based on Predictors, Demographics and Running Behaviors**

Segments ranked from highest to lowest VRE intentions	Age* (avg)	Gender**		Leisure prior (%)		Runner/Walker (%)		Casual/Serious leisure (%)		Formal running club member (%)	
		Male	Female	Yes	No	Run	Walk	Cas	Ser	Yes	No
		<b>S1:</b> Virtual running enthusiasts	42.05	47	183	86.6	13.4	68.8	31.2	68.4	31.6
<b>S2:</b> Value-seeking virtual casual runners	40.76	11	65	84.2	15.8	61.8	38.2	73.7	26.3	38.2	61.8
<b>S3:</b> Virtual benefit-seeking value-conscious casuals	40.14	20	62	89.0	11.0	59.8	40.2	73.2	26.8	41.5	58.5
<b>S4:</b> High hedonic event risk navigators	41.91	20	52	89.0	11.0	63.0	37.0	68.5	31.5	57.5	42.5
<b>S5:</b> Hedonic price-sensitive runners	43.17	40	89	91.5	8.5	75.2	24.8	54.7	45.3	65.1	34.9
<b>S6:</b> Virtual benefit-seeking runners	42.53	27	42	98.6	1.4	81.2	18.8	55.1	44.9	69.6	30.4
<b>S7:</b> Low fun leisure contenders	43.37	35	65	96.1	3.9	85.3	14.7	43.1	56.9	79.4	20.6
<b>S8:</b> Low virtual benefit runners	42.80	21	30	96.1	3.9	92.2	7.8	52.9	47.1	82.4	17.6
<b>S9:</b> Low hedonic runners	45.53	49	54	99.0	1.0	92.2	7.8	44.7	55.3	90.3	9.7
<b>S10:</b> Low hedonic serious club runners	45.02	51	50	99.0	1.0	98.0	2.0	34.7	65.3	94.1	5.9

Note. Refer to Figure 1 for the Nodes in the decision-tree. \*Age represents average age within the node; \*\*Gender represents the number of males/females within the node.

**Table 5. Running Frequency (per week)**

Segments ranked from highest to lowest VRE intentions	Once (%)	Twice (%)	Three (%)	Four (%)	Five (%)	Six (%)	Everyday (%)
<b>S1:</b> Virtual running enthusiasts	16.5	11.3	22.9	14.3	19.5	6.9	8.7
<b>S2:</b> Value-seeking virtual casual runners	22.4	14.5	18.4	13.2	13.2	5.3	13.2
<b>S3:</b> Virtual benefit-seeking value-conscious casuals	20.7	15.9	25.6	17.1	11.0	1.2	8.5
<b>S4:</b> High hedonic event risk navigators	13.7	13.7	24.7	12.3	19.2	6.8	9.6
<b>S5:</b> Hedonic price-sensitive runners	16.3	6.2	17.1	31.0	17.1	7.8	4.7
<b>S6:</b> Virtual benefit-seeking runners	5.8	10.1	20.3	23.2	33.3	5.8	1.4
<b>S7:</b> Low fun leisure contenders	3.9	10.8	19.6	23.5	29.4	8.8	3.9
<b>S8:</b> Low virtual benefit runners	3.9	9.8	17.6	29.4	27.5	7.8	3.9
<b>S9:</b> Low hedonic runners	2.9	5.8	19.4	29.1	28.2	9.7	4.9
<b>S10:</b> Low hedonic serious club runners	0	3	13.9	28.7	33.7	19.8	1

Note. Refer to Figure 1 for the Nodes in the decision-tree.

### Describing the VRE Intention Segments

A key benefit of the CHAID technique is its ability to provide insight into more nuanced differences among segments. Each of the identified nodes was given a descriptive name to capture the characteristics of each market segment. These characteristics included demographics and running behaviors (refer to Table 4), running frequency per week (refer to Table 5), as well as preferred event distance in kilometers (refer to Table 6).

Segment 1: Virtual running enthusiasts. This segment was labeled as *virtual running enthusiasts* as they showed the strongest intention to partake in VREs in the future, probably because they perceive VRE participation to be low risk and fun (hedonia). A total of 13.4% did not run prior to COVID-19 (second highest of all segments). The segment has the second highest number of females

of all segments (79.5%). Even though two-thirds participate as runners (68.8%), this segment has more walkers (31.2%) compared to six other segments. They see themselves as casual runners (68.4%) with just over half (51.1%) belonging to a formal running club. Half of this segment runs between one and three times per week and prefers shorter event distances.

Segment 2: Value-seeking virtual casual runners. This segment was labeled as *value-seeking virtual casual runners* because they showed a high intention to partake in VREs in the future as casual runners, but at low event prices. This segment contains the largest number of participants (15.8%) who have not participated in running activities for leisure prior to COVID-19. This segment has the highest number of females (85%) and the highest number of casual runners (73.7%) who

**Table 6. Preferred Event Distance (km)**

Segment (High to low intentions)	5 km	10 km	15 km	21.1 km	32 km	42.2 km	> 42.2 km	No running prior to COVID
<b>S1:</b> Virtual running enthusiasts	11.3	22.9	14.3	19.5	6.9	8.7	2.6	9.1
<b>S2:</b> Value-seeking virtual casual runners	14.5	18.4	13.2	13.2	5.3	13.2	0	10.5
<b>S3:</b> Virtual benefit-seeking value-conscious casuals	15.9	25.6	17.1	11.0	1.2	8.5	0	6.1
<b>S4:</b> High hedonic event risk navigators	13.7	24.7	12.3	19.2	6.8	9.6	2.7	2.7
<b>S5:</b> Hedonic price-sensitive runners	6.2	17.1	31.0	17.1	7.8	4.7	0.8	7.8
<b>S6:</b> Virtual benefit-seeking runners	10.1	20.3	23.2	33.3	5.8	1.4	5.8	2.9
<b>S7:</b> Low fun leisure contenders	10.8	19.6	23.5	29.4	8.8	3.9	4.9	2.0
<b>S8:</b> Low virtual benefit runners	9.8	17.6	29.4	27.5	7.8	3.9	2.0	2.0
<b>S9:</b> Low hedonic runners	5.8	19.4	29.1	28.2	9.7	4.9	1.9	2.9
<b>S10:</b> Low hedonic serious club runners	0	3	13.9	28.7	33.7	19.8	3.0	1.0

Note. Refer to Figure 1 for the Nodes in the decision-tree.

prefer shorter distances. Another standout for this segment is that they have the highest number of individuals not belonging to a formal running club (61.8%).

Segment 3: Virtual benefit-seeking value-conscious casuals. This segment showed moderately high VRE participation intentions appreciating the benefits offered by a virtual event as well as the lower event prices; and was subsequently labeled as *virtual benefit-seeking value-conscious casuals*. This segment has the most walkers out of all the segments (40.2%) and is the second highest (73.2%) in terms of casual runners who prefer shorter distances. More than half (58.5%) do not belong to a formal running club with a quarter running at least three times per week.

Segment 4: High hedonic event risk navigators. This segment was labeled as the *high hedonic event risk navigators* because they showed high hedonia as well as a higher perceived risk from event participation. The segment comprises 72% female runners with 89% running prior to COVID-19. Two-thirds are casual runners with 57.5% belonging to a formal running club. A quarter prefer to run 10-kilometer distances as well as run at least three times per week.

Segment 5: Hedonic price-sensitive runners. Labeled as *hedonic price-sensitive runners*, this segment showed moderately high hedonia with high levels of event price sensitivity. Over 90% participated in running prior to COVID-19 and three-quarters consider themselves to be runners, rather than walkers. This segment is very balanced in terms of casual versus serious leisure runners (55% versus 45%), and 65% belong to a formal running club. Almost a third (31%) run at least four times per week as well as 15-kilometer distances (31%). The segment comprises of 68.9% females.

Segment 6: Virtual benefit-seeking runners. This segment was labeled as *virtual benefit-seeking runners* because they value the benefits offered by VREs

and will pay for these virtual events. This segment is very balanced in terms of casual versus serious leisure participants (55% versus 45%). Almost 70% belong to a formal running club and 80% participate as runners. Most of the participants were involved in running prior to COVID-19 (98.6%). At least a third run five times per week and prefer to run distances of 21 kilometers and more. The segment comprises 60.8% females.

Segment 7: Low fun leisure contenders. This segment showed relatively low VRE participation intentions with low hedonia and was subsequently labeled as *low fun leisure contenders*. This female segment (65% females) consists of 56.9% serious leisure runners—the second highest of all the segments. In this segment, 79.4% belong to a formal running club. Most consider themselves to be runners, even prior to COVID-19, with almost 30% running five times per week. Over half prefer distances of 15 and 21 kilometers.

Segment 8: Low virtual benefit runners. This segment was labeled as *low virtual benefit runners* because they are not motivated by the benefits offered by virtual events. They mainly participate as runners (second highest, 92.2%) as opposed to walkers, but are balanced in terms of casual versus serious leisure runners. They have been running prior to COVID-19 and 82.4% belong to a formal running club. With 58.8% females, this segment runs four to five times per week preferring distances of 15 and 21 kilometers.

Segment 9: Low hedonic runners. This segment showed low VRE participation intentions with low hedonia and was labeled *low hedonic runners*. The segment is very balanced in terms of gender with 52% females and 48% males. This segment includes mainly runners (92.2%) that have been running prior to COVID-19. With a high running club membership, this segment prefers running four to five times per week with 15 and 21 kilometers being their preferred distances.

Segment 10: Low hedonic serious club runners. This segment was labeled as *low hedonic serious club runners* because they are not motivated by hedonia at all, do not intend to partake in future VREs, and have the highest running club membership of all the segments (94.1%). This segment contains the highest number of runners (99%) and the highest number of serious leisure runners (65.3%). They mainly run four to five times per week and prefer longer distances ranging between 21.1 km and 42.2 km (82.2%). The segment is equally split in terms of gender.

## Implications of the Study

This study applied the CHAID technique to segment the future market for VREs based on intentions of VRE participants to do so again in the future. Although market segmentation is not a new topic of investigation in sport research, the sophisticated CHAID technique applied in this study presented valuable detailed insights to assist strategic decision-making. The CHAID technique identified ten distinct market segments of which six segments can be considered viable future VRE segments. In addition to the novel insights provided by CHAID, the study also makes a theoretical contribution by identifying four significant predictors of VRE participation, namely; hedonia, psycho-social risk, perceived price, and VRE benefits. By understanding the importance of these predictors relative to other individual characteristics, event organizers and marketers can tailor their strategies to target specific segments more effectively (Helsen et al., 2022; Thibaut et al., 2022). The practical implications of the respective segments are discussed below.

The largest and most lucrative market segment for VREs is segment 1, the *virtual running enthusiasts*, and comprises the largest segment of the sample (22.7%). This segment sees VREs as low risk events, making it easy for marketers to create VRE experiences for this segment. Segment 1, together with segment 4 (*hedonic event risk navigators*) indicate that short-term, pleasure-based happiness are distinguishing drivers of their VRE participation. Initiatives for these two segments can include online platforms with visually appealing interfaces, interactive features, and entertaining content (such as music or virtual cheering sections). Other options include, for example, offering hedonistic incentives such as virtual badges; facilitating opportunities for participants to connect with like-minded individuals who share their pursuit of pleasure in running; and encouraging participants to share their experiences online (Wirtz et al., 2021). In addition, marketers need to find ways to lower the perceived psycho-social risk experienced for segment 4, the *high hedonic event risk*

*navigators*. This includes *psychological risk* (experiencing discomfort, worry, and unnecessary tension) and *social risk* (negative perceptions of the individual held by closely related people), as supported by previous research (Madininos et al., 2021; Matiza & Kruger, 2021). This finding suggests to event marketers that the *hedonic event risk navigators* may prefer to have more control over the people they want to run with and, in so doing, create a better social experience for themselves (Deng & Ritchie, 2018; Fuchs & Reichel, 2006). Such co-creation through socialization has proven to add value to virtual event experiences (Waśkowski & Jasiulewicz, 2022). Marketers could also build trust and confidence among participants by fostering a sense of belonging through creating forums or platforms where participants can connect, share experiences, and provide mutual encouragement. These social-contextual elements are essential when participants decide to invest their personal resources into VREs.

Another two lucrative VRE segments are the *value-seeking virtual casual runners* (segment 2) and the *virtual benefit-seeking value-conscious casuals* (segment 3). Both these segments indicate high levels of future VRE participation, moderate hedonia and lower perceived VRE prices. For segment 2, marketers should focus on the affordability of VREs as this is a main driver for this segment. Marketers must develop a clear value proposition and communicate the value participants receive for the price paid. For segment 3, the benefits of VREs must be emphasized as they speak to the time, resources, and energy that are valued by this segment. Event organizers can, for example, highlight the convenience (flexibility) of choosing one's own starting time and route. Marketing efforts can also be directed across a broader geographical base by eliminating costs like travel expenses. Individual benefits, such as running alone or with selected people, can be enhanced by allowing these runners to personalize their VREs using technology.

Segment 5 (*hedonic price-sensitive runners*) and segment 6 (*virtual benefit-seeking runners*) are also segments that can be targeted for VREs. Both these segments show moderate VRE participation intentions with segment 6 seeing VREs as moderate in terms of fun and pleasure (hedonia), and segment 5 considering VREs as high in fun and pleasure (hedonia). Unfortunately, both these segments view the perceived price of VREs as too high. If runners have poor perceptions of the pricing efforts of sport event organizations (making it too expensive) or perceive these events as low value for money (having to create one's own event experiences is not worth paying for; Woyo & Nyamandi, 2021), these two segments will be more likely to regard VREs

as add-ons to live events. To ensure future participation from these two segments, marketers must develop and communicate a clear value proposition of the VREs, and emphasize the fun element for the *hedonic price-sensitive runners* through perhaps interactive features and virtual badges as hedonistic incentives.

The last four segments, segments 7, 8, 9 and 10, are not considered lucrative market segments for VREs. These segments show low intentions to participate in future VREs. The main reasons include that they do not experience the fun and pleasure (hedonia) from these virtual events, with segment 8 (*low virtual benefit runners*) showing no value from the convenience, cost and individual benefits offered by VREs. Instead of trying to create hedonistic incentives or opportunities for these segments, marketers should focus on traditional (live) running events for these runners. This is especially true for the *low hedonic serious club runners* (segment 10) who have the highest percentage of running club membership and consider themselves to be serious leisure runners that prefer long-distance running. These segments align with research conducted among marathon runners during COVID-19 where runners indicated that they would rather wait until it is safe to partake in live races again, as it is impossible to replicate a live event experience in a virtual setting (Woyo & Nyamandi, 2021; Helsen et al., 2022).

In summary, it is clear from this study that different segments have varying motivations to make a personal investment in VREs, and that event organizers need to understand the characteristics that define the members of these distinct, viable VRE segments. This CHAID analysis demonstrated its ability to offer a wider scope of distinct potential markets, thereby including segments that may have been overlooked in segmentation techniques that only allow for a limited number of independent and/or dependent variables. In this study, the CHAID technique uncovered that not all factors play an equal role (or role at all) in the different VRE segments. For example, the fact that virtual event benefits and prices did not feature among serious runners alludes to these runners' higher levels of personal investment required to gain meaningfulness from running events (King et al., 2019). The CHAID technique thus allows researchers to build segment profiles based on more complex relationships between variables, and could therefore effectively explain how a diverse set of characteristics interact in unexpected ways to facilitate the intention to partake in VREs (Becerra et al., 2024; Chang et al., 2023; Orme, 2000). In this study, CHAID uncovered two main considerations when segmenting for VREs. First, creating VREs around fun and low risk experiences that offer benefits due to the virtual nature;

and second, creating traditional running events for the serious leisure runners who derive happiness from traditional running experiences and who do not mind paying for these experiences. Event organizers could consider including a virtual option in addition to their live running events, which could aid in expanding the market reach, potentially leading to increased exposure and revenue.

## Limitations and Future Research

As with all studies, this research is not without limitations. Most behavioral research only considers intentions. Though effort was made to address this limitation by only including individuals who have participated in VREs (displayed the behavior), future studies will benefit from follow-up studies to measure actual uptake (Chang et al., 2023). Ethical issues around permission to contact the same individuals for a repeat study will have to be established. To the contrary, findings also revealed that some VRE participants did not partake in running events prior to COVID-19. Future research could explore whether these individuals have become participants in live running events post-COVID-19 and whether VREs formed part of this decision. Participation behavior can be investigated in formats other than self-reporting, such as secondary registration data (Chang et al., 2023; Finnegan et al., 2020; Kemper & Breuer, 2015), or through quasi-experimental studies, for example, giving away discounts on future races and measuring the uptake.

This study was limited to running events and other types of participatory sporting events, such as virtual cycling or triathlon events, could be investigated. This study is also limited to the type of VREs where participants create their own event experience (time, place, company). Future research could explore whether the same motivational drivers hold in VREs that make use of apps, such as Zwift or MyTrace, where the environment is simulated. To gain a deeper understanding of VRE experiences, different research methodologies can be employed to measure behavior. In the case of simulated events, quantitative experimental designs can be carried out by, for example, using technologies like motion capture or wearable sensors to analyze participants' running forms and biomechanics. For non-simulated events, participants can capture their experiences through various means such as photos, video recordings, and GoPros, offering rich qualitative data. Other motivational factors can also be considered in future research, for example, VREs as a solution to performance anxiety related to live events, socio-cultural elements, and technology usage profiles. Lastly, a non-probability convenience sampling technique was

used, which limits the generalizability of the results. More specifically, gender representation is a significant consideration. Throughout the sports fraternity, the debate continues around male domination in sport (Newland et al., 2020; Wear et al., 2022). However, as indicated by studies cited in this article, COVID-19 has altered sport participation behavior. Greater insight into female runners' behavior could promote the cause for gender equality in the changed post-COVID-19 sport landscape.

By leveraging CHAID as a segmentation tool, sport marketing research can be advanced since it allows marketers to understand different combinations of preferences, motivations, and engagement, and therefore provides actionable insights into sport behavior. Future sport studies could consider using CHAID in combination with other regression analyses, such as Bayesian linear regression, that can identify more detailed individual-level heterogeneity (Orme, 2000). CHAID can also be used as a first step in quasi-experimental methods such as discrete choice, contingent valuation or conjoint analysis to identify the most preferred sport service offerings across newly identified market segments. Finally, future studies should consider alternative measures for perceived physical risk considering the low AVE value reported in this study.

## Conclusion

This study makes a methodological contribution by employing a CHAID analysis to better understand the potential market segments for VREs. It identified ten market segments, which were formed from four significant distinguishing motivational factors for future VRE participation intentions (based on previous VRE participation). This data-driven technique contributed to a more insightful understanding of the runner in the virtual running context and enables marketers to make more informed decisions, allocate resources effectively, and tailor strategies to specific segments based on their willingness to invest personally in event participation. The segment-level data uncovered by CHAID proves to be valuable for not only marketing, but also event planning, public health initiatives, and product development within the running industry. As sport marketers and participants recognize the benefits virtual events can provide, the findings of this study suggest that these virtual offerings should not be ignored as several VRE segments exist. In applying sophisticated segmentation techniques such as CHAID, novel insights can be gained into, not only existing segments, but can also help to uncover new, lucrative future markets.

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