



# Meta-Analysis in Marketing: A Brief Introduction and an Illustrative Example

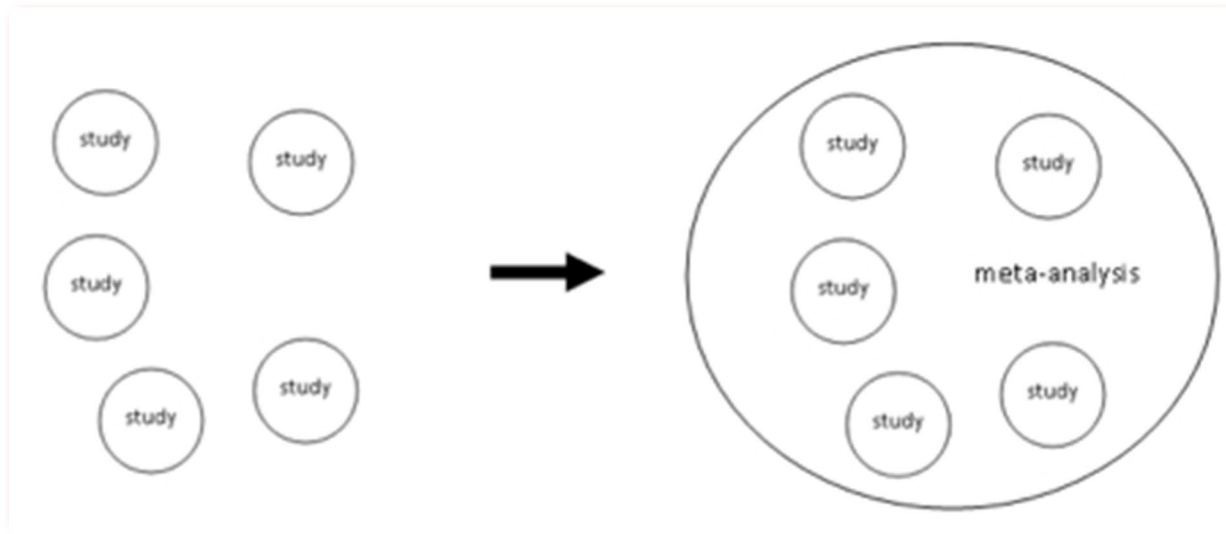
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# Meta-Analysis

- › Meta-analysis = Set of methodological tools to make generalizations based on published (better: existing) empirical research results through quantitative integration and comparison of these findings.





## Why conduct a meta-analysis?!

- › Great as ‘first’ project of a PhD process! One has to study the literature anyhow...
- › More objective than a narrative literature review.
- › Conclusions based on more data -> Larger precision -> larger statistical power.
- › Results can go beyond the existing empirical findings.
- › State-of-art overview used by other scientists, PhD students, policy makers, managers, etc.
- › Meta-analysis papers are often highly cited.



## Impact of meta-analyses (Eisend & Lehmann, 2015)

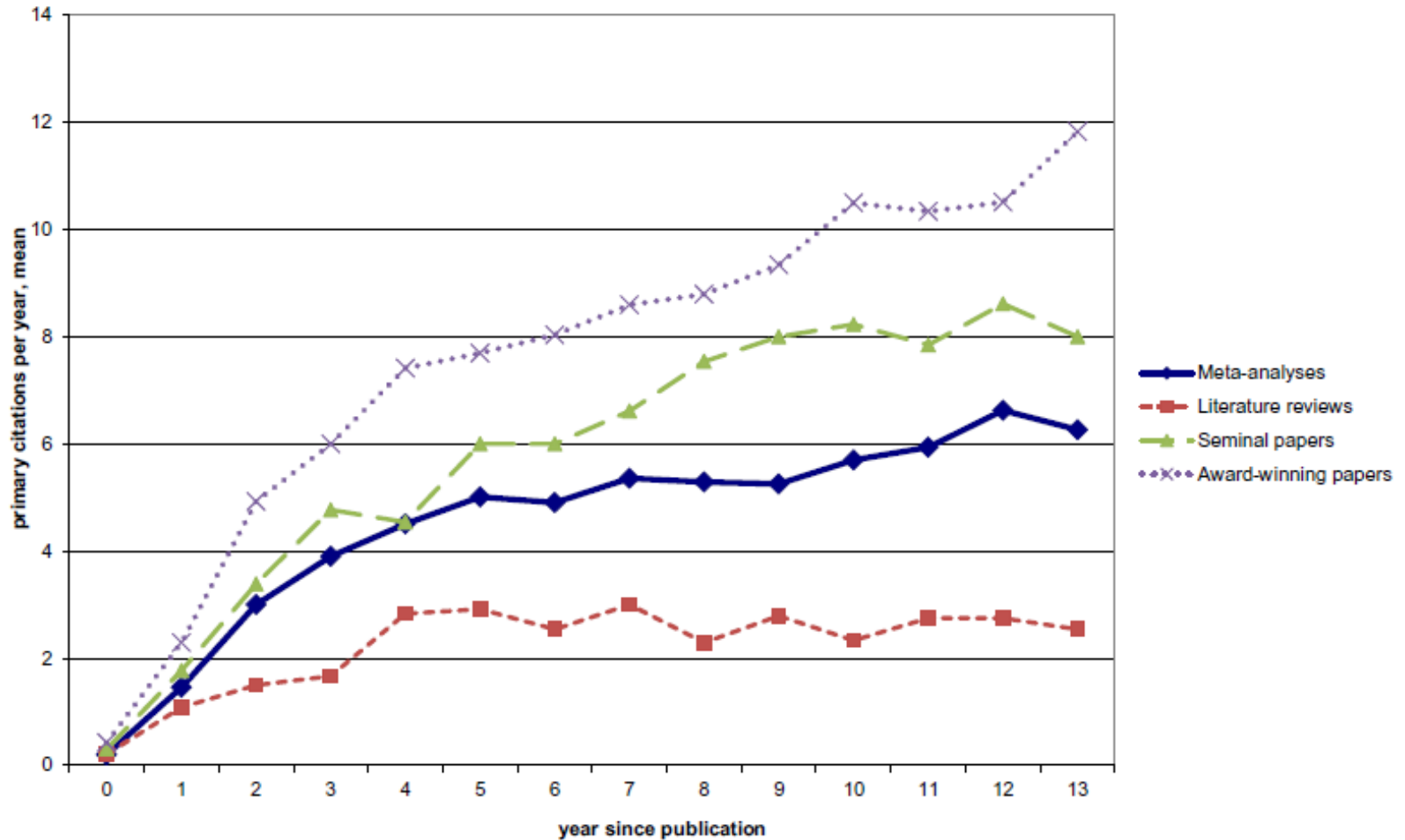


Fig. 1 Average number of primary citations to each type of influential paper within 14 years after publication



## Three general purposes of meta-analysis:

- A. Determine overall size of an effect
  - Size of price elasticity (Bijmolt, Van Heerde and Pieters, 2005)
- B. Determine effect of moderators
  - Elasticity is higher for certain markets, products, models, brands,...
- C. Testing of entire conceptual/theoretical models (mediators; model-based meta-analysis; Structural Equation Models: meta-sem)
  - Relation between price, advertising, distribution and sales

Often combined in a single Meta-analysis paper



## Limitations of Meta-Analysis

- › More time & effort needed than for some other research approaches.
- › Less objective than it might seem: Numerous “small” decisions, which may add up to considerable variability in outcomes.
- › Outcomes depend on the quality of the search & coding.
- › Entire process depends on the availability and quality of existing empirical research.





## Suitable for a meta-analysis...?

- › Issues to look for:
  - Sufficient body of literature? What is “sufficient”?
- › Sample size requirements: How many studies are needed to conduct a meta-analysis? Statistical power depends on:
  - ✓ Type of MA and goal of the MA:
    - Sample size needed for meta-SEM (3) > for meta-regression, moderators (2) > determining the overall effect size (1)
  - ✓ Number of effect sizes per study
  - ✓ Sample size of the original studies (number of cases)
  - ✓ The heterogeneity between the effect sizes
  - ✓ The average effect size
- › So, no quick-and-easy answer



## Suitable for a meta-analysis...?

- › Issues to look for:
  - Sufficient body of literature?
  - Contradictory findings? Debate? Potential factors (moderators) that might explain the differences between findings (partly)?
  - Unclear findings, scattered in the literature, across various disciplines (marketing, economics, strategy, finance, e-commerce, etc.)?
  - Levels of moderator variables that have not been studied or cannot be assessed in one study.
  - No (recent) MA. Updating an “old” MA could be a good strategy.






# Meta-analytic research process

1. Determining the research proposition
2. Data collection
  - a) Collection of studies
  - b) Development of coding questionnaire
  - c) Coding of studies
  - d) Assessing quality of the coding
3. Data analysis
  - a) Computation of effect sizes
  - b) Dealing with publication bias
  - c) Examining homogeneity
  - d) Moderator analysis, meta-regression
4. Formulating conclusions and directions for further research
5. Reporting the findings



# A Meta-Analysis of Brand Extension Success: The Effects of Parent Brand Equity and Extension Fit

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## Definition of a brand extension:

- › The use of an existing brand name for new products within or beyond the parent brand's original product category.
  - Line extension
  - Category extension



## Colgate with Hemp Seed Oil

Colgate-Palmolive extended their line of toothpastes with one that has hemp seed oil.



university of  
groningen

Original product category:

**Magazines**



**Magazine products:**

Cosmopolitan, Cosmo Girl

Destination product category:

**Single Serving Yogurt**



**Yogurt product:**

Cosmo Yogurts



## Brand extensions in practice

- › New product introduction using an existing brand name can reduce new product introduction costs, lower the risk of failure, and increase profits for firms.
- › Almost 70% of new products are brand extensions.
- › Only 30% of all brand extensions in the U.S. survive first two years, a success rate similar to new brands.
- › What are the drivers of brand extension success?





Dominant drivers (both theoretically and empirically):

➤ **Parent brand equity**

How “strong” is the brand?

➤ **Extension fit**

How well do the extension and the original product match?



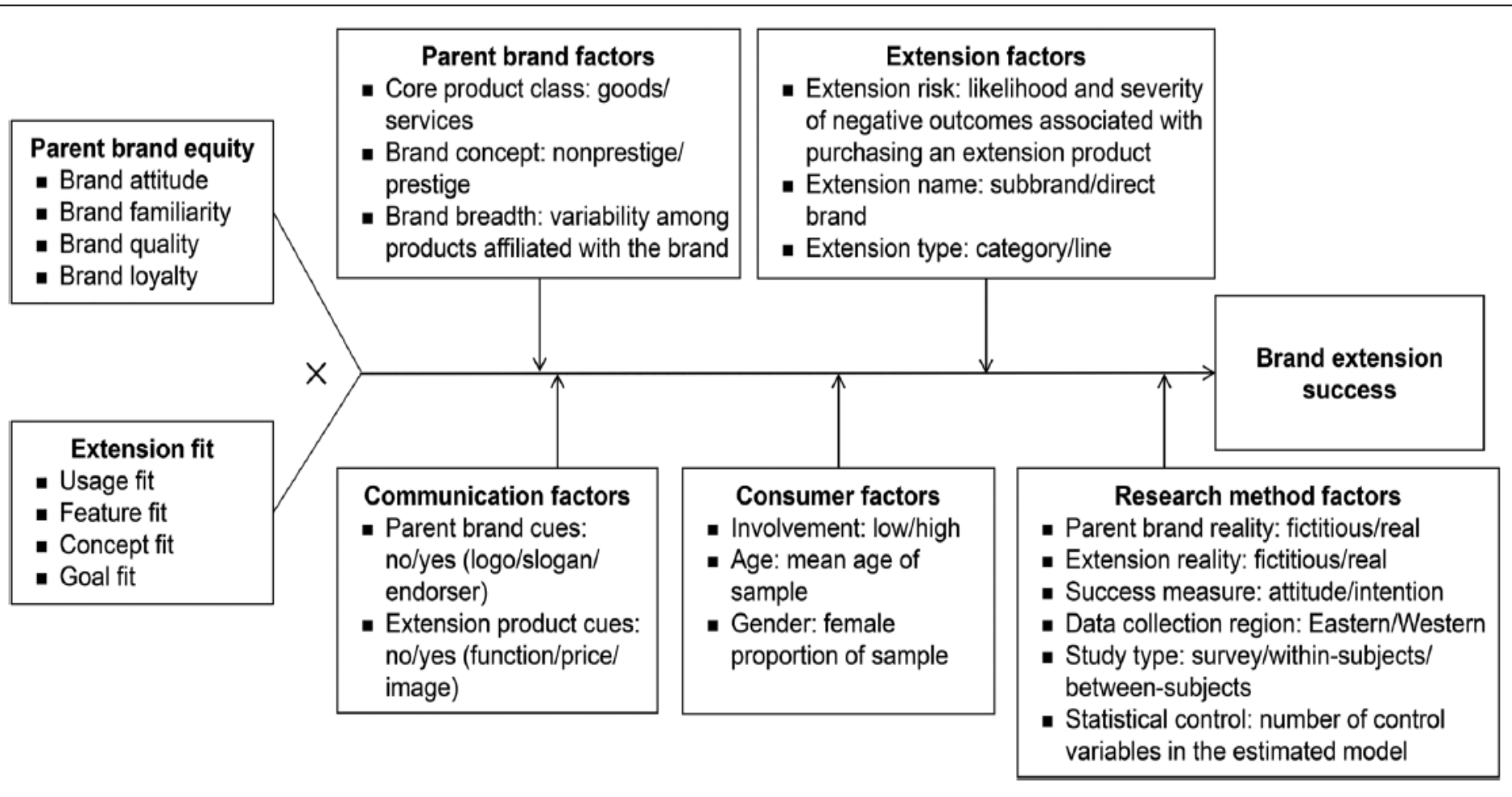
## Research project...?!

- › More than 150 empirical studies on drivers of brand extension success over the past 30 years.
- › Suitable for a meta-analysis!





## Conceptual Framework of the Meta-Analysis





## Parent Brand Equity, Extension Fit, and Their Dimensions

Construct	Definition	Common Aliases
<b>Parent Brand Equity</b>	Incremental value added to a product by its brand name, which consists of the following four dimensions (Aaker 1991; Aaker 1996; Aaker and Jacobson 2001; Keller 1993; Yoo, Donthu, and Lee 2000).	
Brand attitude	Overall evaluation of a parent brand.	Brand evaluation, brand strength, brand reputation
Brand familiarity	Consumers' ability to identify the brand in terms of brand recall and brand recognition.	Brand knowledge, brand awareness
Brand quality	Performance-related values of a parent brand's offerings.	Functional value
Brand loyalty	Consumers' devotion to a parent brand's offerings.	—
<b>Extension Fit</b>	Perceived similarity between a parent brand and an extension product, which consists of the following four dimensions (Martin and Stewart 2001; Martin, Stewart, and Matta 2005).	
Usage fit	Shared product usage contexts.	Complementarity, substitutability
Goal fit	Shared associations organized around common goals.	—
Feature fit	Shared tangible product characteristics.	Transferability
Concept fit	Shared abstract brand images.	Image fit, association fit



# Literature search

Different search methods:

1. Electronic databases—namely, Web of Science, Business Source Premier, ScienceDirect, Sage, Springer, ABI/INFORM, ProQuest Dissertations & Theses, and Google Scholar.
  2. Relevant leading journals issue by issue.
  3. References of review papers on drivers of brand extension success (Czellar 2003; Sattler et al. 2010; Völckner and Sattler 2006).
  4. References of the papers found in the previous steps.
- The search procedure ended in April 2020.



## Inclusion and exclusion criteria

1. Paper had to report one or more effect sizes for the relationship between parent brand equity and/or extension fit and brand extension success or the information needed to compute the effect size.
2. Paper had to provide sufficient details on the research design, including details on the parent brand(s) and corresponding extension product(s).
3. Study needed to examine a branding strategy for new products in line with the definition of brand extensions used in this meta-analysis. For example, we excluded related but different branding strategies, such as brand licensing.



# Database of the meta-analysis

- › 124 papers
- › 147 samples/studies
- › 2134 effect sizes
  - 708 for parent brand equity
  - 1426 for extension fit
- › 43,849 cases
- › 1990-2020
  
- › Effect size measure: Correlations
- › Long list of potential moderators



## Coding of studies

- › Large proportion of the research effort & time!
- › Increase “objectivity” and reduce errors by using multiple coders (often two or three), preferably also non-authors (not informed on the hypotheses).

Procedure:

- 1) Start with sample of studies (e.g. 10) to be coded by all judges.
- 2) Compute inter-judge agreement statistics. Discuss sample (disagreements, correspondence, etc.) with all judges and the authors. Solve discrepancies and reach agreement. Next, adjust the coding sheet if required.
- 3) If needed, repeat steps 1 and 2 with a new sample of studies.
- 4) Finally, remainder of studies coded by single judges.



## Publication bias

- › Publication bias or selection bias or “File drawer” problem
- › Often mentioned as criticism against meta-analysis.
- › Tendency of certain findings (not) to be published; due to the analysis, writing and review process (by the authors, reviewers, and editor).
- › In particular, lower probability to get published for:
  - Non-significant results
  - Non-standard, counter intuitive, non - ‘main stream’ results (or the opposite...?)
- › Problem for any review of the literature, or even scientific publications in general. MA allows to identify and/or accommodate publication bias.



## Approaches

1. Find grey literature = non-published results like proceedings, dissertations, and working papers. Include them in the MA study and assess moderator effect of published versus non-published. (best; always do this (also))
2. File-drawer test.
3. Funnel plot, plus tests
4. Regress effect size on precision (or, s.e., sample size,...); include as a moderator





**Table 4.** Meta-Analytic Descriptive Statistics (Including Average Effect Sizes).

Drivers	Number of Papers	Number of Samples	Number of Effect Sizes	Number of Respondents	Average Effect Size	95% Confidence Interval	Q-Value	Fail-Safe N
Parent brand equity	76	81	708	28,860	.326***	(.271, .379)	14,695.2***	3,553,252
Brand attitude	36	39	404	17,461	.404***	(.323, .480)	11,166.6***	1,286,001
Brand familiarity	7	8	22	1,675	.092	(-.215, .382)	352.6***	— <sup>a</sup>
Brand quality	41	43	237	12,288	.295***	(.248, .340)	2,439.2***	385,460
Brand loyalty	9	9	26	2,044	.351***	(.231, .461)	305.5***	6,669
Mixed brand equity	4	4	19	1,289	.335 <sup>†</sup>	(-.022, .616)	213.9***	314
Extension fit	112	133	1,426	41,140	.352***	(.308, .394)	39,617.8***	17,198,942
Usage fit	14	14	140	3,021	.260***	(.228, .291)	3,096.2***	238,200
Feature fit	23	24	184	7,007	.323***	(.244, .397)	2,311.9***	215,030
Concept fit	13	15	140	3,447	.391***	(.268, .501)	6,069.9***	237,188
Mixed fit	88	107	962	34,344	.361***	(.309, .412)	25,749.8***	7,332,621

<sup>†</sup> $p < .1$ .

\* $p < .05$ .

\*\* $p < .01$ .

\*\*\* $p < .001$  (based on two-sided tests).

<sup>a</sup>Because brand familiarity is not significant, its fail-safe number is not applicable.



## Moderator analysis using Meta-Regression

- › Impact of moderators on the effect of the driver of brand extension success
- › When is the effect of Parent brand equity (Extension fit) larger or smaller?
- › Moderators? Looks like a model with main effects, but note that Y is an effect size itself; so X is a moderator.
- › Software:
  - Comprehensive Meta-Analysis (CMA)
  - metafor package in R



## Meta-Regression: Multi-level model (HLM)

- › Accounts for the nested data structure:
  - effect sizes (i) from the same study (j) are not independent observations.
- › Moderator variables and error term both at the effect size level and study level
- › Accounts for known variance of the observed effect sizes

$$Y_{ij}^m = \beta_0^m + \sum_{k=1}^{K^m} \beta_k^m X_{k,ij}^m + \mu_j^m + \varepsilon_{ij}^m + v_{ij}^m,$$

- › Error terms assumed to follow Normal distributions.

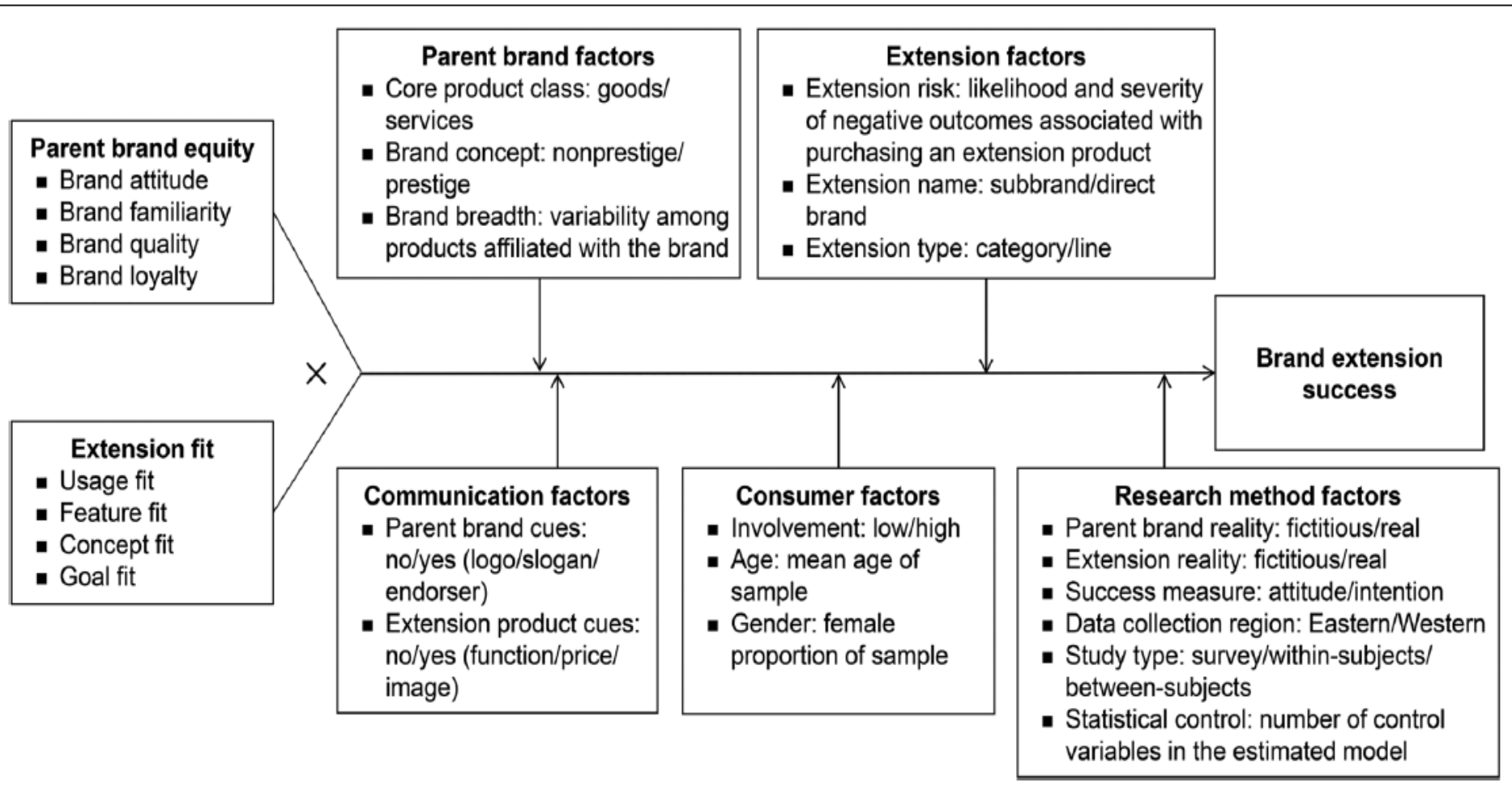


## Moderators:

- ❑ Dimensions of Parent brand equity and Extension fit
- ❑ Interaction between Parent brand equity and Extension fit
- ❑ Factors related to:
  - › Parent Brand
  - › Brand extension
  - › Communication
  - › Consumer
  - › Research methodology
- ❑ See Conceptual Framework



## Conceptual Framework of the Meta-Analysis





## Results of the Meta-Regressions Explaining the Effects of Parent Brand Equity and Extension Fit on Brand Extension Success

Variable	PB Equity–BE Success Relationship Model		Extension Fit–BE Success Relationship Model	
	Estimate	SE	Estimate	SE
Intercept	.445**	.155	.523***	.074
<b>PB Equity/Extension Fit Dimensions</b>				
PB equity dummies (mixed brand equity serves as the reference group)				
- Brand attitude	.040	.097		
- Brand familiarity	-.153	.108		
- Brand quality	-.002	.097		
- Brand loyalty	.003	.101		
Extension fit dummies (mixed fit serves as the reference group)				
- Usage fit			-.114*	.048
- Goal fit			.214†	.123
- Feature fit			-.038	.045
- Concept fit			-.012	.045
<b>Interaction between PB Equity and Extension Fit</b>				
PB equity <sup>a</sup>			.049***	.011
Extension fit <sup>a</sup>	.062***	.012		
<b>Moderating Parent Brand, Extension, Communication, Consumer, and Research Method Factors</b>				
	...	...	...	...



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# Conclusions

**Table 6.** Summary of Key Findings.

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## **A: Main Effects of PB Equity and Extension Fit on BE Success**

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- PB equity (.326) and extension fit (.352) have medium positive effects.
  - The effect of extension fit is statistically significantly larger than the effect of PB equity.
  - Differential effects of the PB equity dimensions: brand quality (.295), brand loyalty (.351), and brand attitude (.404) have similar (small to medium) effects, while brand familiarity (.092) has the weakest (nonsignificant) effect.
  - Differential effects of the fit dimensions: usage fit (.260) has the weakest effect, while concept fit (.391) and feature fit (.323) have similar medium effects.
- 

## **B: Interaction Effects of PB Equity and Extension Fit on BE Success**

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- Positive interaction effect between PB equity and extension fit: for PB equity, a small effect (.245) when extension fit is low and a medium effect (.428) when extension fit is high; for extension fit, a small effect (.273) when PB equity is low and a medium effect (.398) when PB equity is high.
  - PB equity dimensions: brand attitude, brand quality, and brand loyalty have similar interaction effects with extension fit, while brand familiarity has a lower interaction effect with extension fit than the other dimensions.
  - Extension fit dimensions: usage fit, feature fit, and concept fit have similar interaction effects with PB equity.
- 

## **C: Moderating Effects of Contextual Factors and Research Method Factors<sup>a</sup>**

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**PB Factors**

**Extension Factors**

**Communication Factors**

**Consumer Factors**

**Research Method Factors**

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# Developments in Meta-Analysis

- › Gradual improvement of the methodological toolkit
- › Push towards more theory-driven MA (hypotheses, etc.)
- › Meta-SEM
- › Tools for coding (AI?)
- › ...



**THANK YOU**  
for your  
**ATTENTION!**

More on Meta-Analysis:  
Multi-day Workshop  
within ProDok, Germany;  
Spring 2024 in Italy